No. 622,718.

Patented Apr. 11, 1899.

E. SEYMOUR.

ROTARY ENGINE.

(Application filed Sept. 15, 1898.)

(No Model.)

3 Sheets—Sheet 1.

FIG. 1.

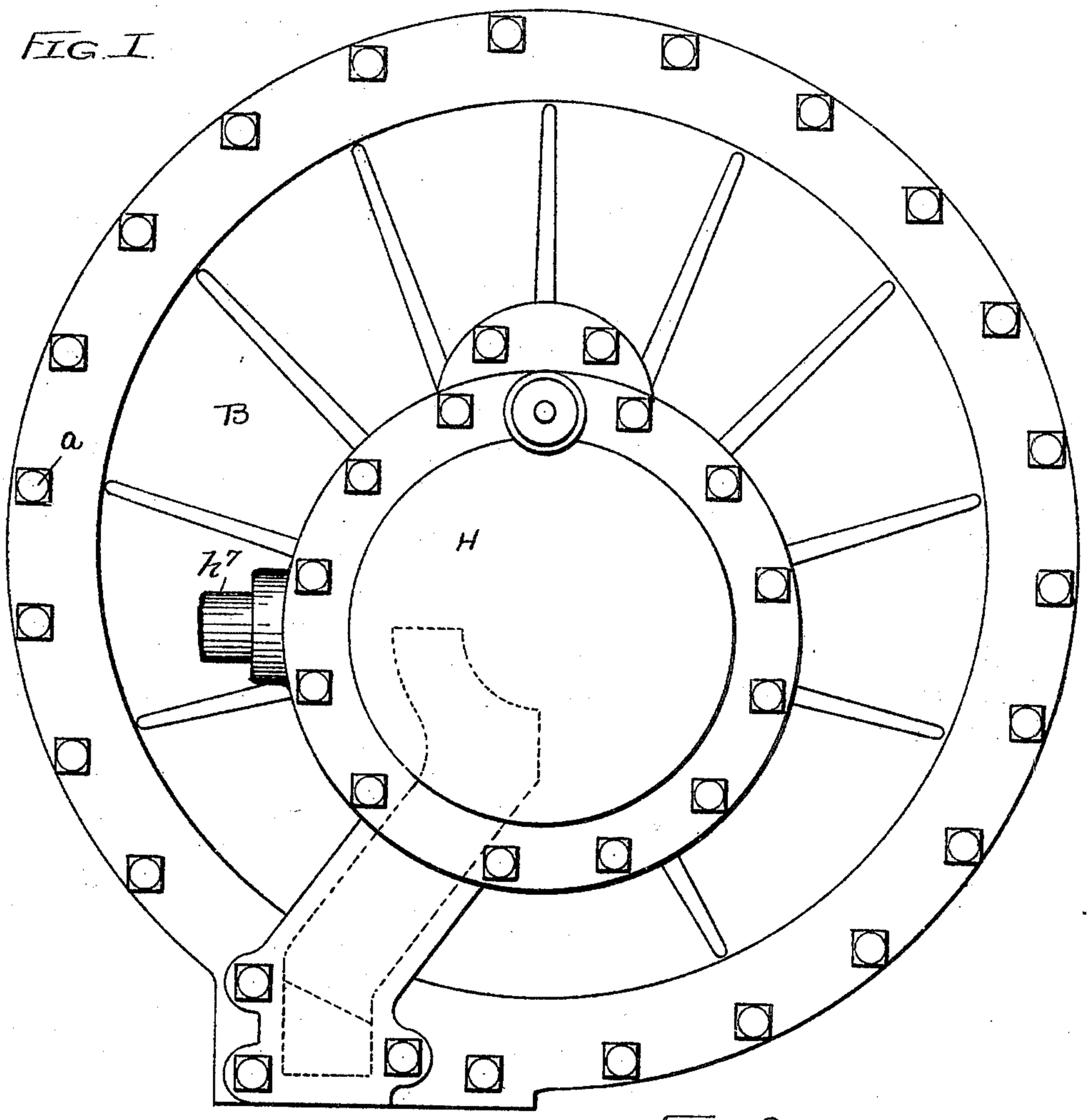

FIG. 6.

