

No. 726,969.

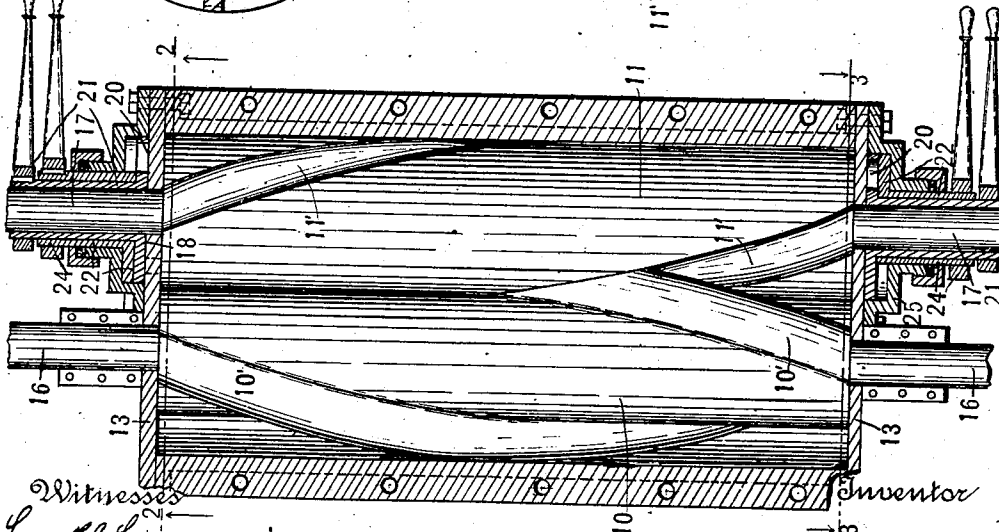
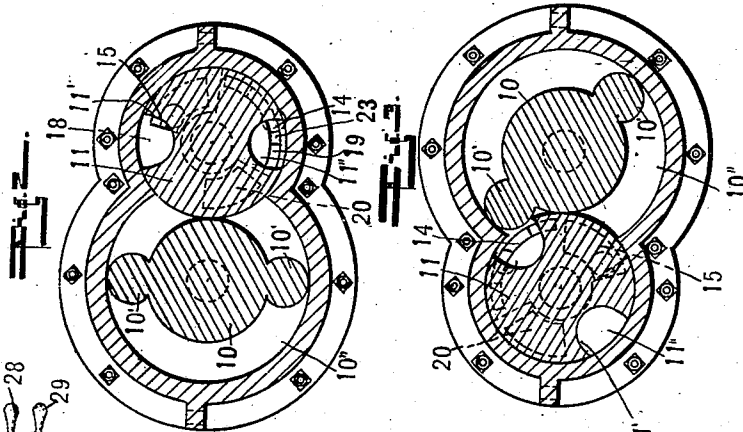
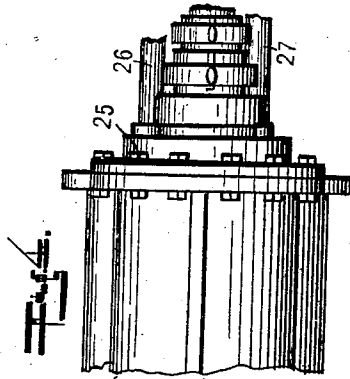
PATENTED MAY 5, 1903.

N. H. MOTSINGER.
ROTARY ENGINE.

APPLICATION FILED DEC. 12, 1901.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
Frank A. Lohr
Arthur M. Ballard

Inventor
Neville H. Motsinger
By
Arthur M. Hood Attorney

No. 726,969.

