

No. 633,387.

Patented Sept. 19, 1899.

T. NACE.
ROTARY STEAM ENGINE.

(Application filed Jan. 27, 1899.)

(No Model.)

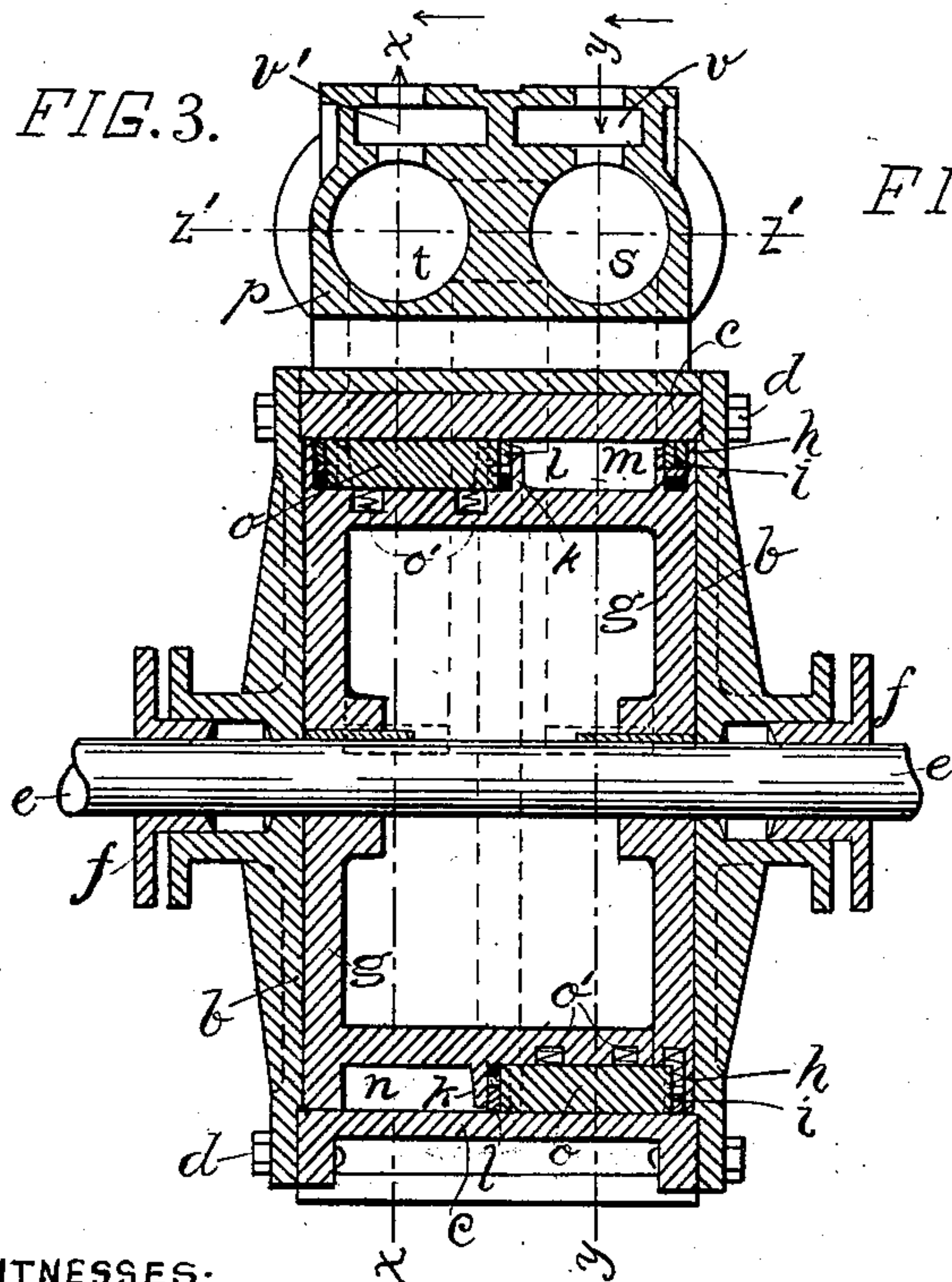
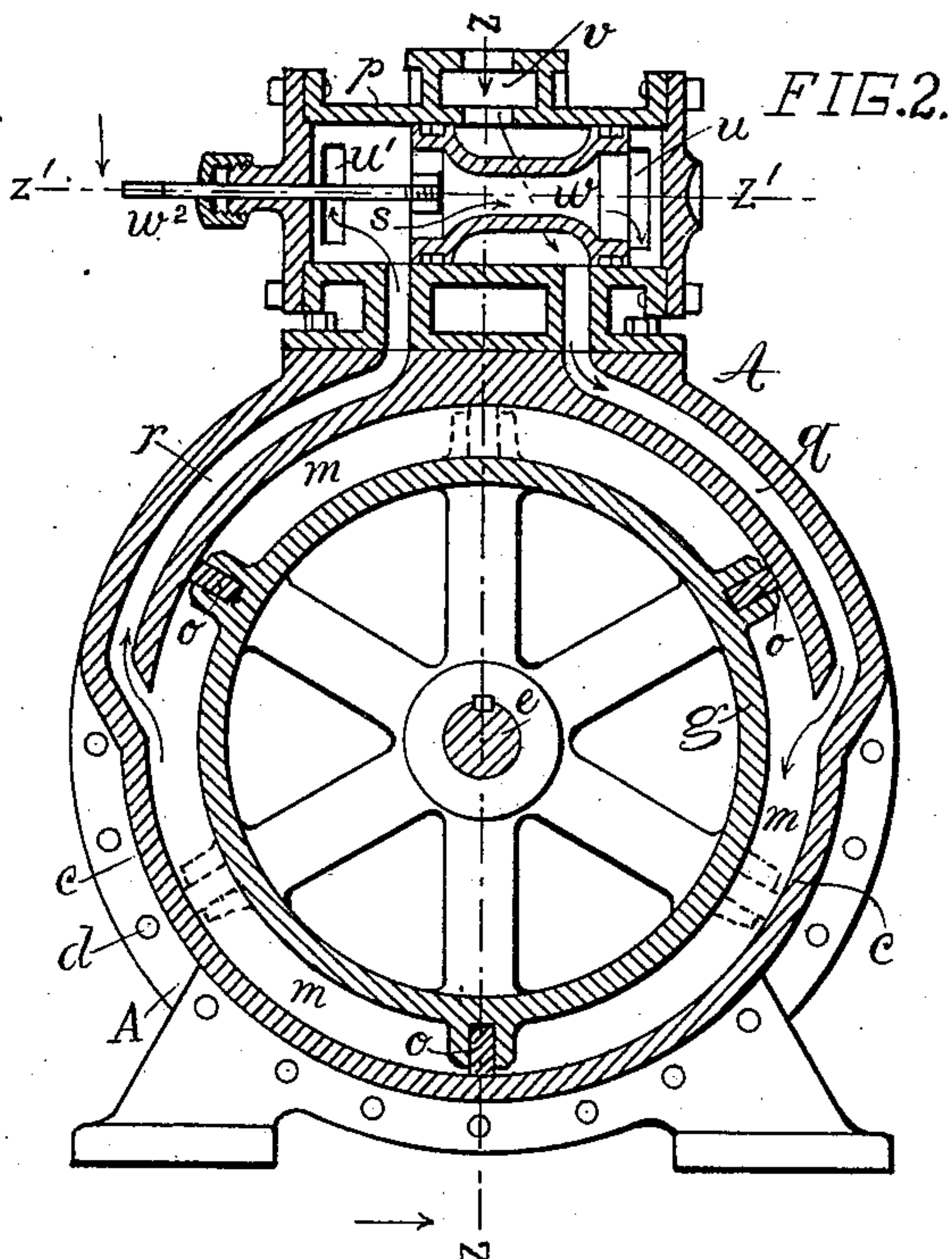