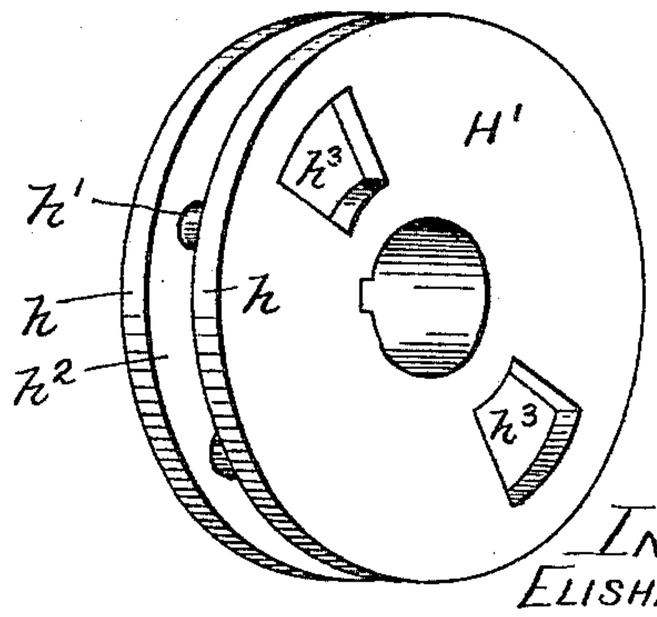

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FIG. 2

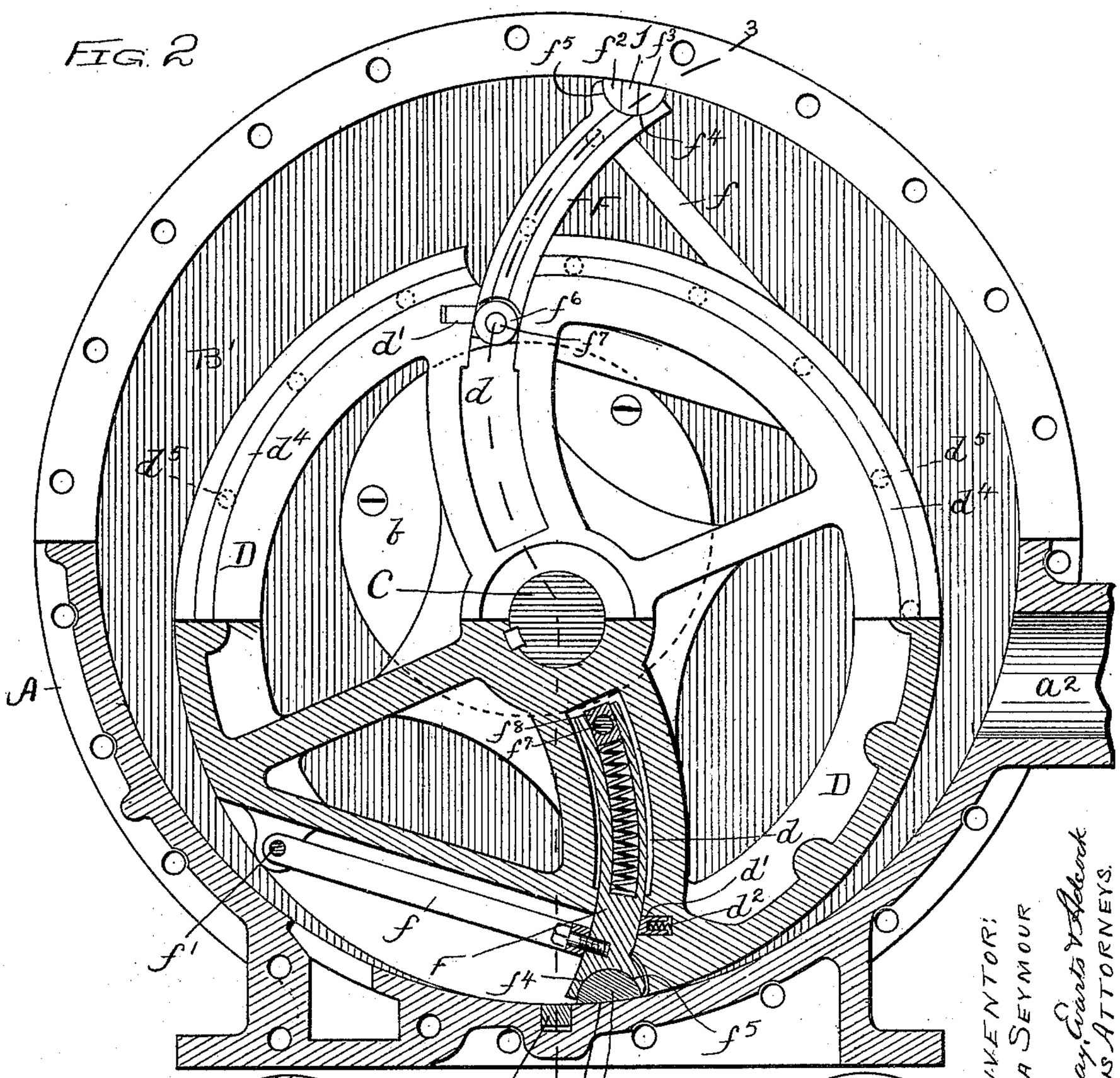


FIG. 4.

