R. MASSOHN & K. T. SANDRECZKI.

ROTARY ENGINE.

APPLICATION FILED JAN. 11, 1912.

1,041,646. Patented Oct. 15, 1912.

3 SHEETS—SHEET 1.

Fig. 1.

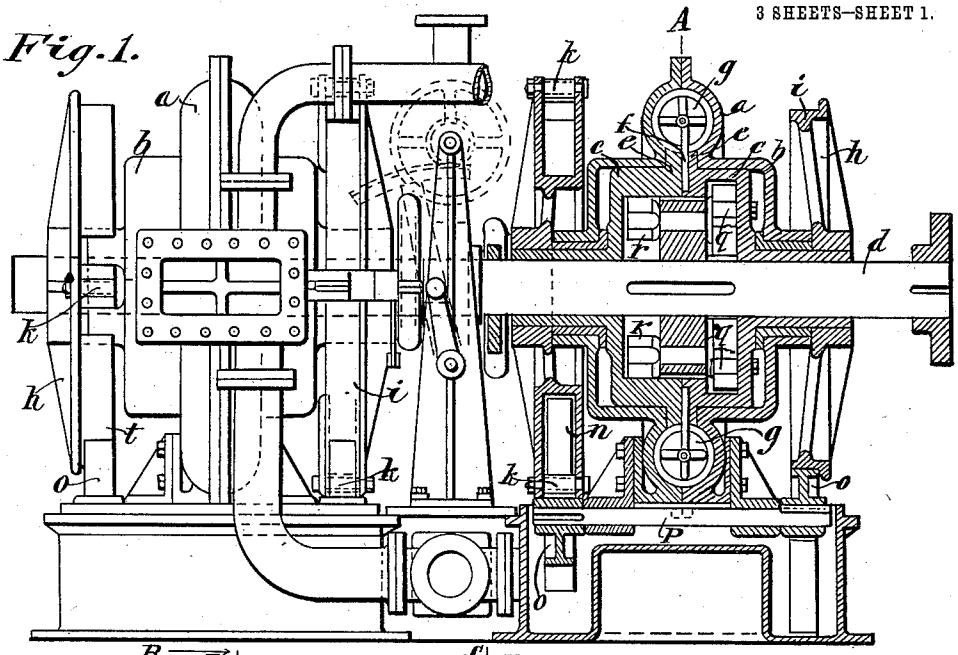
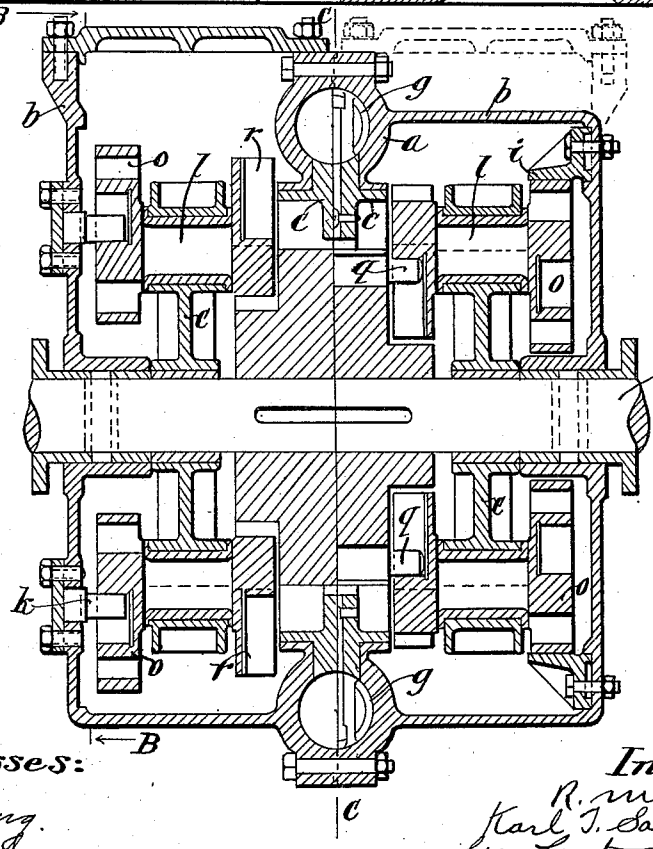


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 2.

