(No Model.) 2 Sheets—Sheet 1.

J. A. JOHNSON.

ROTARY STEAM ENGINE.

No. 522,296. Patented July 3, 1894.

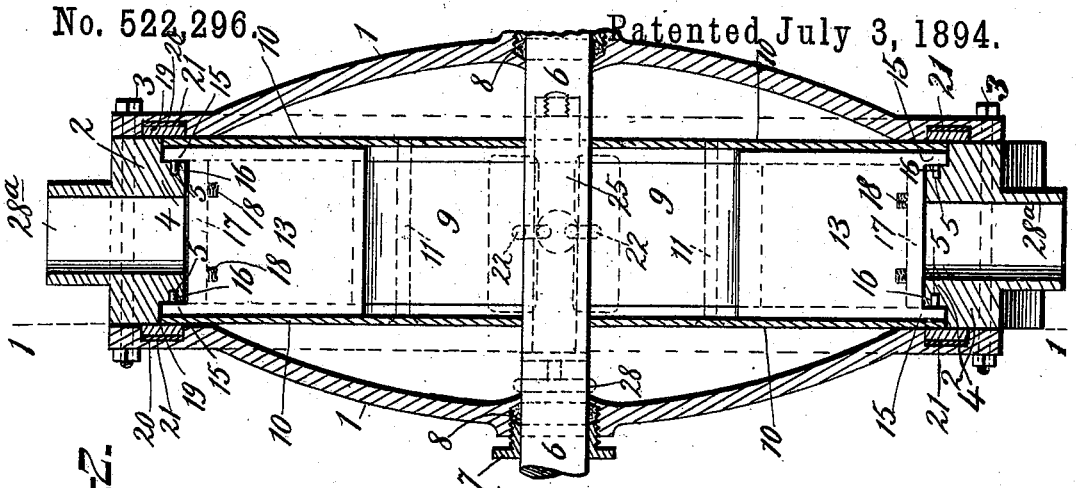

Fig. 2.

