No. 754,411. PATENTED MAR. 15, 1904.

H. BERGLUND.

ROTARY ENGINE.

APPLICATION FILED FEB. 25, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

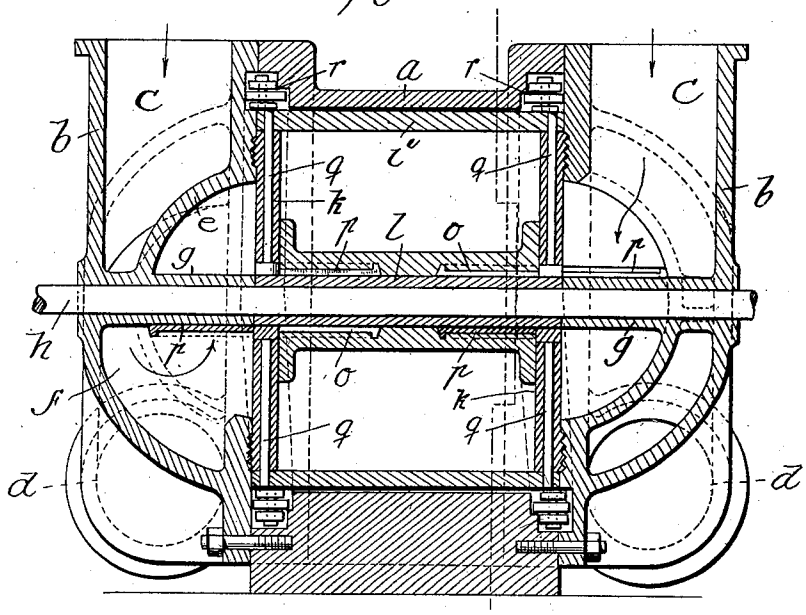
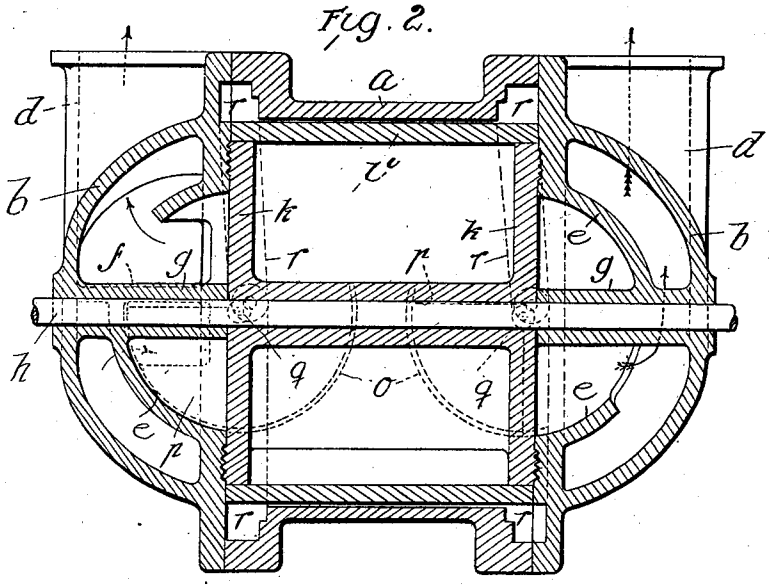


Fig. 2.



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NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.

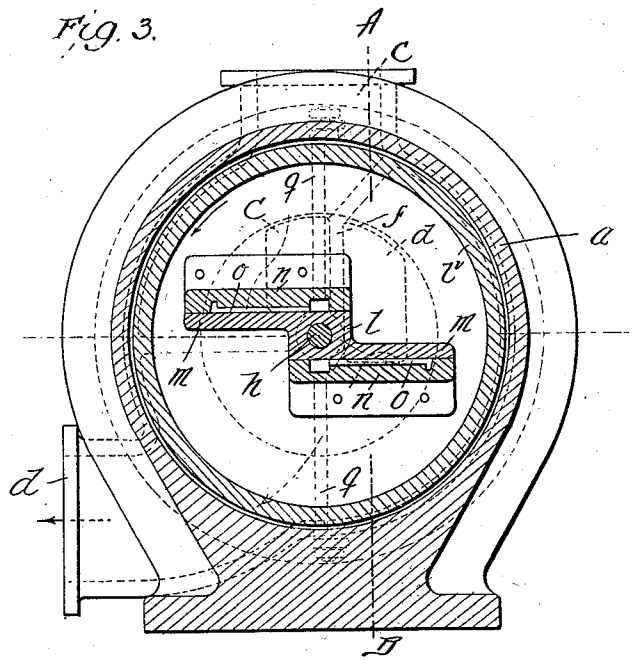
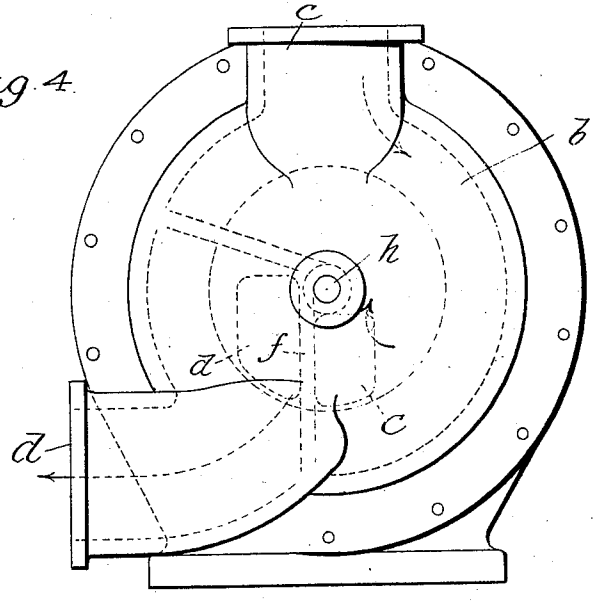


