

No. 826,422.

PATENTED JULY 17, 1906.

P. GRASSMANN.  
ROTARY ENGINE.

APPLICATION FILED FEB. 15, 1906.

3 SHEETS—SHEET 1.

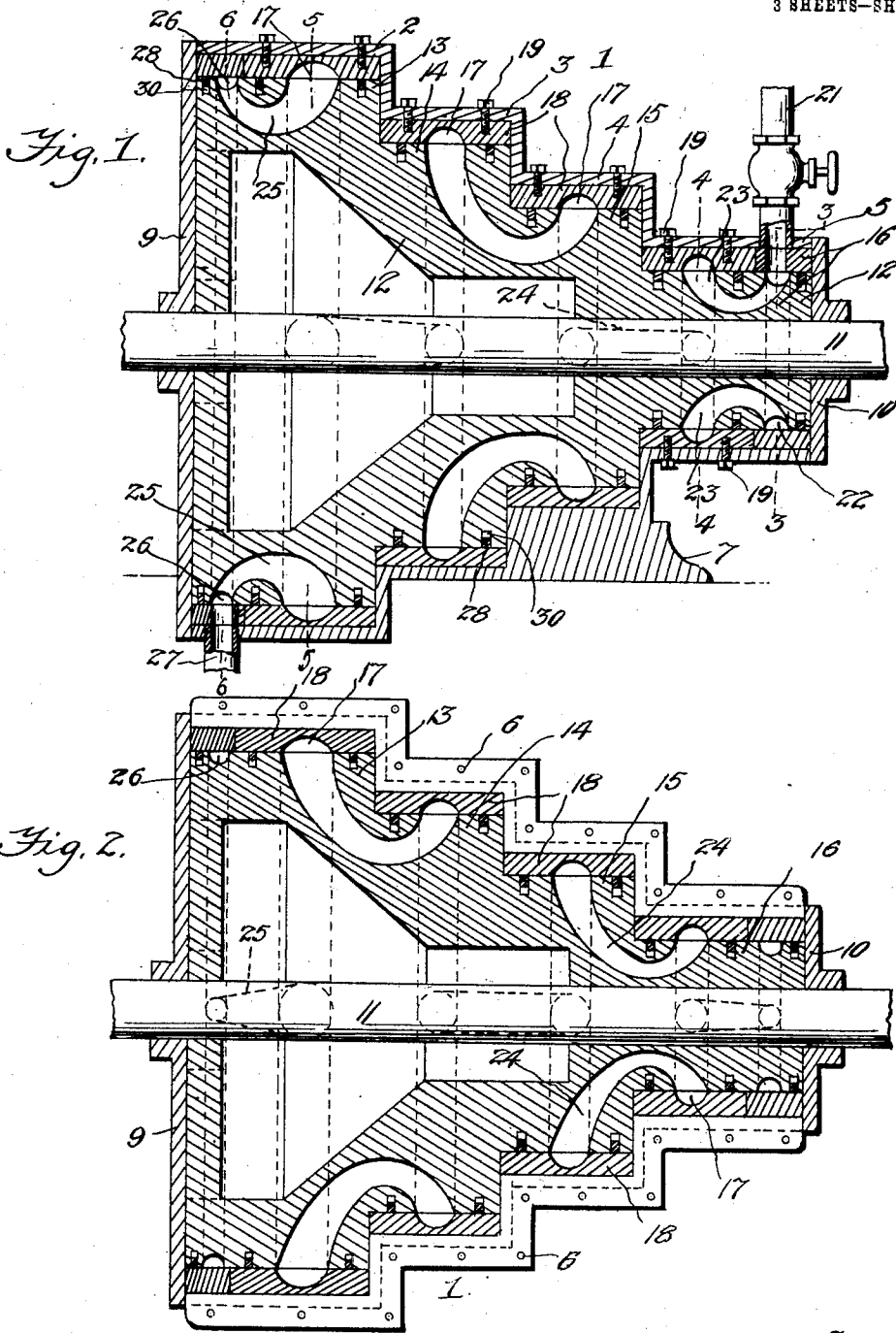


Fig. 1.

Fig. 2.

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3 SHEETS—SHEET 2.

