No. 625,446. Patented May 23, 1899.

B. T. HINSON.

ROTARY ENGINE.

(Application filed Feb. 28, 1898.)

(No Model.) 4 Sheets—Sheet I.

Fig. I.

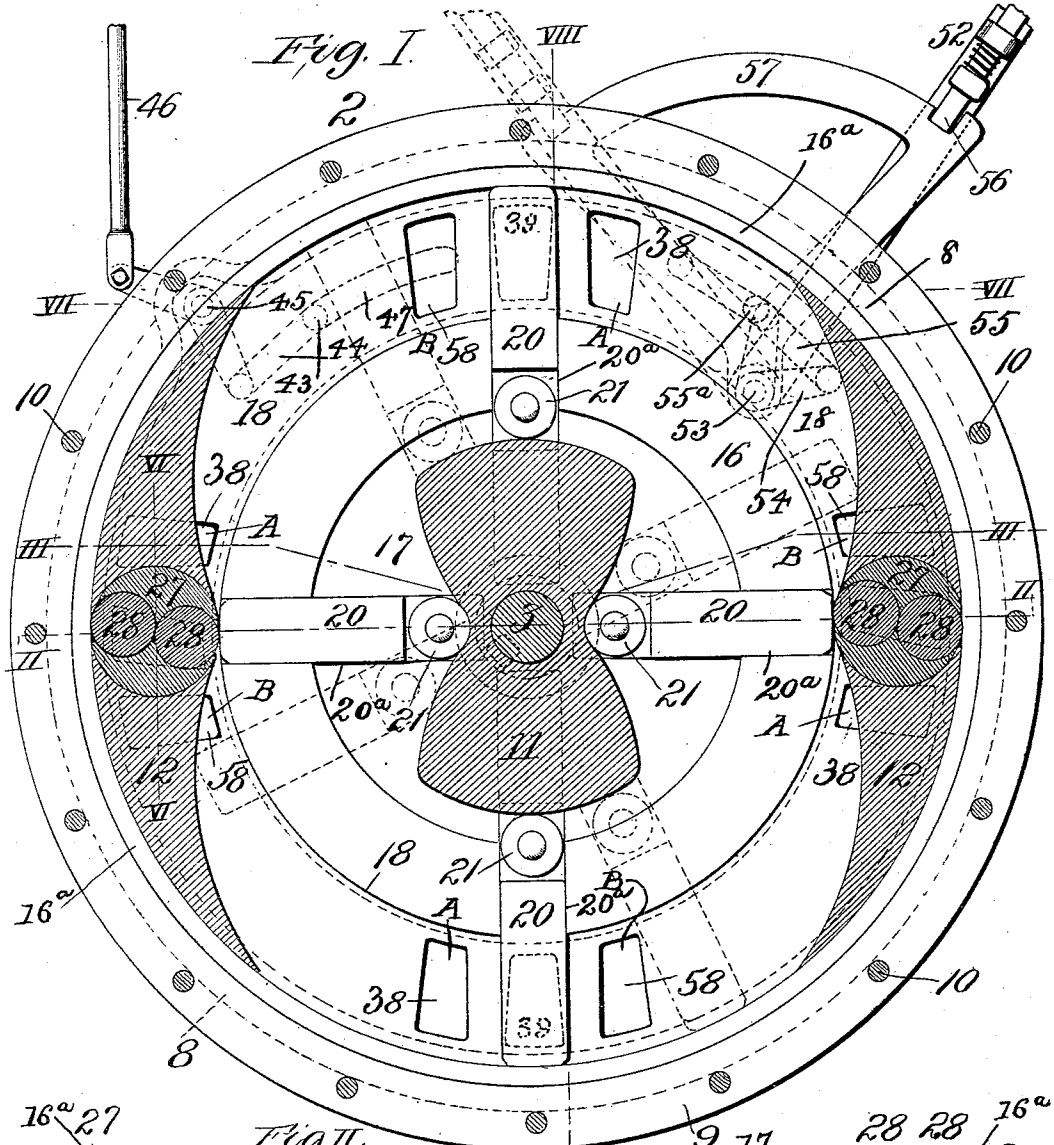
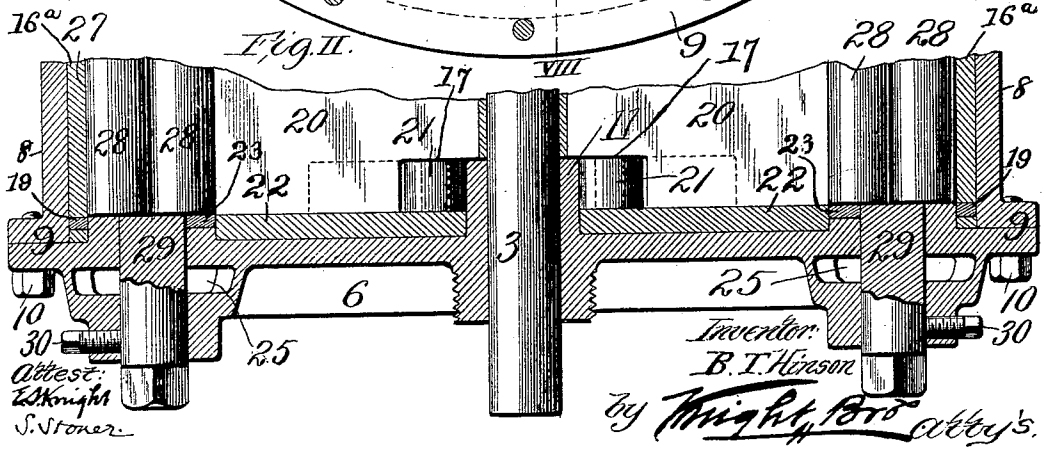