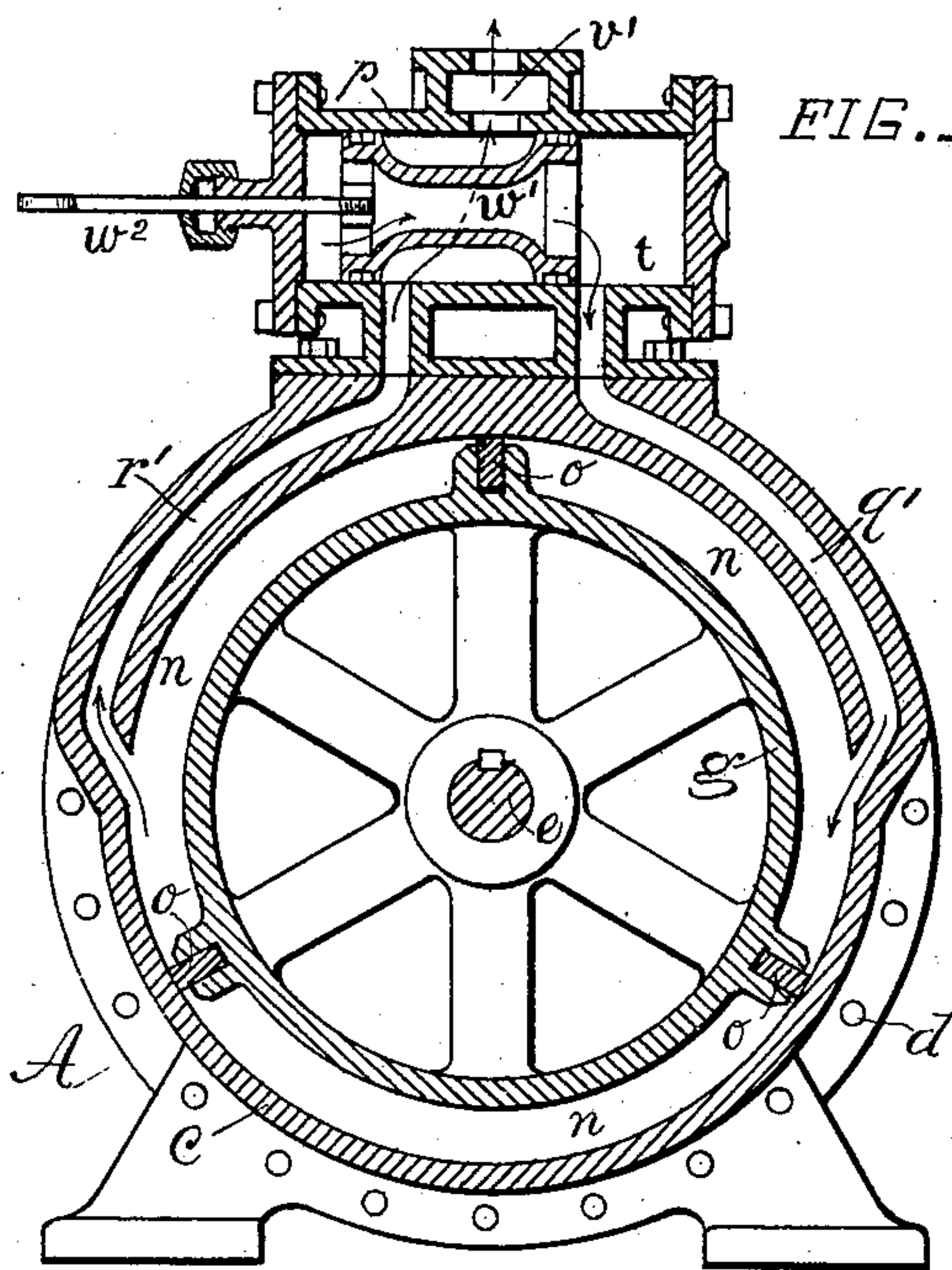
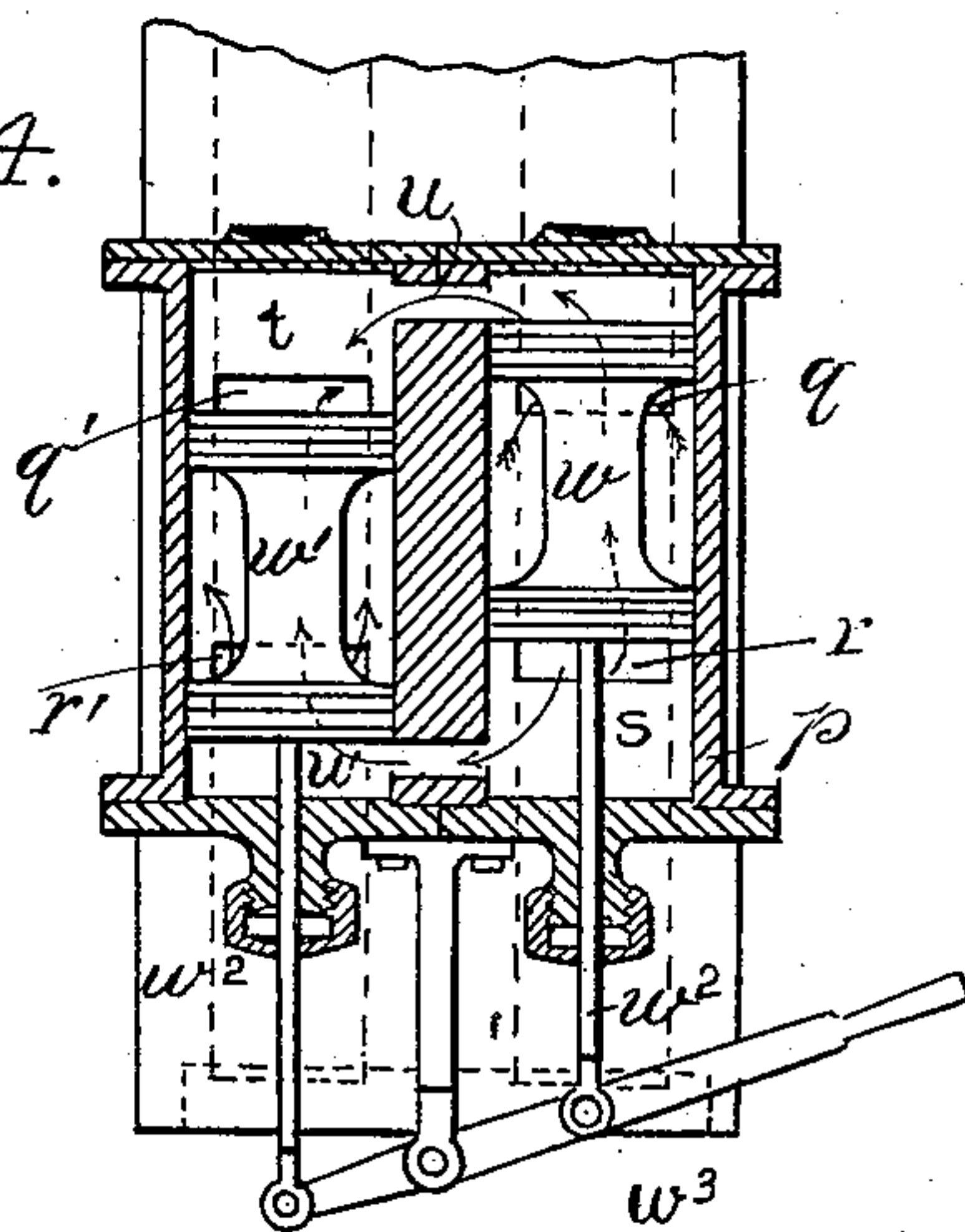