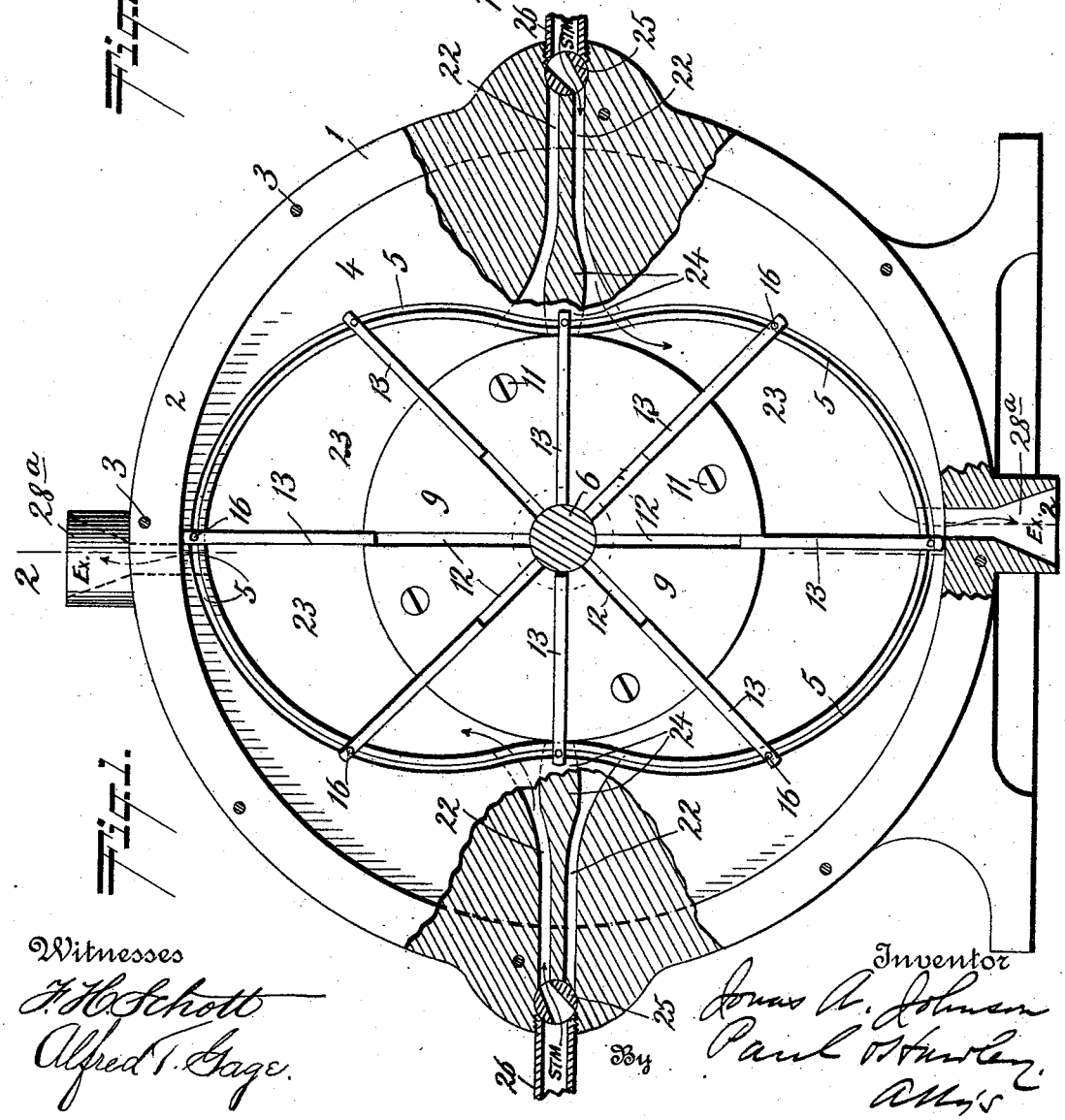

Fig. 1.

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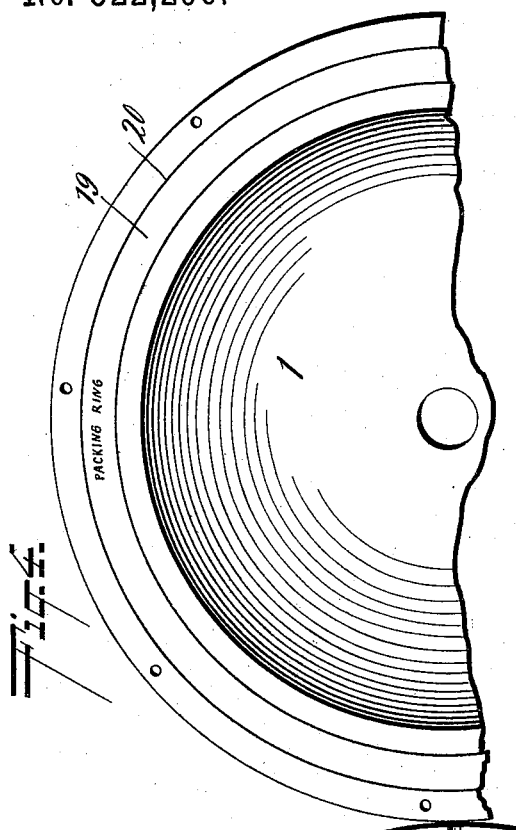

Fig. 4.