Fig. II.



Witnesses:
E. A. Knight
S. Stoner

Inventor:
B. T. Hinson
by Wright Bro & Abbey's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 625,446. Patented May 23, 1899.

B. T. HINSON.

ROTARY ENGINE.

(Application filed Feb. 28, 1898.)

(No Model.) 4 Sheets—Sheet 2.

Fig. IV.

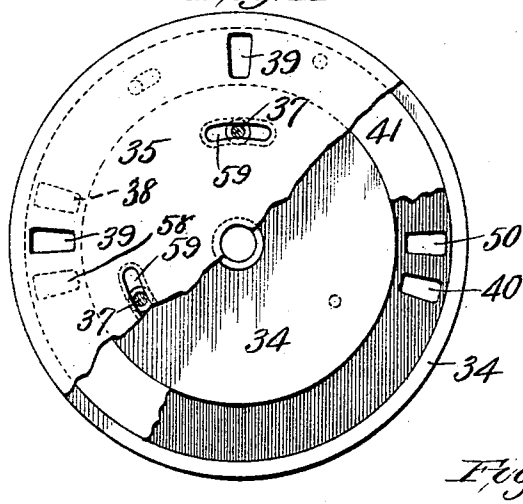


Fig. V.

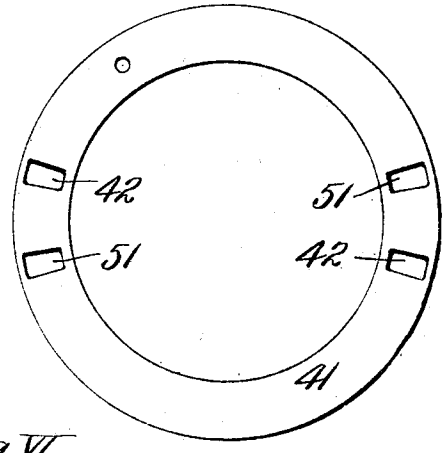


Fig. VI.

