

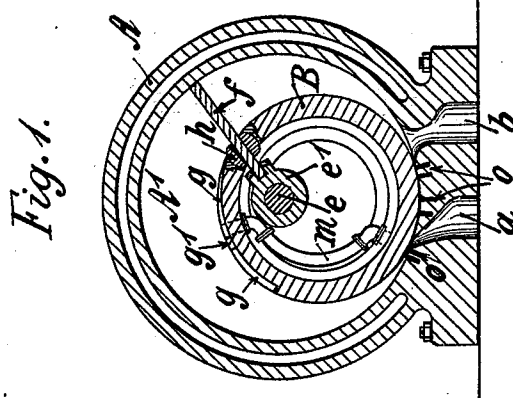
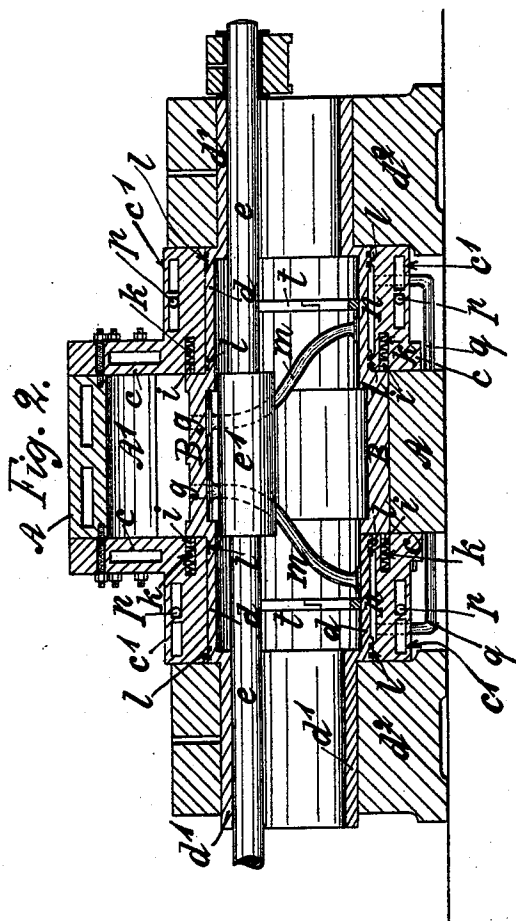
(No Model.)

2 Sheets—Sheet 1.

R. NADENICZEK.
ROTARY ENGINE.

No. 518,327.

Patented Apr. 17, 1894.



WITNESSES:

E. B. Rotton

E. A. Scott.

INVENTOR

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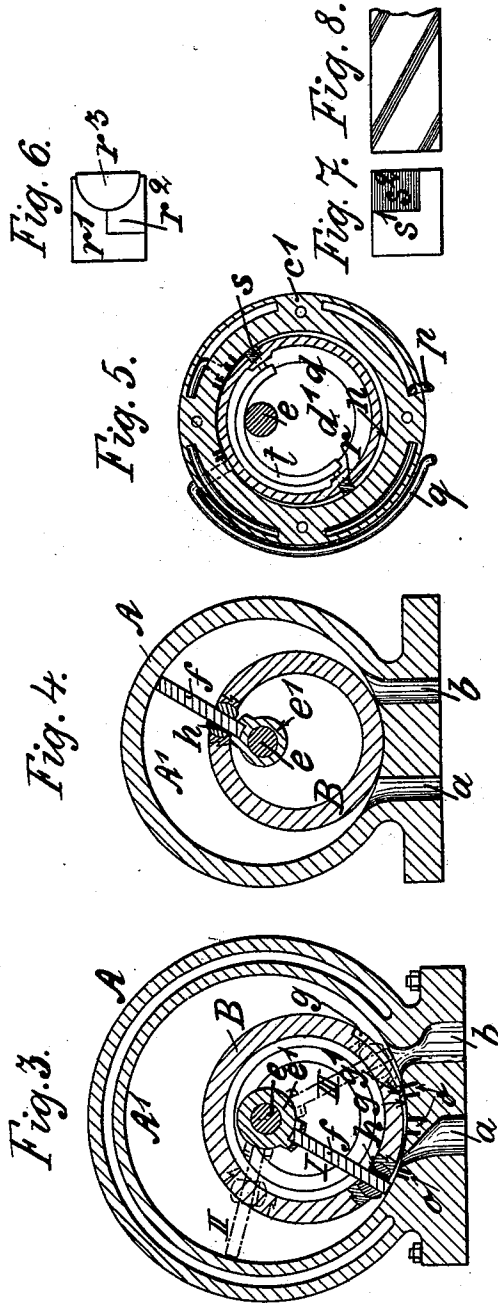
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UNITED STATES PATENT OFFICE.