FIG. 4.



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ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 633,387, dated September 19, 1899.

Application filed January 27, 1899. Serial No. 703,552. (No model.)

To all whom it may concern:

Be it known that I, THOMAS NACE, a citizen of the United States, residing at Toledo, Lucas county, Ohio, have invented certain new and useful Improvements in Rotary Steam-Engines, of which the following is a specification.

My invention relates to and its object is to provide a compound rotary steam-engine which when the engine is in action shall consist of but a single moving member; also, to provide a novel valve mechanism by which my engine may be reversed at will. I attain these objects by means of the device hereinafter described and shown and illustrated in the accompanying drawings, made part thereof, in which—

Figure 1 is a vertical longitudinal section on line xx , Fig. 3; Fig. 2, a like section on line yy , Fig. 3; Fig. 3, a transverse vertical section on line zz , Fig. 2; and Fig. 4, a sectional top plan view on line $Z'Z'$, Figs. 2 and 3.

Like letters of reference indicate like parts throughout the drawings.

In the drawings, A is a drum composed of disks b and a hoop c , bolted together, as at d . Through the axis of the drum passes a shaft e , provided with stuffing-boxes ff . Within the drum A is a cylinder g , axially mounted on and secured to the shaft e . The cylinder g is of such diameter as to leave an annular space between itself and the interior periphery of the drum A. The cylinder lengthwise of the shaft is of such width as to leave barely a working clearance between its ends and the inner faces of the disks b . At the two margins of the outer face of the cylinder g are radially-projecting flanges h , which in circumferential channels carry packing-rings i . Midway between the flanges h is a like flange k , carrying a packing-ring l . The flanges h and their packing-rings divide the annular space between the drum A and cylinder g into two circumferential compartments m and n . Each of the compartments m and n is divided into sections or spaces by equidistant radially-projecting blades o , extending transversely from the flanges h inwardly to the flange k . These blades are "staggered" or alternate with each other at equidistant intervals on opposite sides of the flange k . The blades o are radially movable in lateral grooves and are held projected against the inner faces of the hoop

c by means of springs o' , interposed between the bottom of the cross-grooves and the inner edge of the vanes or blades. It will be seen that the circumferential packing-rings and the lateral blades divide the outer periphery into two series of equal sections placed side by side and alternating with each other.