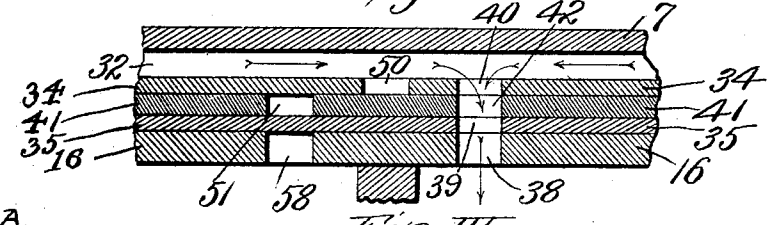
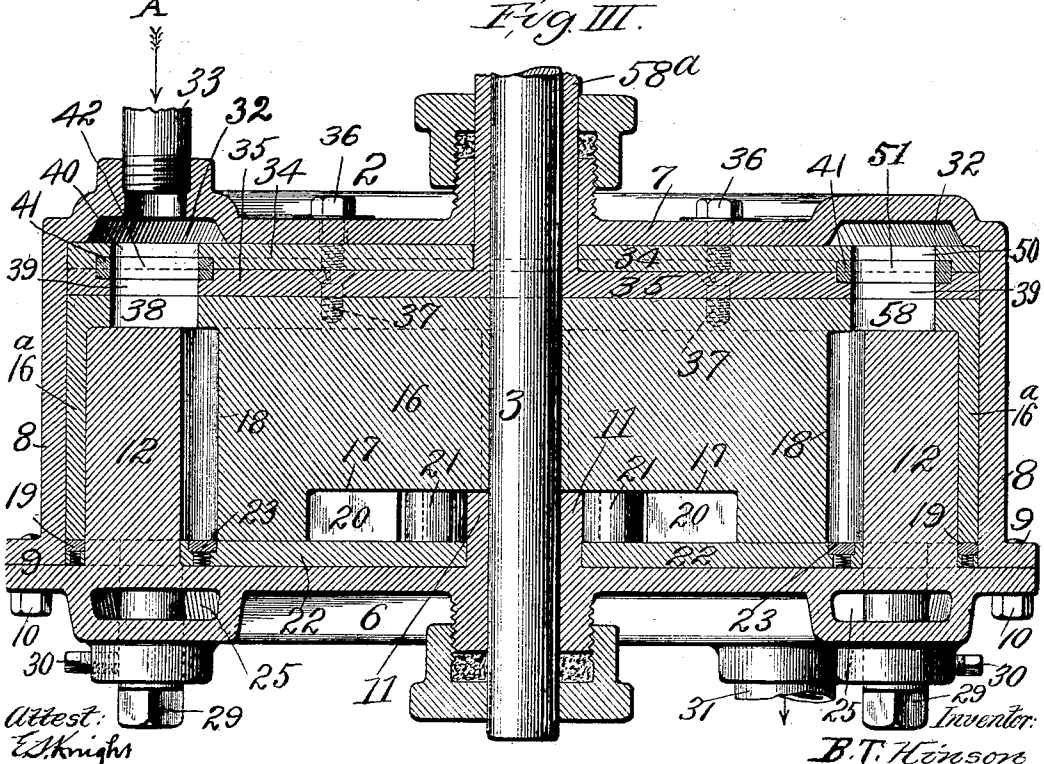


Fig. III.



Attest:
E. L. Knights
J. Stoner

Inventor:
B. T. Hinson
by Knight Bros Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 625,446. Patented May 23, 1899.

B. T. HINSON.

ROTARY ENGINE.

(Application filed Feb. 28, 1898.)

(No Model.) 4 Sheets—Sheet 3.

Fig. VII.

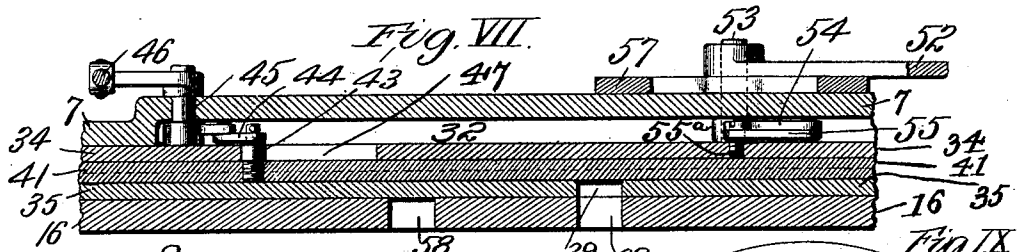


Fig. VIII.