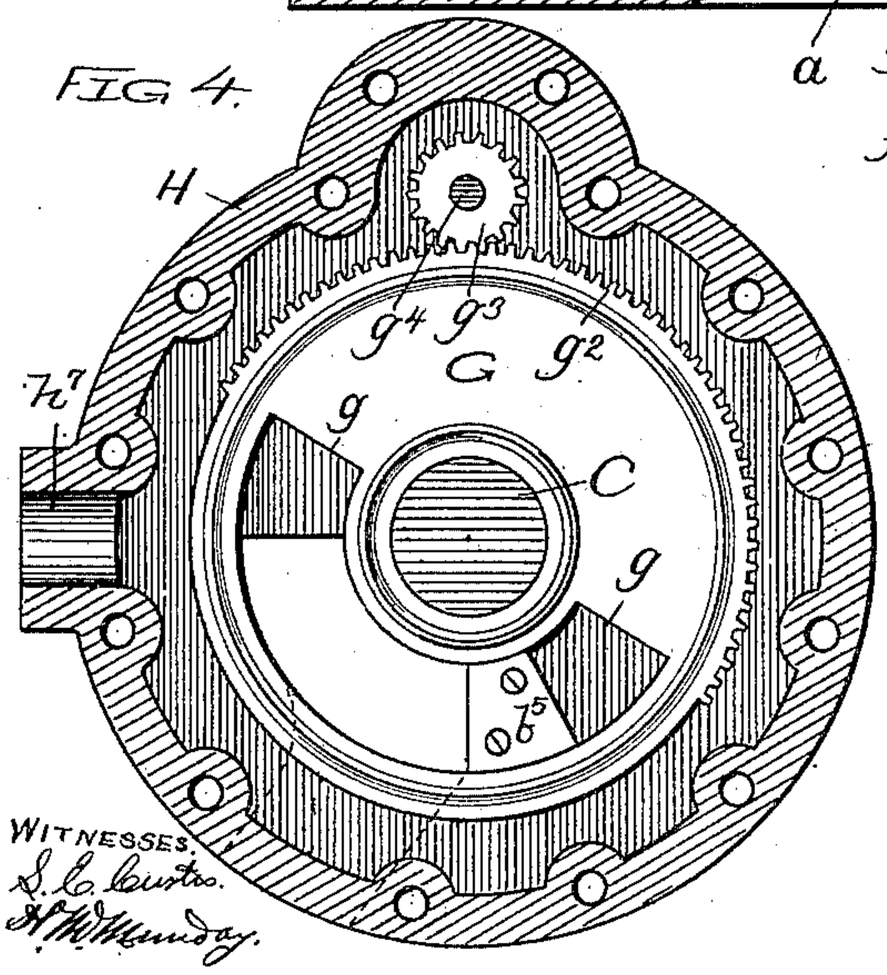