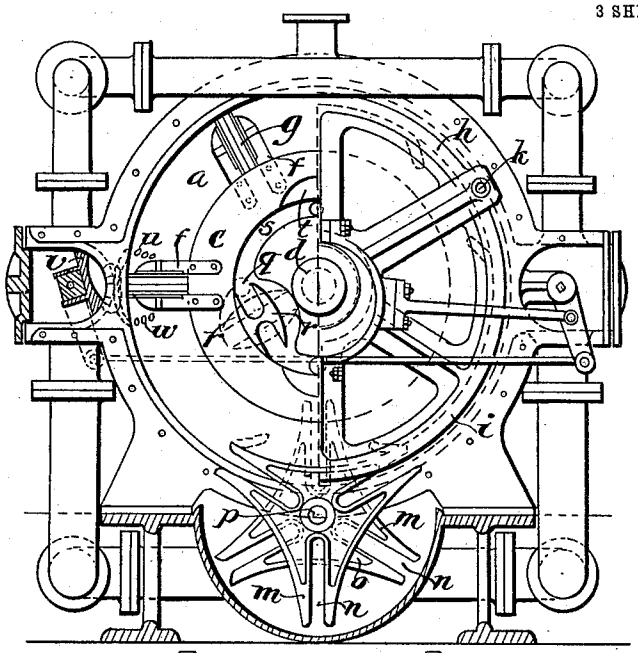
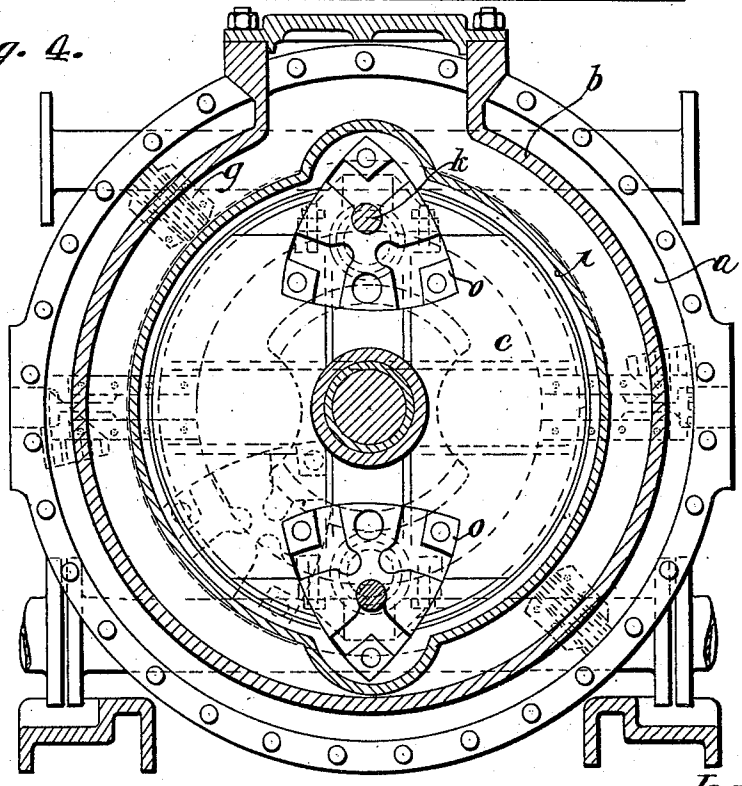


Fig. 4.