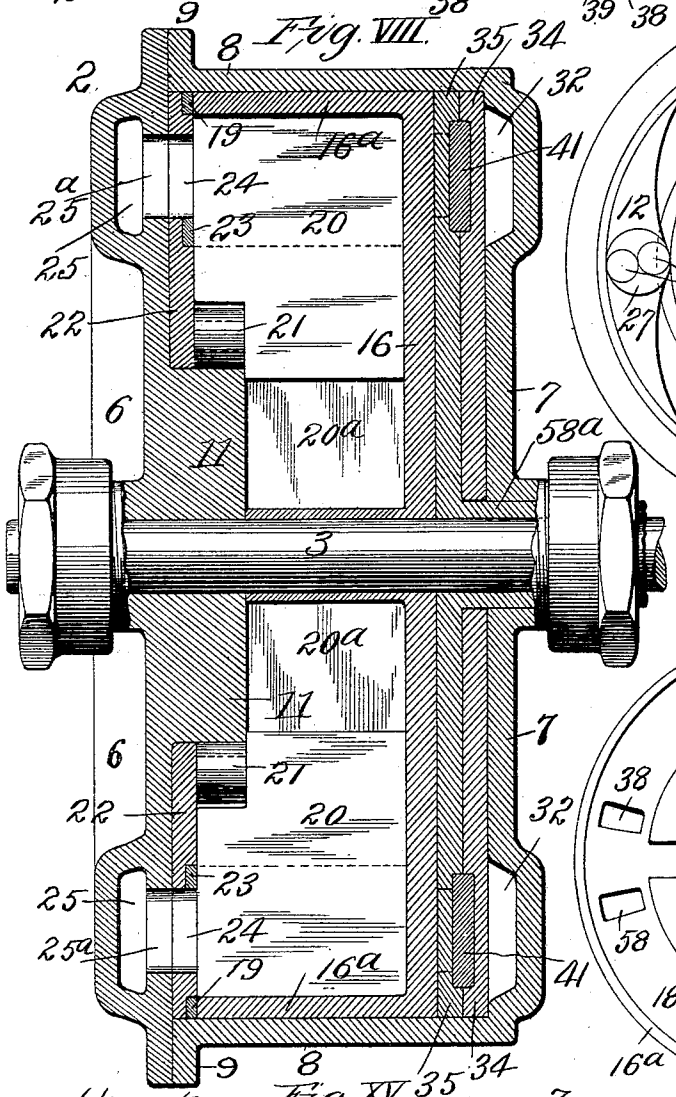


Fig. IX

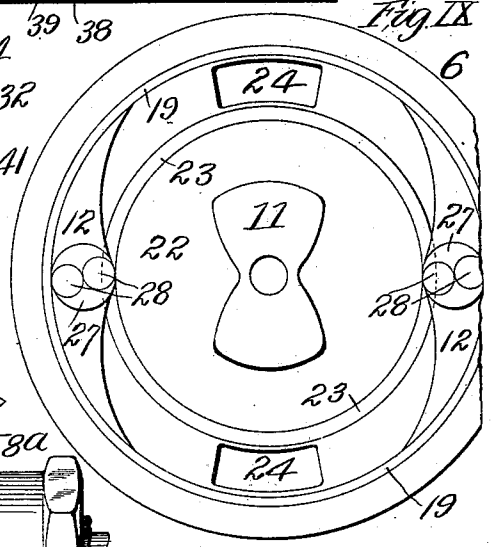


Fig. X

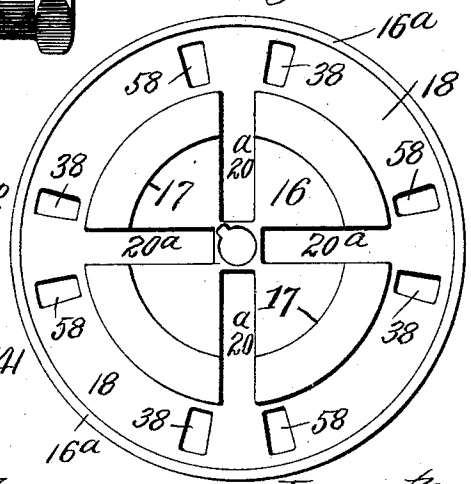
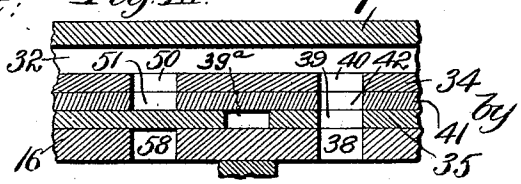


Fig. XV.