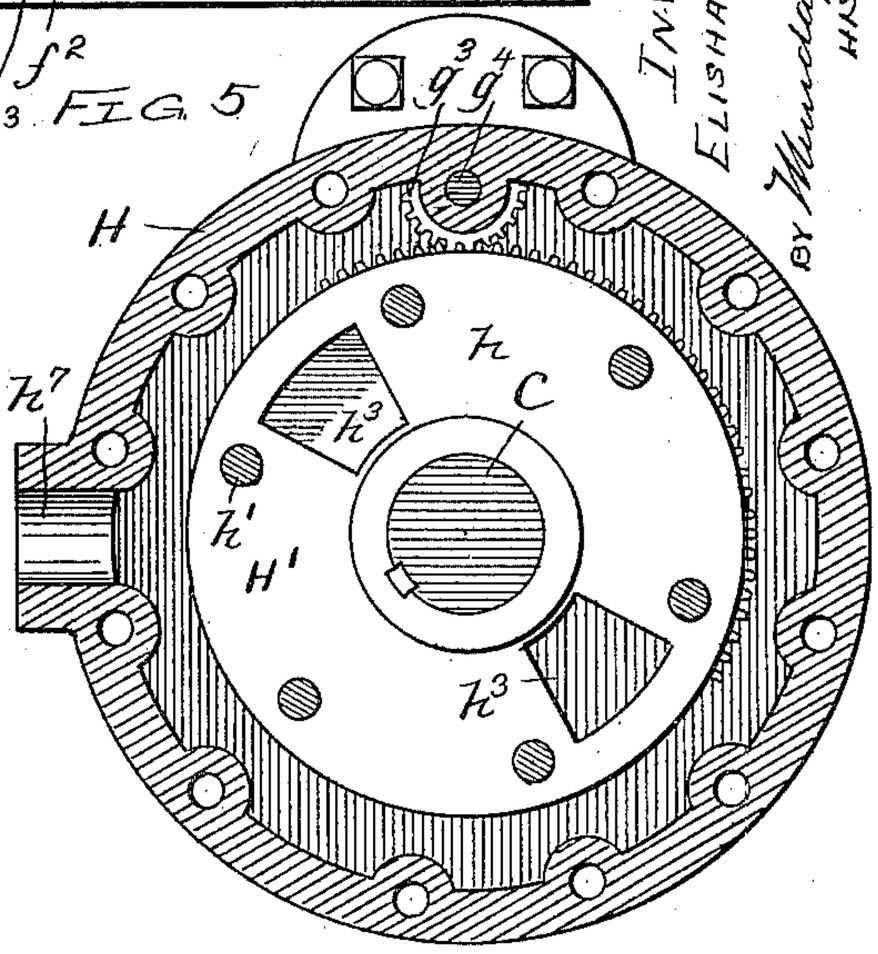