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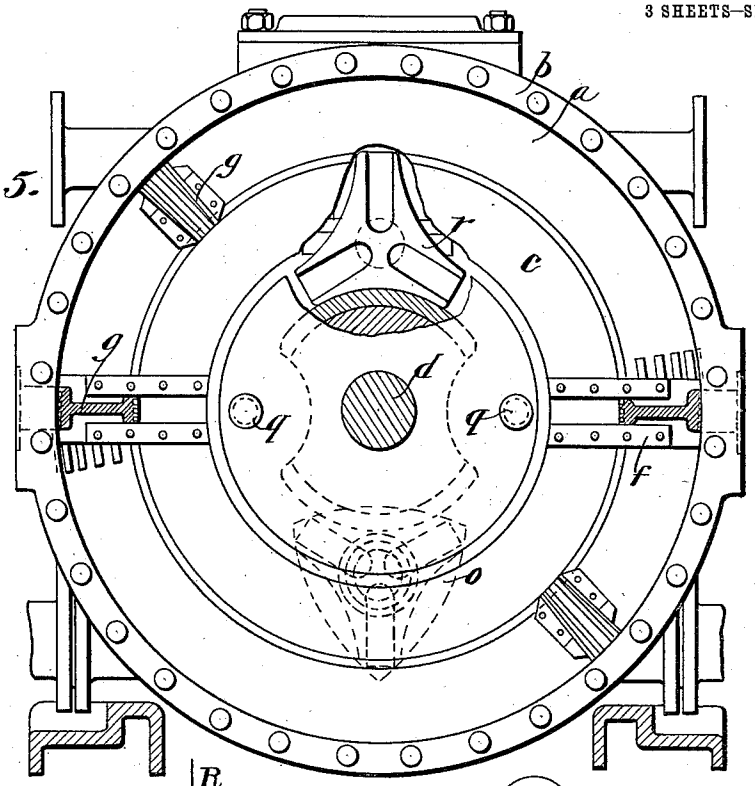
3 SHEETS—SHEET 3.

Fig. 5.



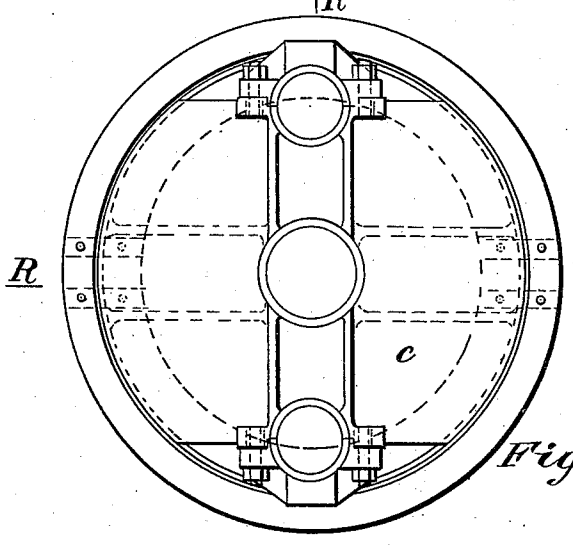


Fig. 6.

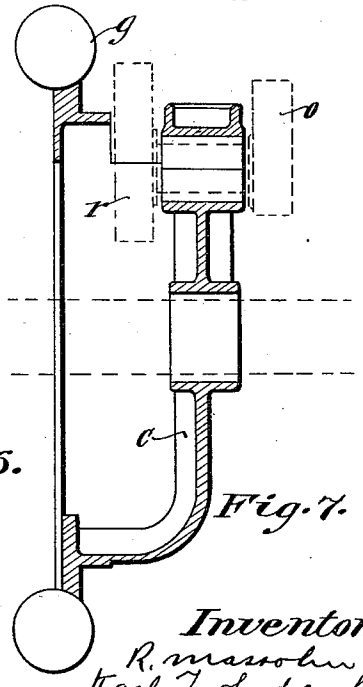


Fig. 7.

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UNITED STATES PATENT OFFICE.