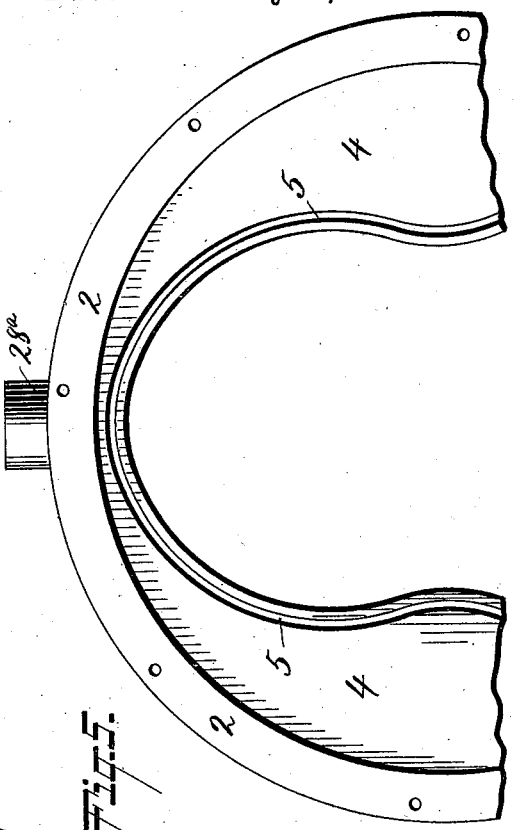

Fig. 5.

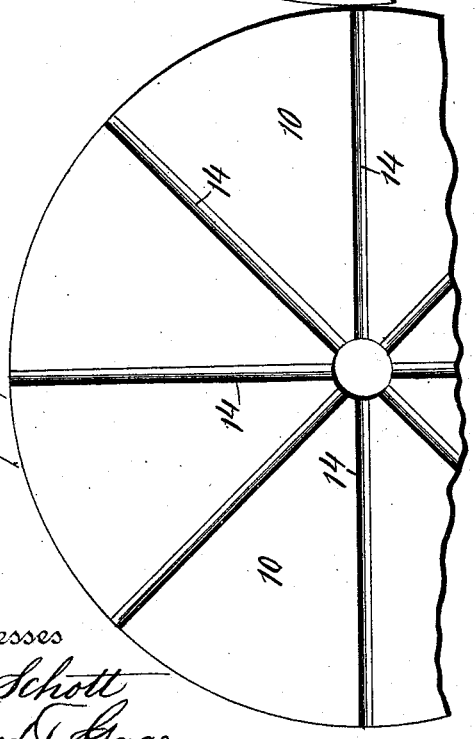

Fig. 3.

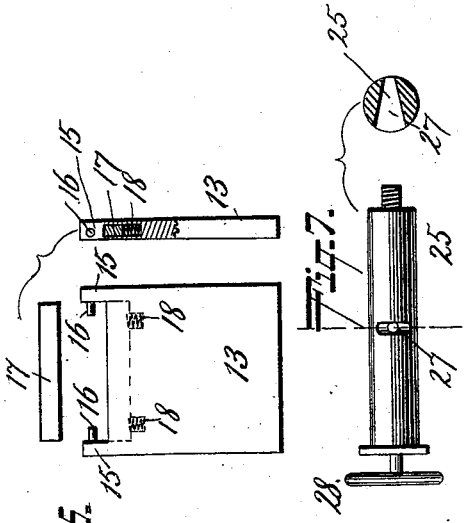

Fig. 7.

Fig. 6.

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UNITED STATES PATENT OFFICE.

JONAS A. JOHNSON, OF HOLMES CITY, MINNESOTA.

ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 522,296, dated July 3, 1894.

Application filed March 28, 1893. Serial No. 468,035. (No model.)

To all whom it may concern:

Be it known that I, JONAS A. JOHNSON, a citizen of the United States, residing at Holmes City, in the county of Douglas and State of Minnesota, have invented certain new and useful Improvements in Rotary Steam-Engines; and I do hereby 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 rotary steam engines, and has for its object to simplify and cheapen the construction of the engine and to render the same more efficient in action and capable of doing as much work if not more with less steam pressure and with much less consumption of fuel than under other constructions.

To the accomplishment of the foregoing and such other objects as may hereinafter appear, the invention consists in the construction and in the combination of parts hereinafter particularly described and then sought to be specifically defined by the claims, reference being had to the accompanying drawings, forming a part hereof, and in which—

Figure 1 is a side elevation of the engine with one of the cylinder heads removed and parts in section. Fig. 2 is a vertical cross section on the line 2—2 of Fig. 1. Fig. 3 is an inside face view of one of the disks or plates formed with grooves or ways for the pistons to slide in, a portion being broken away. Fig. 4 is an inside view of a portion of one of the cylinder heads showing the packing ring in the face thereof. Fig. 5 is a side view of a portion of the central ring of the engine with its web in which is formed the cam shaped groove for moving the pistons in and out. Fig. 6 illustrates in detail portions of the pistons; and Fig. 7 illustrates a side view and cross section through the steam controlling and directing valve.