FIG. 5



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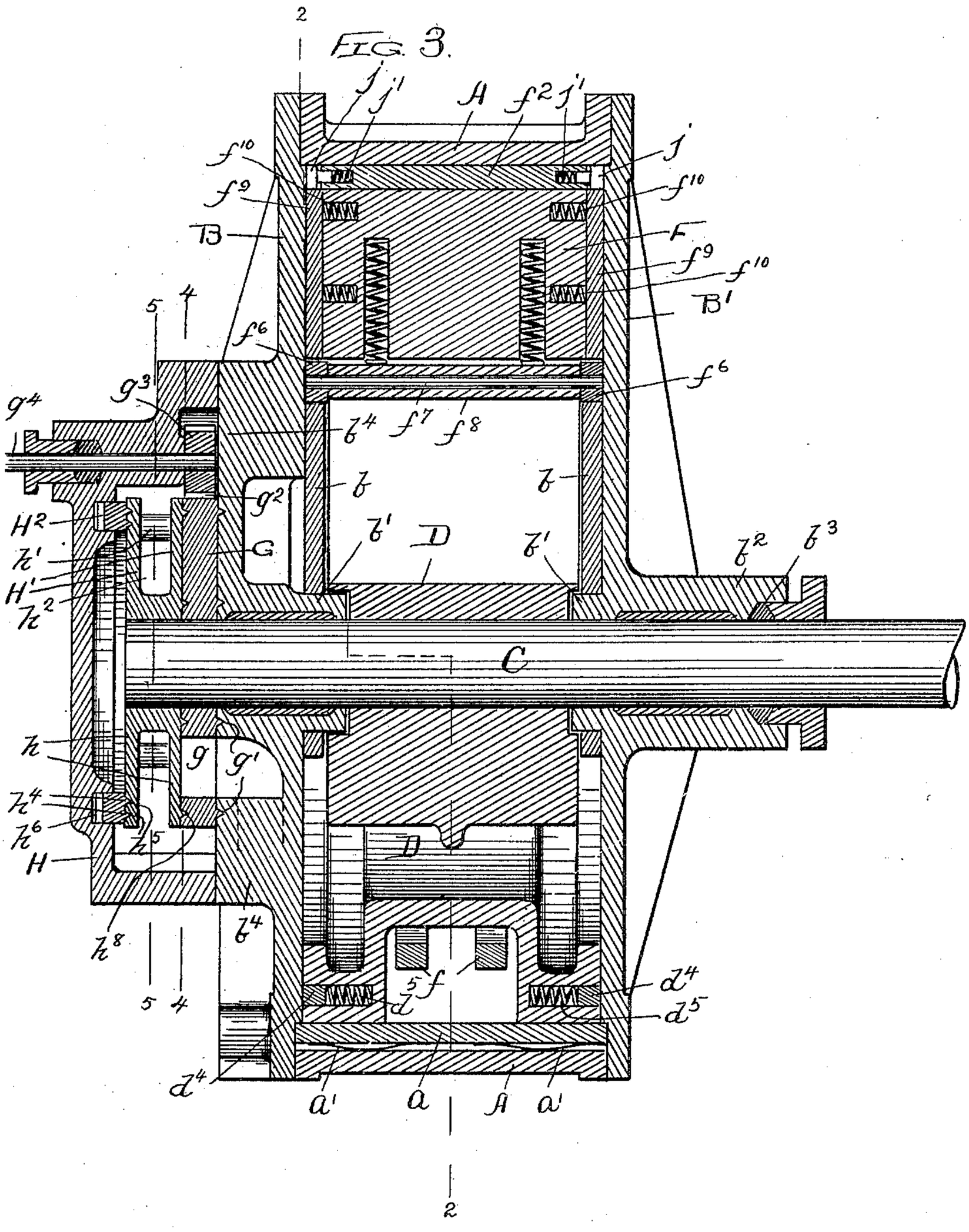
(No Model.) 3 Sheets—Sheet 3.

FIG. 3.



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UNITED STATES PATENT OFFICE.

ELISHA SEYMOUR, OF CHICAGO, ILLINOIS.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 622,718, dated April 11, 1899.