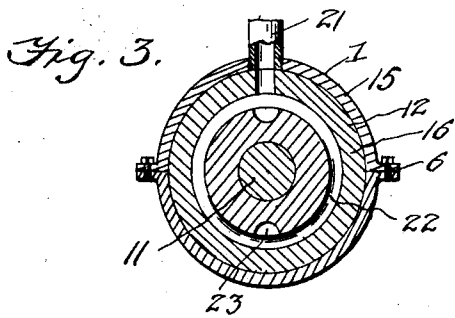


Fig. 8.

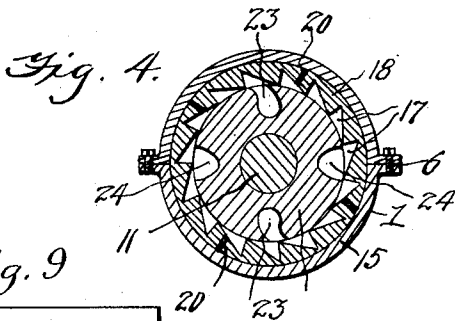


Fig. 9

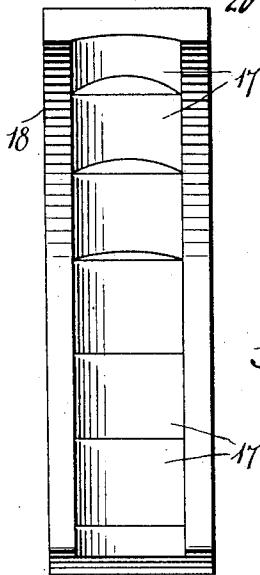
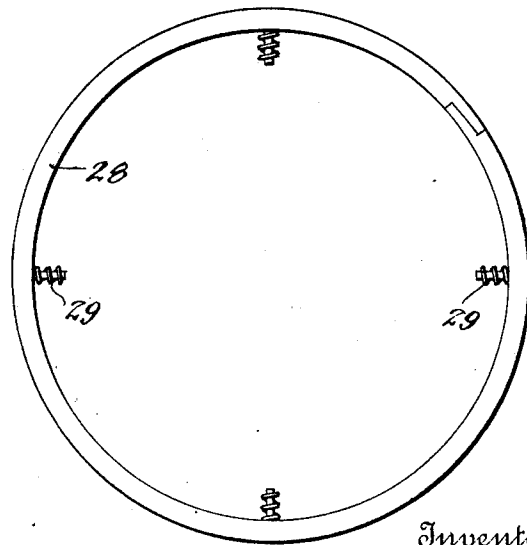


Fig. 7.



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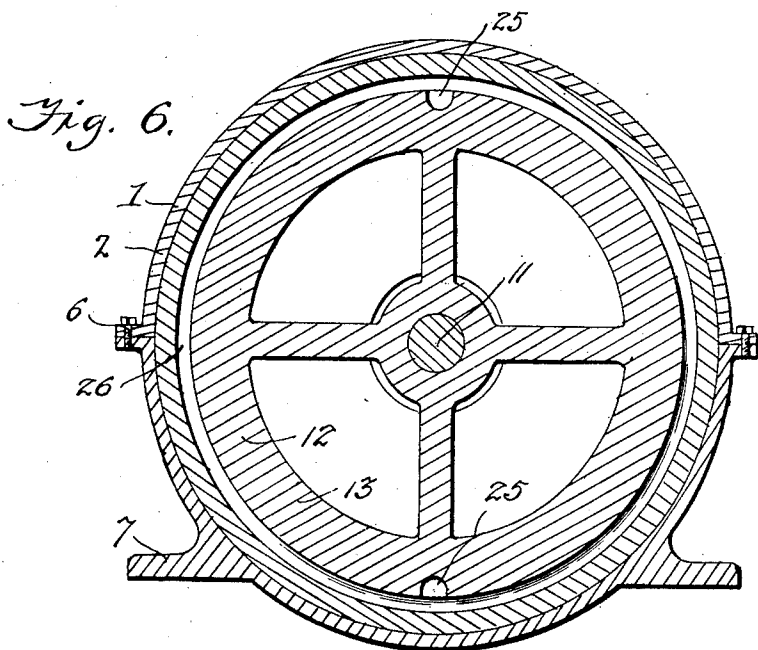
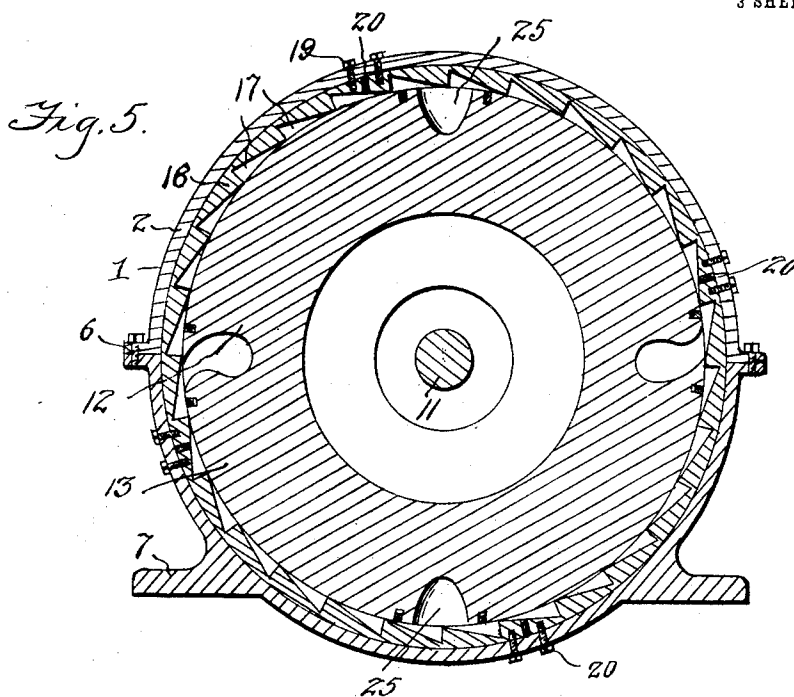
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3 SHEETS—SHEET 3