RICHARD MASSOHN AND KARL THEODOR SANDRECZKI, OF HAMBURG, GERMANY.

ROTARY ENGINE.

1,041,646. Specification of Letters Patent. Patented Oct. 15, 1912.

Application filed January 11, 1912. Serial No. 670,699.

To all whom it may concern:

Be it known that we, RICHARD MASSOHN and KARL THEODOR SANDRECZKI, subjects of the German Emperor, residing at Paulinenplatz 2 and Ifflandstrasse 41, Hamburg, in the State of Hamburg, Germany, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

The present invention relates to a rotary engine in which the pistons alternately remain stationary or rotate and in which a sort of swiveling locking device after the style of a Maltese cross not only regulate the intermittent motion of the pistons but serve also to couple temporarily one or the other of the pistons to the shaft.

It is common to use Maltese crosses in the construction of engines with revolving cylinders, for the purpose of temporarily stopping the shaft, but all other motions of the known engines are controlled by means of toothed wheel gears, making such constructions complicated and unreliable.

The engine disclosed by the present invention is simple in construction and of small dimensions, while at the same time its efficiency is of a high degree.

An example of construction of such an engine is shown in the drawings.

Figure 1 is a view of the rotary engine, showing part of the same in side elevation, and also illustrating internal construction by a longitudinal vertical central section through a portion thereof. Fig. 2 is a vertical cross section on the line A A, Fig. 1. Fig. 3 illustrates, in section, an alternative form of construction, the right-hand half of this figure being a horizontal section, and the left-hand half being a vertical section. Fig. 4 is a cross section on the line B B, Fig. 3. Fig. 5 is a cross section on the line C C, Fig. 3, certain parts being broken away to illustrate internal construction. Fig. 6 is a view of the piston carrier, and Fig. 7 is a section on the line R R, Fig. 6.

In the drawings like characters of reference indicate corresponding parts in each figure.

The two cylinder engine represented in Figs. 1 and 2 is provided with two annular shaped cylinders "*a*", which are supported by a suitable frame. The said annular cylinders are composed of two parts at their central vertical plane. The cylinder casing while forming on its inner circumference an annular space opens out on both sides of the cylinder "*a*" into cylindrical casings "*b*" which are concentric to the axis of the shaft. In the centers of the said casings "*b*", the sleeves of the piston carriers "*c*" have bearing which in turn provide bearing for the shaft "*d*". The piston carriers "*c*" are constructed in the form of disks in such a way that their circumference is in close sliding contact with the casing "*b*".

"*e*" are annular projections or flanges of the piston carriers, to which (by means of straps "*f*") the pistons "*g*" are connected. These projections "*e*" extend into the annular space between the cylinders "*a*" and cylindrical casings "*b*", and rest in contact with the said casings. The circumferential surfaces of the pistons may be formed so as to accurately correspond to the section and form of the annular cylinder.

In the construction represented by the drawings each of the two piston carriers "*c*" of each cylinder "*a*" is provided with two pistons "*g g*" which are placed diametrically opposite to each other.

On the sleeves of the piston carriers "*c*" but outside of the casing "*b*" are mounted disks "*h*", the cylindrical surface "*i*" of which is interrupted at intervals, thus forming a corresponding number of separate slides. Pins "*k*" are placed on said disks "*h*" at a greater radius and facing each of the said interruptions. These surfaces "*i*" and pins "*k*" are to engage respectively cylindrical faces "*m*" and radial slots "*n*" of two three-armed swivel-locks "*o*" which are mounted on shafts "*p*" supported in stationary bearings. The two swivel-locks "*o*" are mounted in such a way that their respective arms or radial slots alternate 60°. Correspondingly also the slides "*i*" and pins "*k*" are alternately arranged under the same angle.