RUDOLF NADENICZEK, OF BUDA-PESTH, AUSTRIA-HUNGARY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 518,327, dated April 17, 1894.

Application filed November 10, 1893. Serial No. 490,560. (No model.)

To all whom it may concern:

Be it known that I, RUDOLF NADENICZEK, clerk in an office at No. 69 Praterstrasse, Buda-Pesth, Austria-Hungary, and a subject of the Emperor of Austria-Hungary, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to that class of rotary engines, in which a piston plate is made to rotate within a cylinder. This plate is either driven round by steam admitted to the cylinder, transmitting its motion to another driving medium, for instance, a shaft; or inversely, the plate is driven round from a driving shaft, &c., and used as a suction pump for air or water. In each case the piston plate must have a suitable guide in the interior of the cylinder, and further the inlet and outlet ports of the cylinder must be opened and shut in a suitable manner. For these two motions, I employ a single device, namely, a second cylinder in the interior of the outer cylinder containing the piston-plate.

In order to make this invention more fully intelligible, reference is had to the accompanying drawings, in which like letters are used to denote like parts throughout the several figures.

Figure 1 is a cross-section of the engine employed as a steam engine. Fig. 2 is a longitudinal section of the same. Fig. 3 is a cross-section showing the position of the piston-plate by entrance and by expansion of steam. Fig. 4 is a cross-section of the engine arranged as a suction-pump. Fig. 5 is a cross-section through cylinders *c'* and Figs. 6, 7 and 8 are enlarged details.

The new rotary engine which can be employed as a steam engine with expansion of steam, or as a suction pump, is provided with the little cylinder B so seated in the outer cylinder A that it rests on the same between the inlet and outlet ports *a* and *b*, and in the case where the machine is employed as a steam engine, the cylinder B covers the inlet port *a* and consequently bears eccentrically in the interior of the larger cylinder A, Fig. 3. The working space A between the two

cylinders, sickle-shaped in cross-section, is inclosed at the sides by the two lids *c c*, which form the flanges of two further cylinders *c' c'*, Fig. 2. Into these cylinders *c'* the ends *d d* of the inner cylinder B protrude, and lie with their outer surfaces against the inner surfaces of said cylinders. The cylinder ends *d d* pass through the cylinders *c' c'* and, diminished in cross-section, are laid in bearings *d'*.

The driving shaft *e* of the machine lies in the longitudinal axis of the larger cylinder A and passes through the inner cylinder B. It is laid in bearings in a suitable manner outside the cylinders and carries the piston-plate *f* attached to it by means of a coupling *e'*, said plate passing through a slit in cylinder B into the working space and filling up the whole breadth of the same from one lid *c* to the other, being made to fit steam or water tight against the same.

The machine as above described can be used in combination with another of a similar nature, the two plates *f* being set at an angle of one hundred and eighty degrees to each other and arranged on one shaft *e*.

The engine works as follows: The piston *f* of each working-chamber takes up its first position I, when it is slightly in front of the port *a*, through which steam enters, Fig. 3. The steam presses the piston round and when at full steam, it is in position II. During this period of motion, an excision *g* on the surface of the cylinder B, which otherwise closes the ports *a*, passes over the said port, and permits the entrance of steam behind the piston-plate *f*. Excision *g* is divided up by one or more bridge-pieces *g'*, so that the steam can not pass over direct from inlet port *a* to outlet port *b*; the excision *g* being longer than the breadth of the cylinder surface between *a* and *b*. When the piston has taken its position II, excision *g* of cylinder B has left the port *a*, which latter is now closed by cylinder B. The expansion of the steam now commences, which brings the piston from position II into position III. From this point the one piston is taken again into position I by the other piston on the common shaft *e*, and

which is now under steam pressure. The steam passes out at port *b*.

In order that the machine can act as a suction pump, both the inlet and outlet ports *a* and *b* are arranged near the place where the cylinder B rests part of its surface on the inner surface of cylinder A, Fig. 4. The inlet port therefore, in this instance, also remains uncovered. Excision *g* on the surface of cylinder B is here unnecessary. For the remainder, the arrangement of the machine as a suction-pump is essentially the same as when acting as a steam motor. The shaft *e* is however rotated by some external driving power, the medium to be pumped being sucked in through port *a* behind the piston plate *f* into the working chamber A', and pressed out at *b* in front of the plate. As the piston plate, which passes through the walls of the inner cylinder, does not rotate round the axis of rotation of the same, but round the axis of rotation of the larger cylinder A, it will, in rotating, continually alter its position in the slit of cylinder B. For this purpose, the slit in cylinder B is provided with loosely mounted bearings *h*, through which the piston-plate passes. The bearings turn corresponding to the positions of the piston-plate in the slit.