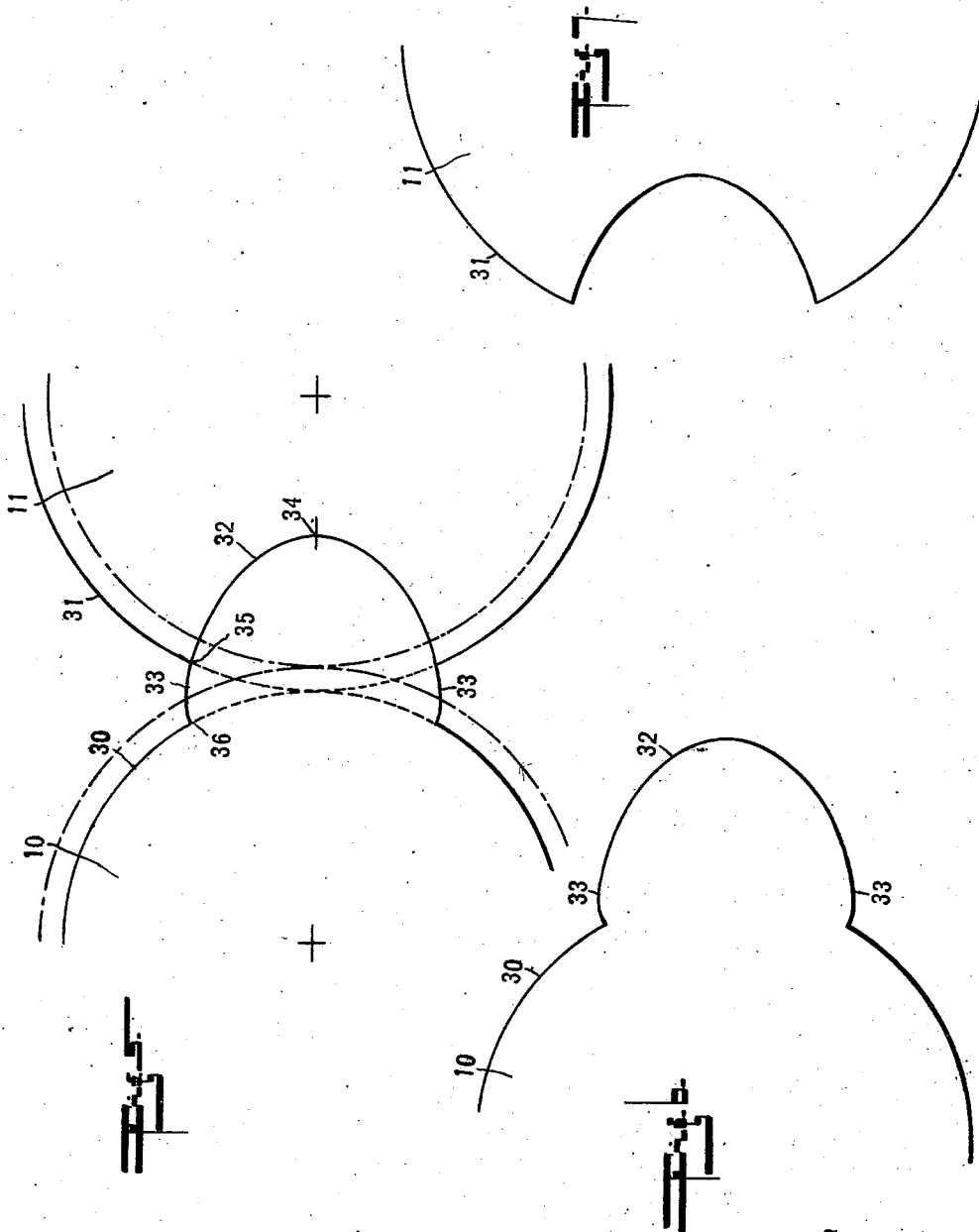
PATENTED MAY 5, 1903.

N. H. MOTSINGER.
ROTARY ENGINE.

APPLICATION FILED DEC. 12, 1901.

NO MODEL.

4 SHEETS—SHEET 2.



Witnesses
Frank A. Fable
Arthur M. Ballard

Inventor
N. H. Motsinger
By
Arthur M. Hood
Attorney

No. 726,969.