Fig. 4.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 5.

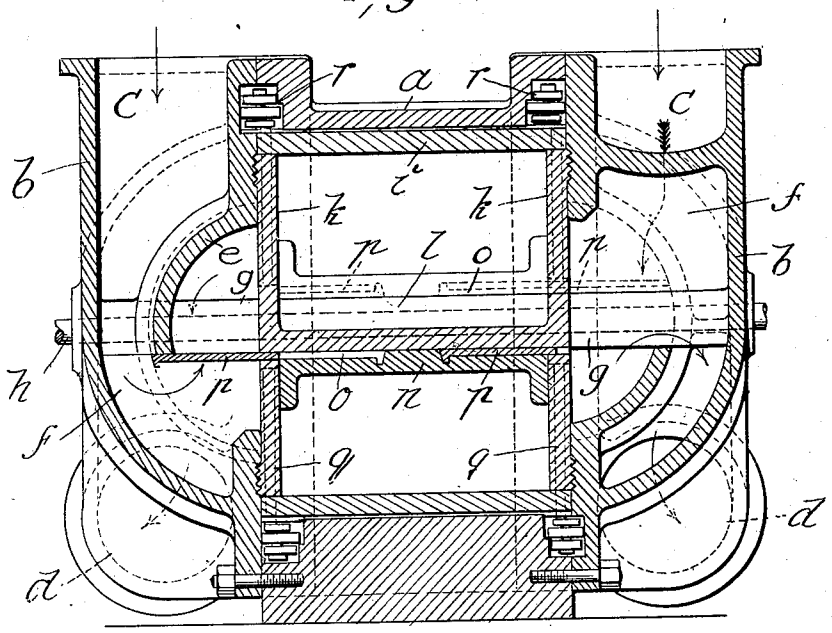


Fig. 6.

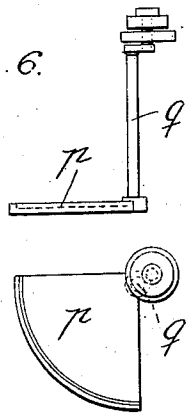
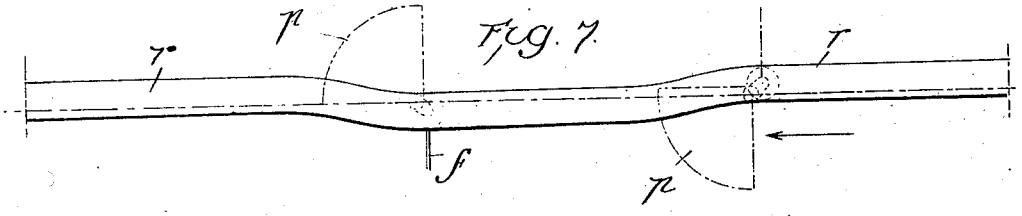


Fig. 7.



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No. 754,411. Patented March 15, 1904.

UNITED STATES PATENT OFFICE.

HENRIK BERGLUND, OF STOCKHOLM, SWEDEN.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 754,411, dated March 15, 1904.

Application filed February 25, 1902. Serial No. 95,514. (No model.)

To all whom it may concern:

Be it known that I, HENRIK BERGLUND, a citizen of the Kingdom of Sweden, and a resident of Stockholm, Sweden, have made certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to a rotary engine provided with oscillating vanes, and more especially adapted to be driven by water-power.

In the accompanying drawings such an engine is illustrated in longitudinal sections in two planes perpendicular to each other in Figures 1 and 2, in a vertical cross-section in Fig. 3, and in an end view in Fig. 4. Fig. 5 is a vertical cross-section on the line A B, Fig. 3. Fig. 6 illustrates a vane with its crank-shaft in side elevation and end view, and Fig. 7 is a development of a cam-groove for turning the vane.