In order that the cylinder B fits well against the lids *c* circular grooves are made in said lids opposite the outer edge of cylinder B, in which grooves steel rings *i* are placed, pressing against cylinder B under the influence of helical springs *k*, Fig. 2. Similarly, between cylinders *d* and *c'* steel rings *l* are placed, Fig. 2.

In order that the inner cylinder B should not bear too heavily on the bearings *d*² inclosing its ends *d'*, and also on the lower inner surface of cylinder A, from the great pressure of steam in the working-chamber A', steam tubes *m* are arranged in the inner cylinder, which connect the working-chamber A' with narrow circular chambers *n* which lie between the cylinders *d* and *c'*, Figs. 1 and 2. The steam entering these chambers presses against the inner cylinder with the same pressure and always in a contrary direction to the pressure, in the working-chamber A'. In order to make the surfaces of the cylinders A and B steam-tight, packing-rods *o* are set in the surface of the larger cylinder, Figs. 1 and 3. The motion of the piston-plate *f* is assisted by lateral rods *r* acting as pistons. These lie in slits in the outer surface of the cylinder *d*, Fig. 5. In order that each rod *o* may lie tightly against the inner surface of the cylinder end *c'* a steel half ring *t* is sprung in between each piston *r* and a sliding-cheek *s* likewise set in cylinder *d* and opposite to *r*. This spring half ring *t* has sufficient force to press piston *r* and cheek *s* continually against the walls of the cylinder *c'*.

When the machine is acting as a steam engine, fresh steam is admitted into the narrow

sickle-shaped space *n* between *c'* and *d* pushing the rod-piston *r* with the cylinder *d* round, the steam being admitted through pipe *p* which at one end opens into the inlet port *a*, passes through the mantle of the cylinder *c'* and at the other end opens out into the space between *c'* and *d*, Fig. 5. The live steam entering the space *n* acts in conjunction with the steam admitted through the tubes *m* to equalize the pressure and prevent friction in the bearings, the tubes *m* being supplemental means so as to connect said spaces directly with the steam chamber A'.

If the machine is acting as a suction-pump, then the medium is sucked into the space *n* behind the piston *r*, while the cylinder *d* with the rod-piston *r* is rotated from the exterior. The steam, &c., passes out again through a tube *q*, which opens into the outlet port *b*. In a similar manner as the inlet and outlet ports *a* and *b* of the working chamber A' are separated by the part of the surface of the cylinder B resting on cylinder A, the inlet and outlet ports of each space *n* are separated by the parts of the cylinder *d d* of cylinder B resting on the inner surfaces of the cylinders *c' c'*. The contact surfaces of the parts *d d* lie in a contrary sense to those of the cylinder B. Further when two machines are connected to work together, the pistons *r r* of the one machine can be placed at an angle of one hundred and eighty degrees to the pistons of the other, similarly to the piston-plates *f*, so that the one pair is assisted over from the outlet opening of tube *q* to the inlet opening of tube *p*, by the other pair, when these latter are under steam pressure. Piston *r* is composed, as can be seen from Fig. 6 of the three parts *r' r² r³*, of which the two combined parts *r' r²* hold the part *r³* firmly in a mold. This latter part lies with its exterior surface tight against the inner walls of the cylinder *c'* and can turn slightly in its mold. Sliding cheek *s* is composed of two parts *s'* and *s²*, Figs. 7 and 8, and is provided on the outside with small flutings, through which the steam led in by tube *p* can pass behind the pistons *r*.

Having fully described and ascertained the nature of this invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination in a rotary engine, the main cylinder, the reduced lateral cylinder extension *d*, the rotary part in the main cylinder having the piston plate, the reduced lateral extension on said piston portion fitting within the lateral cylinder extension, with contracted intervening spaces *n* and the steam supply pipes leading to said spaces, substantially as described.

2. In combination in a rotary engine, the main cylinder the reduced lateral cylinder extension *d*, the rotary part in the main cylinder having the piston plate, the reduced lateral extension on said piston portion fitting within the lateral cylinder extension, with

the contracted intervening spaces n , and the rod piston in said spaces, substantially as described.

5 3. In combination, the main cylinder, the rotary piston therein, the reduced lateral cylinder and piston portions, the piston plate forming a working chamber A' for the live steam and the pipe m extending from the

chamber A' to the contracted space n between the reduced cylinder and piston plates substantially as described.

RUDOLF NADENICZEK.

Witnesses:

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GERSTERÖRÖN.