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# UNITED STATES PATENT OFFICE.

PETER GRASSMANN, OF LOUISVILLE, KENTUCKY.

## ROTARY ENGINE.

No. 826,422.

Specification of Letters Patent.

Patented July 17, 1906.

Application filed February 15, 1906. Serial No. 301,221.

*To all whom it may concern:*

Be it known that I, PETER GRASSMANN, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Rotary Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in rotary steam engines or turbines; and it consists in the novel construction, combination, and arrangement of devices hereinafter described and claimed.

The object of the invention is to improve and simplify the construction and operation of motors of this character, and thereby render the same more efficient and durable in use and less expensive to manufacture.

The above and other objects, which will appear as the nature of the invention is better understood, are accomplished by means of the construction illustrated in the accompanying drawings, in which—

Figure 1 is a vertical longitudinal sectional view through a rotary engine constructed in accordance with my invention. Fig. 2 is a horizontal sectional view through the same. Figs. 3, 4, 5, and 6 are vertical transverse sectional views taken, respectively, on the planes indicated by the lines 3 3, 4 4, 5 5, and 6 6 in Fig. 1. Fig. 7 is a detail view of one of the steam packing-rings. Fig. 8 is a detail view of one section of one of the removable bucket-rings. Fig. 9 is a view of the inner side or face of the ring-section shown in Fig. 8.

Referring to the drawings by numeral, 1 denotes a stationary casing which is of cylindrical form and consists of a plurality of sections 2, 3, 4, and 5, each of which is of greater diameter than the next succeeding, as shown in Figs. 1 and 2 of the drawings. This casing 1 is preferably formed of upper and lower half-sections, which are united, as shown at 6, the lower section being adapted to be secured upon a suitable base or support, as shown at 7. The large end of the casing, or the outer end of the section 2, is adapted to be closed by a removable head or plate 9, and the small end of the casing, or the outer end of the small section 5, is similarly closed by a removable head or plate 10.

Mounted in suitable bearings and extending concentrically through the casing 1 and

its heads 9 10 is a shaft 11, upon which is secured a rotary wheel or piston 12, which is also of cylindrical form and consists of a series of stepped sections 13, 14, 15, and 16, which are adapted to fit and rotate within the sections 2, 3, 4, and 5 of the casing. This wheel or piston 12 is rotated by the impact of steam discharged from the periphery of the same into pockets or buckets 17, arranged upon the inner faces of the casing 1. These pockets or buckets 17 are preferably formed in sectional rings 18, which are removably secured by means of set-screws or the like 19 upon the inner faces of sections 2, 3, 4, and 5 of the casing. A packing 20 is preferably provided between the abutting ends of the sections of each of said bucket-rings 18. The steam is admitted through a valve-controlled steam-inlet pipe 21, which projects through the small end of the casing and opens into an annular groove 22, formed in the small section 16 of the piston. From this annular groove 22 the steam is adapted to pass through curved ports or passages 23, formed in said section 16, and to be discharged against the buckets or pockets 17 in the smallest section 5 of the casing 1. These inlet ports or passages 23 are arranged at diametrically opposite points, as shown in Fig. 1 of the drawings, and the steam after being employed in the first section of the engine is discharged from the latter into the second section through pipes or passages 24, arranged at diametrically opposite points in a plane at right angles to the plane of the ports or passages 23. The steam after being used in the second section of the engine is discharged through similarly-arranged ports or passages into the next section, and so on until it reaches the last section 2.