On the top of the casing or drum is a steam-chest p , from which lead steam-passages q and q' , forming inlet-ports for the two sides of the engine. At the opposite side of the drum or casing are outlet steam passages or ports r and r' , leading from the interior of the casing or drum to the steam-chest. The steam-chest is provided with two parallel horizontal bores, the axes of which are at a right angle to the shaft e . The steam-chest bore corresponding with the annular steam-space m is lettered s and the other one t . The two chambers s and t are connected at both their ends by ports u and u' . (See Fig. 4.) Chamber s has an inlet-port v , which is to be connected with the boiler, and chamber t has an outlet-port v' to be connected with an exhaust-pipe.

Movable longitudinally in each of the chambers s and t is an elongated hollow plunger w and w' , contracted at its middle. Each of the plungers is provided with a valve-rod w^2 , passing through a stuffing-box in the head of the steam-chest. These valve-rods are connected to a lever w^3 , (see Fig. 4,) the throw of which moves the plungers in opposite directions. The plungers are designed to be moved manually and are normally at rest, their relation being changed only when the motion of the machine is to be reversed.

The further details of construction of my device can be best understood from a description of its mode of operation, which is as follows: The steam supply and exhaust pipes being connected up at ports v and v' and the valves or plungers w and w' being set, as shown in the drawings, steam is admitted through port v . The course of the steam is now through the annular space surrounding the centrally-contracted plunger w , thence through steam-passage q into the chamber m . It will be observed that the inner extremity of the passage q is tangentially disposed in relation to the circle described by the blades of the rotary cylinder, so that the incoming steam has its impact upon the rear side of the blades.

As the cylinder revolves the steam finds its exit from the drum through passage *r* into the steam-chest *s*, thence through the hollow plunger *w*, thence through the connecting-
 5 port *u* into chamber *t*. From chamber *t* steam follows passage *q'* into the annular chamber *n*, where it operates expansively upon the blades *o* in the manner above described. The steam now escapes through passage *r'* into
 10 the annular space surrounding the plunger *w'*, which is in communication with the exhaust-port *v'*, and thence into the open air or condenser.

In case the engine is to be run in the direction opposite that just described the lever
 15 *w*³ is pulled outwardly and the two plungers are each caused to move to the opposite ends of their respective chambers. The inlet-port *v* is now connected by way of the annular
 20 space around the plunger *w* with the port *r*, and the course of the steam is reversed, following the annular space *m*, port *q*, across through port *u'*, thence through the hollow plunger *w'*, steam-passage *r'*, the annular
 25 space *n*, passage *q'*, the annular space surrounding *w'*, and thence through port *v'* to the outer air or condenser.

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

1. In a rotary steam-engine, a cylinder journaled concentrically within the drum and of less diameter than the interior diameter of the drum, three parallel circumferentially-
 35 arranged packing-rings surrounding the cylinder and forming two separate blade circumferential chambers, a set of radial blades carried by the cylinder within said chambers, two valve-chambers having communication
 40 with each other at both ends and respectively with said blade-chambers, exhaust and inlet ports in communication respectively with the valve-chambers, and valves in said valve-chambers constructed to control all of said
 45 steam communications, substantially as described.

2. In a rotary engine a rotary cylinder having two sets of radial blades side by side, and

a valve mechanism controlling the passage of steam to said two sets of blades, comprising
 50 two valve-chambers, a port between said two chambers at both ends, an inlet-port communicating with one of said valve-chambers, an exhaust-port communicating with the other
 55 said valve-chambers, inlet and outlet passages for each of said sets of radial blades connected with said valve-chambers, valves within said chambers and constructed to control said passages, substantially as described.

3. In a rotary engine a rotatory cylinder having two sets of radial blades side by side, and a valve mechanism for controlling the passage of steam through said two sets of blades, comprising two valve-chambers, a hollow centrally-contracted plunger in each of said
 60 valve-chambers, a port between said two chambers, an inlet-port communicating with the annular space surrounding the contracted portion of one of said plungers, an exhaust-port connected with the like portion of the
 70 other plunger, an inlet-passage and an outlet-passage for each of said sets of radial blades connected with said valve-chambers and means for reciprocating said plungers simultaneously in opposite directions, substantially
 75 as and for the purpose specified.

4. A rotary steam-engine comprising a drum, a shaft mounted axially therein, a cylinder mounted axially within the drum on said shaft and of less diameter than the interior
 80 diameter of the drum, three parallel circumferentially-arranged packing-rings dividing the annular space surrounding the cylinder into two separate circumferential chambers, a set of radial blades in each of said
 85 chambers, a steam-chest having two valve-chambers in communication with each other at both ends and separate valves within said chambers adapted to lead the steam in through
 90 one of said circumferential chambers and out through the other, substantially as described.

THOMAS NACE.

In presence of—

WILBER A. OWEN,
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