Application filed September 15, 1898. Serial No. 691,032. (No model.)

To all whom it may concern:

Be it known that I, ELISHA SEYMOUR, a citizen of the United States, residing in Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Rotary Engines, of which the following is a specification.

My invention relates to improvements in rotary engines.

The object of my invention is to provide a rotary engine of a simple, durable, and efficient construction that may be cheaply manufactured and that may be run continuously without getting out of order and with little friction or wear and by means of which the expansive power of the steam can be more fully and economically utilized than in rotary engines heretofore in use and by means of which also the quantity of steam admitted to the engine-cylinder and the number of its expansions therein may be properly controlled.

My invention consists, essentially, in the combination, with a circular steam cylinder, case, or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder, case, or shell and journaled eccentric thereto and to said cam-track and provided with one or more (preferably two) radially-sliding curved piston-wings having each an arm at its outer end pivotally connected to said rotary piston wheel or drum to prevent the friction of the piston-wings against said case or shell from binding in their radially-sliding movements as the piston wheel or drum rotates within the case or shell.

My invention further consists in the novel construction of parts and devices and in the novel combinations of parts and devices herein shown and described, and specified in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a rotary engine embodying my invention. Fig. 2 is a central vertical section taken on the line 2 2 of Fig. 3. Fig. 3 is a section taken on the partly-radial and partly-curved line 3 3 of Fig. 2. Figs. 4 and 5 are sections on the lines 4 4 and 5 5, respectively, of Fig. 3; and Fig. 6 is a detail perspective view of parts hereinafter to be described.

In the drawings, A represents the cylinder, case, or shell, the same having two heads or end plates B B′, firmly clamped to the shell A by bolts or rivets *a*.

C is the shaft, extending through the heads B B′ of the cylinder, and D is the rotary piston wheel or drum secured to said shaft and rotating with it. The rotary piston wheel or drum D is provided with curved radially-sliding pistons F F, preferably two in number, the same being mounted in radial curved slots *d d* in the wheel or drum D. Each of these curved piston-wings F F is furnished with an arm *f*, pivoted at *f′* to the rotary wheel or drum D, the arm *f* serving to support and brace the outer end of the curved piston and to prevent the friction of said piston against the cylinder, case, or head A from causing the piston F to bind in its radially-sliding movements in and out of the rotary wheel or drum D. The curvature of the pistons F and of the slots *d*, in which they fit, correspond to the arc formed by the pivoted brace-arm or support *f* as a radius, so that the pistons may move in and out freely. The pistons F are also each provided with a rocking shoe f^2 at its outer end or edge, said shoe having a curved outer face f^3, which fits and bears against the curved inner face of the cylinder, case, or shell A, and said rocking shoes have a round or cylindric inner face f^4 fitting in a similar curved socket f^5 at the outer end of the pistons F, so that the rocking shoes may fit and bear properly against the cylinder or case A in every position of said pistons as the wheel or drum D rotates. The radially-sliding curved pistons F are moved outward as the piston wheel or drum D rotates by means of cams *b b*, one secured to the inner face of the heads or end plates B B′ of the cylinder, case, or shell A, said cases being circular in form and concentric with the case or shell A, but eccentric to the rotary piston wheel or drum D, as will be readily understood from Figs. 2 and 3 of the drawings. Each of the pistons F is provided with antifriction-rollers f^6 to ride on said cams, said rollers being on a shaft f^7, which passes through a block f^8, forming a part of the piston. A spring is interposed between the piston F and the part f^8, through which the shaft f^7 passes, so that the piston F, telescoping on said part f^8, may compen-

sate for any wear or lack of adjustment or accuracy of fit. The wheel or drum D is provided with packing-blocks d', supported by springs d^2 at the point where the piston F bears against said wheel or drum, as will be readily understood from Fig. 2 of the drawings.

The cams b b are preferably supported in place by internal hubs or projections b' on the heads or end plates B B'.