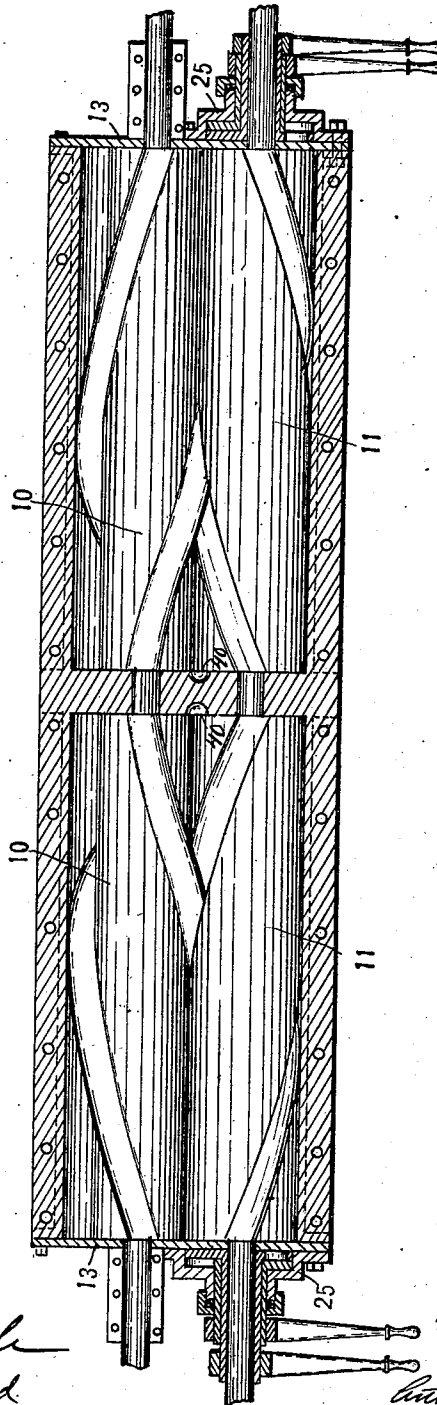
PATENTED MAY 5, 1903.

N. H. MOTSINGER.
ROTARY ENGINE.

APPLICATION FILED DEC. 12, 1901.

NO MODEL.

4 SHEETS—SHEET 3.



Witnesses
Frank A. Fable
Arthur M. Ballard

Inventor
N. H. Motsinger
By
Arthur M. Hood
Attorney

No. 726,969.

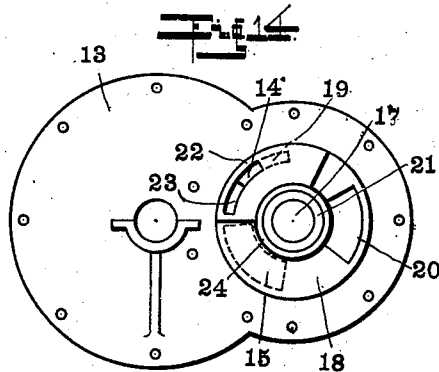
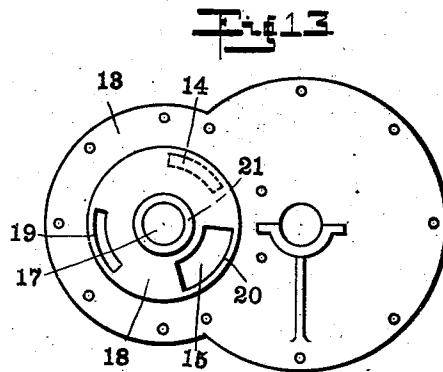
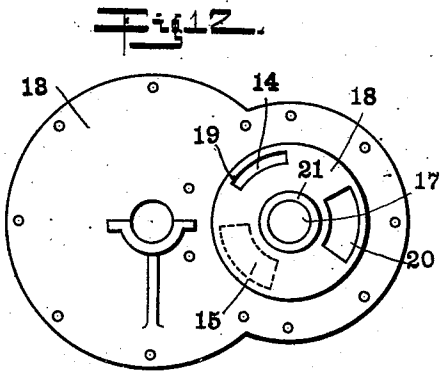
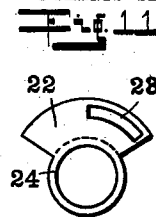
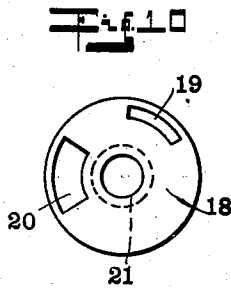
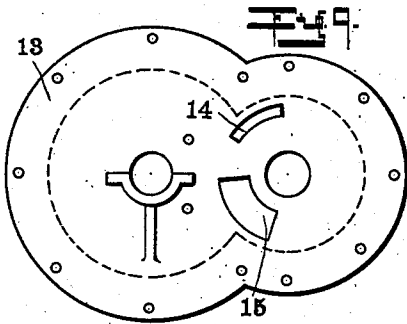
PATENTED MAY 5, 1903.