Pins "*q*" which are to engage two-armed swivel-locks "*r*" are fixed to the inner walls of the piston carriers "*c*". The said swivel-locks "*r*" are mounted on an axle in such a way opposite each other on the two sides of a disk "*x*" fixed on the shaft "*d*", that the arms of the swivel-locks on one side are at right angles to those of the swivel-locks on the other side. By this arrangement the pins "*q*" of one piston carrier "*c*" are held in each half of a revolution, while the pins "*q*" of the other piston carrier are released. The rotary motion for

changing the position of the swivel-locks "r" is produced in the following manner: When a piston carrier "c" is turning and its slide disk "h" is sliding on one of the sliding faces "m" of a swivel-lock "o" (see right-hand part of the section in Fig. 1) the swivel-lock "r" of the other piston carrier which for the time being is not coupled to the piston carrier "c", is sliding on a cylindrical face "s" of this other piston carrier (fixed at this time by a slot "n" and pin "k" of one swivel-lock "o") and thus causes the lock "r" of the same axle on the opposite side of the disk "x" to be locked and coupled with a pin "q" of the piston carrier of this side. The sliding swivel "r" then arrives with its point at a recess "t" in the face "s" and with its slot in front of the stationary pin "q" of the other piston carrier with the result that it is turned about 90° by the pressure of the said pin "q". This movement causes the swivel "r" of the other side to turn through the same degree and to come into contact with its sliding surface "s". The stationary pin is now coupled to the swivel-lock "r" while the other hitherto coupled pin is released and now remains stationary, in other words: the moving piston "q" is coupled to the shaft "d" and the fixed one (by "n" and "o") released. During the changes in movement of these parts both pistons are in motion for a moment on account of the centrifugal momentum on the shaft respectively of the revolving bodies, and the shaft is now driven by the pin "q" which has been last coupled until the same is in a similar manner released and stopped while the other is again being coupled and driven.

The foregoing explains in what manner the alternately driven pistons alternately transmit their motion to the shaft.

The detention of the pistons is arranged to occur a short distance in front of a steam inlet port: and at the very moment at which the other, (now released) piston has been driven (for instance by centrifugal force) past that inlet port, the steam influx is regulated by means of a rotary valve "v" which is operated by suitable means, while the exhaust may freely escape through the port "w", behind the stationary piston.

The two cylinder arrangement offers the advantage that no centrifugal force is required to actuate the pistons in the change-over position.

Instead of two-armed swivel or coupling-locks (Maltese crosses) "r" such with three or more arms might be provided.

An alternative form of such power generator is shown in Figs. 3–7. Here the Maltese cross-like locking devices for regulating the motions both of shaft and of pistons, are arranged in pairs on common axles in the interior of the body of the piston carrier in such a way that in the one place they stop the corresponding piston when held by pins provided in the casing, while in the second place they are adapted to engage pins provided on the shaft-connecting disks. Such an arrangement allows the swivel locking devices to be arranged in close proximity to each other and to be completely inclosed in the casing, by which means the construction of the engine is considerably simplified. The annular shaped cylinders "a" each consist of two halves from which the casing "b" extends laterally as an integral part. The carrier bodies "c" for the pistons "g" are constructed in such a way that the axles "l" of the locking swivels "o" and "r" have bearing on them, while the bodies themselves have bearing on sleeves arranged on the shaft in the interior of the casing.

The disk "x", which is situated in the interior of the carrier body, carries the pins "q" and is provided with guide cams "s" for the swivel locks "r".

The pins "k" engage with the locking swivels "o" as well as the guiding faces "i" for these are arranged on the inside of the face ends of the casing "b".

The working is performed in a manner analogous to that of the first described construction. When one of the piston carriers "c" is held by means of a locking swivel "o" engaging a pin "k", the corresponding swivel-lock "r" is resting against its respective guide cam "s" on the driving disk "x", and the piston carrier "c" of the other side is coupled to the driving disk by means of its swivel lock "r" and pin "q", while the corresponding lock "o" slides on the guide cam "i" of the casing. Similarly as in the previously described example, the coupling and piston movement is alternately changed by recesses in the respective guide cams.