The pistons F are each provided with packing-blocks f^9, pressed outward by springs f^{10} and which bear against the heads or end plates B B' of the steam-cylinder.

The head B' is provided with an external hub b^2, furnished with a stuffing-box b^3 for the shaft C. The cylinder-head B is provided on its outer face with a boss b^4 to receive the valve-case H, which is secured thereto. H' is a rotary valve within the valve-case H, the same being secured to the engine-shaft C and rotating therewith. The valve H' has two parallel disks h h, preferably formed integral with each other and united by the central or hub portion of the valve and by the studs h', so as leave an annular space or channel h^2 for the steam between the two plates of the valve. The inner valve-disk h is provided with two ports h^3, the ports corresponding in number to the pistons F on the rotary piston wheel or drum D. H^2 is a packing-ring having V-shaped projections h^4, fitting in V-shaped grooves h^5 and interposed between the case H and valve H'. Flat springs h^6 press the packing-ring against the valve. The valve case or shell H is provided with an inlet-port h^7 for the steam. G is a rotary expansion or cut-off ring mounted to turn on the shaft D and interposed between the valve H' and the cylinder-head or end plate B. It is provided with a port or opening g for the passage of the steam through it into the cylinder or case A through the port b^5 in the head B. The adjustable expansion or cut-off ring G is provided with V-shaped packing projections g', which fit in corresponding V-shaped grooves in the outer face of the end plate B, and it is also provided with V-grooves to receive the V packing projections or rings h^8 on the valve H'. The expansion or cut-off ring G is turned or adjusted on the shaft D by means of the gear-teeth g^2 thereon, which mesh with a gear g^3 on the shaft g^4.

b^5 is a stop secured to the face of the head or end plate B and which fits in the port or opening g of the expansion or cut-off ring G, so that by turning the expansion-ring on its axis this stop will serve to vary or adjust the operative length of the segmental port g, and thus vary the quantity of steam admitted to the cylinder at each stroke and also the time of its admission, as the shorter the segmental slot or port g in the expansion-ring the quicker will the port h^3 in the rotating cut-off valve H' be in passing. By turning the rotatable or expansion ring G in the direction to lengthen the operative length of its slot or port g the longer will the port h^3 in the valve H' be in passing the segmental slot or port g and the greater will be the quantity of steam admitted to the cylinder A and the less will be the number of expansions of the steam therein. When the load upon the engine is light, by simply turning the expansion-ring in the direction to shorten the operative length of the port or slot g the quicker will the port h^3 be in passing and the greater will be the relative proportion of time during each rotation of the valve H' when the live steam is cut off from the engine-cylinder and the greater will consequently be the number of expansions of the steam in the engine-cylinder.

The rocking shoe f^2 is furnished with packing-strips j, which are forced outward against the cylinder-heads B B' by springs j'.

The piston-wheel D is provided with a segmental packing-ring d^4, pressed out by springs d^5 against the heads B B', and the cylinder or shell A has a packing-bar a, pressed out by flat springs a' to prevent steam escaping from the pressure side to the exhaust side at the point where the piston-wheel D is tangent to the cylinder A. a^2 is the exhaust-port.

I claim—

1. The combination with a circular steam-cylinder case or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cam-track and provided with a radially-sliding curved piston-wing, said piston-wing riding against the inner periphery of said case or shell substantially as specified.

2. The combination with a circular steam-cylinder case or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cam-track and provided with a radially-sliding curved piston-wing having a brace or arm at the outer end thereof pivotally connected to said wheel or drum, said piston-wing riding against the inner periphery of said case or shell substantially as specified.

3. The combination with a circular steam-cylinder case or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cam-track and provided with a radially-sliding curved piston-wing, said piston or wing having a rocking shoe at its outer end to form a bearing against said cylinder case or shell, said piston-wing riding against the inner periphery of said case or shell substantially as specified.