In the drawings the numeral 1 designates the two heads of the engine which are preferably formed with a concave inner face as illustrated, the heads however next to the periphery being flat so as to form a close joint with the opposite side of the central rim 2 to which the heads are secured by the bolts 3. From the central rim 2 projects inwardly a web 4 having formed in its opposite faces the grooves 5 of the form illustrated which may represent the sections of two ellipses with their bases toward each other and connected together by the segments of two circles extending inwardly so as to form a cam shaped groove that may for convenience be designated a sectional elliptical groove having intermediate inwardly extending curves. The form of this cam shaped groove is such that at the inwardly curved portions of the groove the pistons will be at the limit of their inward movement and at the top and bottom or two outwardly extremes of the groove the pistons will be at the limit of their outward movement. The inner face of the web describes a contour corresponding to the shape of the cam groove so that the pistons in their rotation may describe the course of the cam groove.

The engine shaft 6 passes centrally through the two cylinder heads and has its bearings in suitable boxes 7 fitting into the heads at which point suitable packings 8 are provided. This shaft has keyed or otherwise secured to it a central drum 9, and plates or disks 10 bear against the opposite faces of this drum and are secured thereto by bolts 11. The periphery of these plates or disks lie on opposite sides of the web 4 at a distance therefrom and bear against the inner flat faces of the peripheral portion of the cylinder heads as illustrated. The plates or disks and the central drum revolve together. The central drum 9 is formed with radial slots 12 in which work the pistons 13. The outer edges of these pistons move in grooves 14 formed radially in the inside faces of the plates or disks and corresponding to the radial slots 12 in the drum, by means of which the pistons are guided in their reciprocation. The outer ends of the pistons 13 are formed with side extensions 15 which fit into the spaces left between the opposite faces of the web 4 and the inner faces of the disks or plates 10, and from these extensions pin 16 project inwardly and enter the cam grooves 5 formed in the opposite faces of the web so that the pistons will be caused to move in and out as they move around the cylinder.

In order to insure close contact between the outer ends of the pistons and the cam

shaped face of the web, the pistons are provided at their outer ends with sliding blocks 17 which are forced outwardly by springs 18 so that a close and yielding contact is insured between the piston and the cam face of the web.

In order to prevent leakage of steam at the joints between the outer peripheries of the plates or disks 10 and the central rim 2, annular rings 19 are fitted into annular grooves 20 formed in the inner faces of the cylinder heads near their peripheries, and a suitable elastic packing 21 or its equivalent is inserted back of the rings so as to cause the inner faces of the rings to bear closely against the joint and thus prevent leakage.

At opposite points in the central rim of the cylinder are formed ports 22 which at their inner ends diverge from each other and open into the steam space 23 which lies on opposite sides of what may be termed the bridges 24 so that steam may be admitted to act against the faces of the pistons at opposite points indicated by the arrows in Fig. 1 and in the direction in which the pistons travel in their rotation. Steam is admitted into these ports through the valves 25 as it is received from its source through the pipes 26. These valves are suitably journaled in the central rim and are formed with the transverse port 27 and with the hand wheel 28 so that the valves may be turned to direct the steam into one port or the other as desired by making a quarter revolution of the valve, or to cut the steam off entirely by making a half revolution of the valve. If desired these two valves may be connected together by any suitable means so that when one valve is turned the other valve will be turned at the same time. The central rim is also provided at opposite points with the exhaust ports 28^a arranged on opposite sides of a line drawn diametrically through the engine so that the steam may exhaust from the space to one side of the two pistons that have reached practically the limit of their outward movements as clearly indicated in Fig. 1 of the drawings. It will be observed that by this arrangement of ports and pistons, live steam from the inlet ports is acting against the faces of two of the pistons at the same time while steam is expanding in the space between the piston against one face of which the live steam is acting and the other piston immediately in advance of that piston. The result is that the steam is acting against four pistons at the same time, the expanding steam acting against two of the pistons and the live steam against two other pistons.