The engine consists of a cylindrical case *a*, secured to a base-plate, the ends of said case being closed by heads *b*, containing the admission and discharge passages *c d* for the driving fluid and having on their inner sides a semispherical pocket *e*, the working chamber, the center of which is situated on the axis of the cylindrical case, and in which pocket terminate an admission-passage and a discharge-passage separated by an axially-extending sector-shaped partition *f*, which is rigidly connected with the head *b* and with a journal-box *g*, projecting centrally in the pocket and serving as a bearing for the driving-shaft *h*. The location of the partitions *f* is marked in the figures. Said sector-shaped partitions, the inner edges of which abut to the end walls of the revolving drum *i*, divide the interior of each head and its spherical pocket *e* in two chambers, connected the one with the admission-passage and the other with the discharge-passage for the driving fluid, as clearly shown in the drawings. Said partitions thus form a hindrance for the driving fluid to pass directly through the head *b* from the inlet to the outlet, but compel it to act upon the vanes as described in the specification. On the said shaft is secured a drum *i*, located concentrically in the cylindrical case and provided with tightly-closing end pieces *k* and a hub *l*, with parallel vanes or plates *m* projecting in opposite directions from diametrally opposite points and extending the whole length of the drum. On the side of the vanes pointing away from the shaft is placed a plate *n*, having at each end of the surface facing the vane *m* a shallow depression *o*. In the end pieces of the drum are slits corresponding to the depressions or recesses *o*, and in each of these slits is located a sector-shaped vane *p*, arranged to swing outward and to close tightly against the walls of the working chamber *e* or to swing inward into the depression or pocket *o*, leaving the working chamber free. Each of said vanes is secured to the inner end of a radial shaft *q*, journaled in the corresponding end wall of the drum and having its outer end formed into a crank, carrying friction-rollers rolling on a corresponding cam-shaped guide *r*, arranged on the inner circumference of the case *a* and having such shape that during one half of the revolution of the drum the crank will occupy a position in which the corresponding vane is completely pushed out into the working chamber *e*, while during the other half of a revolution it is first pushed into the corresponding pocket *o*, so that it can move past the partition *f* in the working chamber and subsequently again be moved out of the latter. To make the end walls *k* of the drum close tightly against the heads of the case, the said parts are provided with concentric ribs and channels engaging with each other, thus preventing the escape of driving fluid this way.

The engine operates as follows: The driving fluid—water—entering the working chamber *e* through the admission-passage *c* fills the space between the fixed partition *f* and the movable vane *p*, situated ninety degrees in front of it in its outer position, and compels the said vane to revolve, together with the drum and the shaft *h*. When the drum has thus revolved through one-fourth of a revolution, the other vane *p*, which has hitherto remained in its pocket *o*, enters the pressure-chamber, where during the next one-fourth of a revolution it is pushed out into its outer position by means of the cam-shaped guide *r*, while the first-mentioned vane retains its outer position

until during the fourth quarter of the cycle it is pushed into its pocket and leaves the work to be done by the other vane, which has at that time assumed its extreme position and is actuated by the driving fluid in the same manner as the former one. When a vane is withdrawn, the liquid by which it has been actuated discharges through the discharge-passage *d*. The vanes at both ends of the drum are actuated in the same manner, whereby the advantage evidently is gained that the driving forces of the engine will form a couple, so that no pressure will act on the bearings of the engine except that caused by the gravity of the revolving parts. The internal pressures are readily seen to be completely balanced owing to the arrangement of the two sections of the engine, and the engine, moreover, is in perfect equilibrium as regards the weights. It should besides be pointed out that neglecting the friction of the crank motion proper the movements inward and outward of the vanes take place without resistance, inasmuch as these movements always take place in chambers where the same pressures exist, the vanes consequently being surrounded either of pressure fluid only or of discharging fluid only.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

An improved rotary engine consisting of a cylindrical case *a* with tightly-closing heads *b* each provided on the inside with a semispherical recess or pocket *e*, the working chamber, having admission and discharge apertures separated by an axial partition, and in which case is inclosed a tight-fitting rotatable drum *i* with tight-closing ends *k* through each of which oscillate two sector-shaped vanes *p* parallel to each other and to the shaft and located on opposite sides of the latter *h*, said vanes being secured to the inner end of shafts *q* arranged radially in the drum and having its outer end formed into a crank provided with friction-rollers rolling on a cam-shaped guide *r* arranged on the inside of the casing and actuating each crank in such a manner during the rotation of the engine that the corresponding vane during one-half of a revolution of the drum will occupy its outer position projecting across the working chamber in the corresponding head *b*, to be subsequently pushed in during the succeeding quarter of a revolution so that it can move past the partition between the discharge and admission apertures, whereupon during the next quarter of a revolution it is once more projected into its outer position.

In witness whereof I have hereunto set my hand in presenee of two witnesses.

HENRIK BERGLUND.

Witnesses:
H. TELANDER,
D. DAHLSTRÖM.