The power generator or motor may be used with all power generating fluids. It may also serve as a pump or the like.

What we claim as our invention is:

1. A power generator comprising an annular cylinder; a pair of piston-carriers normally loosely mounted on a shaft; pistons carried by said piston-carriers; means keyed to said shaft, and positioned between said piston-carriers; rotary-slotted means; means whereby said rotary slotted means are journaled, the said rotary slotted means coacting with said member and said piston-carriers and means mounted in the engine, so that the said piston-carriers will be alternately locked from rotation and locked to said shaft, as set forth.

2. A power generator comprising an annular cylinder through which a shaft passes; a suitable frame in which said shaft has bearing; a pair of piston-carriers operating within said cylinder and normally loosely

mounted on said shaft; pistons carried by said piston-carriers; means positioned between said piston-carriers and keyed to said shaft; pins carried by said piston-carriers and projecting inwardly; rotary slotted means mounted one on each end of two axles journaled in said member keyed to said shaft, the said rotary slotted means on each axle being positioned at right angles to each other; unitary means keyed to each of the said piston-carriers; means whereby when one of the said unitary means is rotating, the other of said unitary means is locked from rotation, thus locking its associated piston-carrier from rotation, the said slotted means having bearing surfaces which coact with bearing surfaces and recesses formed in said piston-carriers, and the said pins, so that when one of said piston-carriers is at rest, the other piston-carrier is coupled to said shaft.

3. A power-generator comprising an annular cylinder through which a shaft passes; a suitable frame in which said shaft has bearing; a pair of piston-carriers operating within said cylinder and normally loosely mounted on said shaft; pistons carried by said piston-carriers; means positioned between said piston-carriers and keyed to said shaft; pins carried by said piston-carriers and projecting inwardly; rotary slotted means mounted one on each end of two axles journaled in said member keyed to said shaft, the said rotary-slotted means on each axle being positioned at right angles to each other; a rotary-member keyed to each of the said piston-carriers, the periphery of said rotary-members being concentric to said shaft except at certain points where said periphery is interrupted by slots; a pin carried by each of the said rotary-members and opposite said slots; a shaft journaled in said frame; a rotary slotted member keyed to each end of the second-mentioned shaft, and each being provided with bearing surfaces which are concentric to the periphery of said rotary-members, the whole being arranged so that when one of said rotary-members is locked to prevent the rotation of its associated piston-carrier, the other rotary-member and its piston-carrier will be rotating and locked to said shaft.

4. A power-generator comprising an annular cylinder through which a shaft passes; a suitable frame in which said shaft has bearing; a pair of piston-carriers operating within said cylinder and normally loosely mounted on said shaft, and each provided with bearing surfaces overhanging said shaft and concentric thereto, the said bearing surfaces being interrupted by pockets at intervals; pistons carried by said piston-carriers; means positioned between said piston-carriers and keyed to said shaft; pins carried by said piston-carriers and projecting inwardly; rotary slotted means mounted one on each end of two axles journaled in said member keyed to said shaft, the said rotary slotted means on each axle being positioned at right angles to each other, and each being provided with an outer bearing surface which coacts with the concentric bearing surfaces of its associated piston-carrier; a unitary means keyed to each of the said piston-carriers; means whereby when one of the said unitary means is rotating, the other of said unitary means is locked from rotation, thus locking its associated piston-carrier from rotation, the said slotted means having bearing surfaces which coact with the said bearing surfaces and recesses formed in said piston-carriers, and the said pins, so that when one of said piston-carriers is at rest, the other piston-carrier is coupled to said shaft.

In testimony whereof we affix our signatures in presence of two witnesses.

RICHARD MASSOHN.
KARL THEODOR SANDRECZKI.

Witnesses:
ERNEST H. L. MUMMENHOFF,
IDA CHRIST. HAFERMANN.