If it is desired to reverse the action of the engine, it is only necessary to turn the inlet controlling valve one quarter of a revolution so as to cut off the steam from one set of ports and admit it to the other set when it will act against the pistons in the opposite direction to what it did at first and thus reverse the engine.

The construction and arrangement of the parts described serve the objects stated, and the advantages are apparent to the skilled in the art and need not be further enlarged upon.

I have described and shown what are considered the best details of construction and arrangement, but I do not mean to limit myself thereto as it is obvious that alterations can be made without departing from the spirit of the invention.

Having described my invention and set forth its merits, what I claim is—

1. In a rotary engine, the combination with the radially reciprocating rotating pistons, the casing formed with a sectional elliptical groove in the inwardly projecting web having intermediate inwardly extending curves for reciprocating the pistons, and the central circular drum in which said pistons slide and by which a steam space is formed between said drum and casing of increasing area from the inlet to an exhaust port and of decreasing area from said exhaust toward a second inlet port, of the steam inlet ports arranged at opposite points to act upon the piston adjacent thereto, and the exhaust ports located at opposite points intermediate of said inlet ports and where the pistons reach the extreme outward limit of their movement, substantially as and for the purposes described.

2. In a rotary engine, the combination with the radially reciprocating rotating pistons, the casing formed with a sectional elliptical groove in the inwardly projecting web having intermediate inwardly extending curves for reciprocating the pistons, and the central circular drum in which said pistons slide and by which a steam space is formed between said drum and casing of increasing area from the inlet to an exhaust port and of decreasing area from said exhaust toward a second inlet port, of the inlet ports arranged at opposite points to act upon the pistons adjacent thereto and located respectively one above and the other below the bridges located at or adjacent to the points where two of the pistons will lie at the limit of their inward movement, and exhaust ports located at opposite points intermediate of said inlet ports, and where the pistons reach the extreme outward limit of their movement, substantially as and for the purposes described.

3. In a rotary engine, the combination with the radially reciprocating rotating pistons, the casing formed with a sectional elliptical groove in the inwardly projecting web having intermediate inwardly extending curves for reciprocating the pistons, and the central circular drum in which said pistons slide, and by which a steam space is formed between said drum and casing of increasing area from the inlet to an exhaust port and of decreasing area from said exhaust toward a second inlet port, of the two sets of inlet ports arranged on opposite sides of the bridges lying opposite to each other, valves for directing the inflow of steam into one set of ports or

the other as desired, and the exhaust ports located intermediate of the two sets of inlet ports and where the pistons reach the extreme outward limit of their movement, substantially as and for the purposes described.

4. In a rotary engine, the combination of the centrally located drum and the disks or plates on opposite sides thereof, the drum and plates being formed with corresponding ways or grooves, the web having the cam grooves formed in its opposite faces, the pistons reciprocating in the ways or grooves of the drum and the disks or plates and provided with inwardly projecting pins engaging said cam grooves, and inlet and exhaust ports, substantially as and for the purposes described.

5. In a rotary engine, the combination of the centrally located drum and the disks or plates on opposite faces thereof, the drum and disks or plates having corresponding grooves or ways, the web formed with cam grooves in its opposite faces, the pistons reciprocating in the ways of the drum and disks and plates and having pins entering said cam grooves, and the spring actuated blocks located at the ends of the pistons to bear against the face of said web, substantially as and for the purposes described.

6. In a rotary engine, the combination with the central rim and the disks or plates formed with ways for reciprocating pistons, of the cylinder heads formed with annular recesses, the annular rings located in said recesses and overlapping the joints between said disks or plates and the central rim, substantially as and for the purposes described.

In testimony whereof I affix my signature in presence of two witnesses.

JONAS A. JOHNSON.

Witnesses:
S. O. WAGENIUS,
O. J. ANDERSON.