4. The combination with a circular steam-cylinder case or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cam-track and provided with a radially-sliding curved piston-wing having a

brace or arm at the outer end thereof pivotally connected to said wheel or drum, said piston or wing having a rocking shoe at its outer end to form a bearing against said cylinder case or shell, said piston-wing riding against the inner periphery of said case or shell substantially as specified.

5. The combination with a circular steam cylinder case or shell provided with a circular cam-track concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cam-track and provided with a radially-sliding curved piston, and friction-rollers on said piston riding on said cam, said piston riding at its outer end against the circular inner periphery of said case or shell, substantially as specified.

6. The combination with a circular steam cylinder case or shell provided with circular cams concentric therewith, of a rotary piston wheel or drum within said cylinder case or shell and journaled eccentric thereto and to said cams and provided with radially-sliding curved pistons having each a brace or arm at the outer end thereof pivotally connected to said wheel or drum, and friction-rollers on said pistons riding on said cams, said pistons riding at their outer ends against the inner circular periphery of said case or shell, substantially as specified.

7. In a rotary engine, the combination with the steam-cylinder having a circular inner periphery, of a rotary piston wheel or drum journaled eccentric to said cylinder, radially-sliding pistons thereon, a circular cam concentric with said steam-cylinder for operating said radially-sliding pistons, and rocking shoes at the end of said pistons, substantially as specified.

8. In a rotary engine, the combination with a steam-cylinder having a circular inner periphery, of a rotary piston wheel or drum journaled eccentric to said cylinder, radially-sliding pistons thereon, a circular cam concentric with said steam-cylinder for operating the same, and hinged arms or braces connected to the outer ends of said radially-sliding pistons to prevent the same from binding in sliding in and out, substantially as specified.

9. In a rotary engine, the combination with the steam-cylinder having a circular inner periphery, of a rotary piston wheel or drum journaled eccentric to said cylinder, radially-sliding plates thereon, and circular cams concentric with said steam-cylinder and secured to the heads of the engine-cylinder on opposite sides of said rotary wheel or drum for operating said radially-sliding pistons, substantially as specified.

10. In a rotary engine, the combination with the steam-cylinder having heads B B′ provided with cams, of a rotary piston wheel or drum, radially-sliding pistons thereon operated by said cams, a valve-case, a rotary valve secured to the engine-cylinder provided with ports, and an adjustable rotary expansion or cut-off ring between said rotary valve and engine-cylinder head provided with a segmental slot or port, and a stop on the engine-cylinder head, substantially as specified.

11. The combination of steam-cylinder A, provided with a circular inner periphery and having heads B B′, rotary piston wheel or drum D, having shaft C journaled in said heads B B′ eccentric to said steam-cylinder, curved pistons F F riding against the circular inner periphery of said steam-cylinder and furnished with brace or supporting arms pivoted to said wheel or drum, substantially as specified.

12. The combination of steam-cylinder A, provided with a circular inner periphery and having heads B B′, rotary piston wheel or drum D, having shaft C journaled in said heads B B′ eccentric to said steam-cylinder, curved pistons F F riding against the circular inner periphery of said steam-cylinder and furnished with brace or supporting arms pivoted to said wheel or drum, and cams concentric with said steam-cylinder for operating said radially-sliding pistons, substantially as specified.

13. In a rotary engine, the combination with the engine-cylinder head B, of engine-shaft C, a rotary valve H′ and expansion or cut-off ring G, said rotary valve and its expansion or cut-off rings being provided with V-shaped packing grooves and projections, substantially as specified.

14. The combination of the steam-cylinder having an inner circular periphery with the rotary piston wheel or drum journaled eccentric to said cylinder and provided with radially-sliding pistons furnished with spring-supported packing plates or bars, and cams concentric with said steam-cylinder for operating said radially-sliding pistons, substantially as specified.

ELISHA SEYMOUR.

Witnesses:
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EDMUND ADCOCK.