It will be understood that a greater or less number of the sections may be employed than that shown in the accompanying drawings. The steam after being used in the last or largest section of the engine is discharged through ports or passages 25 to an annular groove 26, formed in the large section 13 of the wheel or piston 12. From this annular groove the steam escapes through an exhaust-pipe or other connection 27 into the atmosphere or to a suitable condenser.

In order to prevent the leakage and escape of steam between the different sections of the engines, I preferably provide annular packing-rings 28 in annular grooves arranged in the outer faces of the sections 13, 14, 15, and

16 of the piston or wheel 12, as clearly shown in Figs. 1 and 2 of the drawings. These rings, as shown in Fig. 7, are divided and have their ends overlapping, and they are pressed outwardly against the inner faces of the pocket or bucket rings 18 by coiled springs 29, which are arranged in sockets or recesses 30. The wheel or piston 12 may be cast in one piece or it may be formed in sections, which may be secured together and to the shaft 11 as desired.

The construction, operation, and advantages of the invention will be readily understood from the foregoing description, taken in connection with the accompanying drawings. It will be seen that the steam entering the small end of the engine will pass through the succeeding steps or sections and operate against the pockets or buckets in each of said sections to assist in turning or rotating the shaft 11. The packing arranged as shown in the drawings prevents any escape or loss of steam.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A rotary engine comprising a casing having an annular series of pockets or buckets upon its inner face, a steam-inlet pipe opening into said casing, a rotary piston in said casing having an annular groove to aline with said steam-inlet, and a passage or port leading from said groove and adapted to direct the steam against the pockets or buckets in said casing.

2. A rotary engine comprising a cylindrical casing formed of concentrically - arranged steps or sections of successively-increasing diameters, said sections being provided in their inner faces with annular series of pockets or buckets, a steam-inlet opening into the smallest section of said casing, a rotary piston or wheel mounted within said casing and provided with steps or sections to rotate in the sections of said casing, the smallest section of said piston being formed with an annular groove to register with said steam-inlet and with diametrically - opposed passages leading from said groove and adapted to discharge steam against the buckets or pockets in the smallest section of the casing, and ports or passages in said piston affording communication between its adjacent sec-

tions and arranged at diametrically opposite points in planes at right angles to each other, substantially as described.

3. A rotary engine comprising a cylindrical casing formed of concentrically - arranged steps or sections of successively-increasing diameters, said sections being provided in their inner faces with annular series of pockets or buckets, a steam-inlet opening into the smallest section of said casing, a rotary piston or wheel mounted within said casing and provided with steps or sections to rotate in the sections of said casing, the smallest section of said piston being formed with an annular groove to register with said steam-inlet and with diametrically-opposed passages leading from said groove and adapted to discharge steam against the buckets or pockets in the smallest section of the casing, ports or passages in said piston affording communication between its adjacent sections and arranged at diametrically opposite points in planes at right angles to each other, the largest section of said piston being formed with an annular groove adapted to register with an exhaust port or passage in said casing, and spring-pressed packing-rings arranged in the outer faces of the sections of said piston and adapted to bear against the inner faces of the sections of said casing upon opposite sides of their pockets or buckets, substantially as shown and described.

4. A rotary engine comprising a casing having a series of concentric sections of varying diameters, each with a series of buckets on its inner face, said casing being further provided with a steam-inlet to one of said sections and an exhaust-outlet from another, and a rotary piston in the casing having sections fitting in the respective sections of the casing, one of said piston-sections having an annular groove communicating with the steam-inlet in the casing, another of said piston-sections having an annular groove communicating with the exhaust-discharge port of the casing, said piston being further provided with passages to establish steam communication between its various working faces, and passages to connect said grooves with those of its working faces which are contiguous to said grooves.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

PETER GRASSMANN.

Witnesses:

AUGUST HOLZKNECHT,  
BALDWIN KREMER.