N. H. MOTSINGER.
ROTARY ENGINE.

APPLICATION FILED DEC. 12, 1901.

NO MODEL.

4 SHEETS—SHEET 4.



WITNESSES:

Frank R. Fable
J. A. Walsh

INVENTOR

Newell H. Motsinger

BY

Arthur M. Wood
ATTORNEY.

UNITED STATES PATENT OFFICE.

NEWELL H. MOTSINGER, OF INDIANAPOLIS, INDIANA.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 726,969, dated May 5, 1903.

Application filed December 12, 1901. Serial No. 85,876. (No model.)

To all whom it may concern:

Be it known that I, NEWELL H. MOTSINGER, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to an improvement in that class of engines in which the working parts are continuously rotary.

The object of my invention is to produce a machine of the class described in which there will be formed one or more expansible spiral wedge-shaped chambers for the reception of an operating fluid under pressure, such as steam, water, explosive gases, air, &c.

The accompanying drawings illustrate my invention.

Figure 1 is an axial section of my improved engine. Fig. 2 is a section on line 2-2 of Fig. 1. Fig. 3 is a section on line 3-3 of Fig. 1. Fig. 4 is a side elevation of one end. Figs. 5, 6, and 7 indicate a preferred contour for the vane and groove. Fig. 8 is a plan of a modified form for balancing the end thrust. Fig. 9 is an elevation of the left-hand end of Fig. 1 with the valve-plates removed. Fig. 10 is an elevation of the valve-plate 18. Fig. 11 is an elevation of the valve-plate 22. Fig. 12 is a view similar to Fig. 9 with valve-plate 18 in position thereon. Fig. 13 is a similar view of the opposite or right-hand end of Fig. 1. Fig. 14 is a view similar to Fig. 12 with both of the valve-plates in position.

In the drawings, 10 and 11 indicate a pair of drums, either cylindrical or conical, the peripheries of which are in contact throughout their lengths. Carried by or formed integral with the periphery of the drum 10 are one or more vanes 10', which extend in an axial spiral along the periphery of the drum. Formed in the drum 11 is a series of spiral grooves 11', each of which grooves is adapted to receive and coact with one of the spiral vanes 10'. The relative forms of the vanes and grooves are such that that portion of the vane which is in mesh with its corresponding groove will practically fill the groove so as to close communication between the ends of the groove. Surrounding the two drums is a casing 12, in which are formed two barrels 10'' and 11'', barrel 10'' being of internal

diameter equal to the external diameter of drum 10 with its vanes, while the internal diameter of barrel 11'' is equal to the external diameter of drum 11. Each end of the casing is closed by a suitable head 13, through each of which is formed an inlet-port 14 and exhaust-port 15. Drums 10 and 11 are provided with shafts 16 and 17, respectively, which extend through suitable bearings in the head-plates. Suitable pulleys may be carried by either shaft.

Any suitable valve mechanism may be provided for controlling the entrance of the motive fluid into the engine; but in the drawings the drum 11 serves to automatically open and close the ports. In order, however, to enable me to reverse the rotation of the drums and also to control the effective area of the inlet-ports, I pivot upon shaft 17 at each end just outside of the head 13 a plate 18, provided with an inlet-port 19 and exhaust-port 20, which ports are so arranged in the plate that when one is brought opposite the corresponding port in head 13 the other will be out of communication with its corresponding port in the same head. This plate is provided with a sleeve 21, which is journaled upon shaft 17. Journaled upon this sleeve is a plate 22, provided with a port 23, which is adapted to be brought into register or partial register with port 19 of plate 18. This plate is also provided with a sleeve 24, which is sleeved upon sleeve 21. The valve-plates described are inclosed in a steam-chest 25, secured to the head 13, and provided with suitable inlet and exhaust connections 26 and 27, respectively. Secured to sleeves 21 and 24 are operating-handles 28 and 29, respectively, by means of which the plates may be independently shifted.

There are several different contours which the vanes 10' and coacting grooves 11' may assume; but my present experience leads me to the conclusion that the best contour may be found in the following manner, as shown in Fig. 5: In this figure, 30 indicates the periphery of drum 10, while 31 indicates the periphery of drum 11. The two drums must rotate at the same angular velocity, and as the rotation is accomplished by the interaction of vane 10' and groove 11' and the two peripheries must remain in contact the radius

of the periphery 30 is less than the pitch-radius, while the radius of the periphery 31 is an equal amount greater than the pitch-radius, the pitch-radii being equal. The half-contour of the vane 10' consists of two surfaces 32 and 33, the surface 32 extending from the crown 34 to the point 35, which lies upon the periphery 31 when the axis of the vane is in alignment with a line drawn between the centers of the drums, while surface 33 extends from the point 35 to point 36 at the base of the vane and on the periphery 30. Surface 32 is a curve traced by the point 34 when the pitch-circle of drum 10 is rolled upon the pitch-circle of drum 11, this curve being an inverted epicycloidal arc, and surface 33 is a curve traced by the point 35 when the pitch-circle of the drum 11 is rolled upon the pitch-circle of drum 10, the point 35 being of course outside of the pitch-circle of drum 11. The cross-section of the completed vane is shown in Fig. 6. The groove in drum 11 corresponds in cross-section to the two surfaces 32, so that when any cross-section of the vane lies with its axis in line with the centers of the drums it will fit the groove closely, and as the two drums are rotated they will be advanced with equal angular velocities, the tip of the vane remaining in contact with one of the surfaces 32 of the groove, while the opposite point 35 of the groove remains in contact with the surface 33 of the vane.

In operation the intermeshing of the vanes 10' with the grooves 11' produces a spiral wedge-shaped chamber, into the rear end of which is introduced the motive fluid, which if it be steam or an explosive gas acts both by impact and expansion upon the walls or arms of the wedge and forces them apart; thus causing a rotation of the two drums in opposite directions and causing the wedge-shaped chamber to spread and its closed point to advance parallel with the axes of the drums until it reaches the farther end of the casing and the motive fluid discharged through the exhaust. By this time another vane and co-acting groove have come opposite the inlet-port and the motive fluid is admitted into the new wedge-shaped chamber formed thereby. The operation is continuous and automatic, and where steam is used the impact pressure and expansion are utilized.

There is of course considerable end thrust

upon the drums, and in order to balance this a construction like that shown in Fig. 8 may be provided. In this figure drums 36 and 37 are provided with coacting vanes and grooves 36' and 37'. Secured to the shafts of these drums are similar drums 38 and 39, provided with vanes and grooves 38' and 39', the inclination of which, however, is opposite to that of the vanes and grooves of the other drums. In this case the exhaust-ports 40 may be formed in the central partition.

I claim as my invention—

1. In a rotary engine, the combination with a pair of rotative elements and a suitable casing therefor, of coacting means carried by the two elements forming a spiral wedge-shaped motive-fluid receptacle expansible by the relative rotation of the two elements, an inlet-port in the casing at each end, an exhaust-port leading from the casing at each end, a valve-plate provided with an inlet-port and an exhaust-port, such a valve-plate being mounted at each end of the casing and so arranged that its ports may be brought alternately into register with the corresponding inlet-port and exhaust-port of the casing, a second valve-plate mounted adjacent the first valve-plate and provided with an inlet-port adapted to be brought into register with the inlet-port of the first plate, a suitable chamber inclosing said plates and having inlet and exhaust passages leading to and from the same, and means for shifting said plates, substantially as and for the purpose set forth.

2. The combination of a rotative drum, having a spiral vane with crown curves consisting of a pair of oppositely-extending inverted epicycloidal curves traced by a point outside of the pitch-circle, when the pitch-circles of the two drums are equal and the vane-drum rolls upon the other, and inverted epicycloidal base curves traced by the point of intersection of the crown curve with the periphery of the groove-drum when said drum rolls upon the first drum; and a groove-drum provided with a spiral groove the contour of said groove being a pair of diverging inverted epicycloidal curves corresponding to the curve of the crown of the vane.

NEWELL H. MOTSINGER.

Witnesses:

ARTHUR M. HOOD,
BERTHA M. BALLARD.