Attest:
E. L. Knight
J. Stoner

Inventor:
B. T. Hinson.
by Knight Bros
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

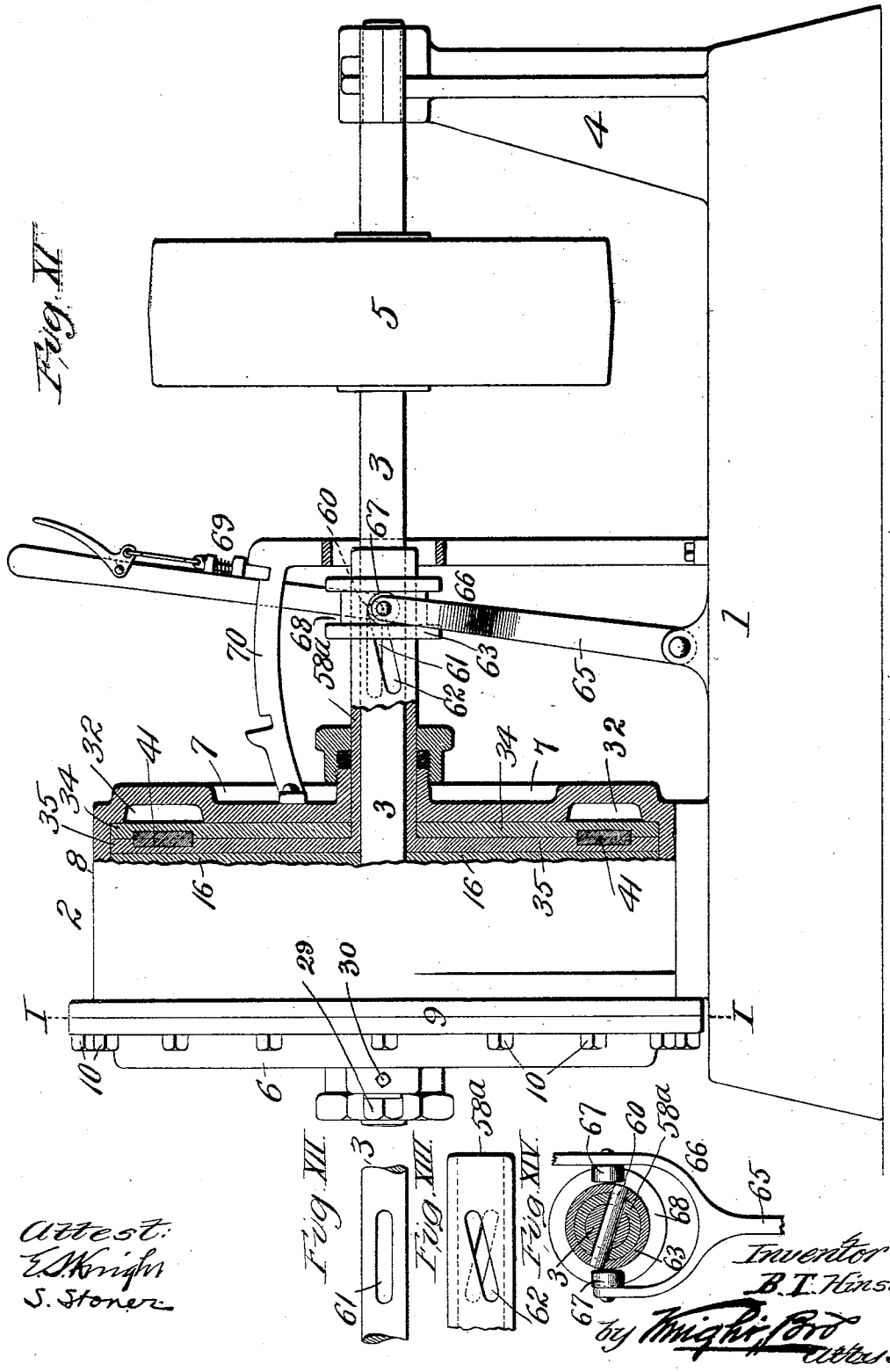
No. 625,446. Patented May 23, 1899.

B. T. HINSON.

ROTARY ENGINE.

(Application filed Feb. 28, 1898.)

(No Model.) 4 Sheets—Sheet 4.



Attest:
E. S. Knight
S. Stoner.

Inventor
B. T. Hinson
by Wright Brothers
Atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

BENONI T. HINSON, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO ARMAND J. WELCKER AND CHARLES WERZ, OF SAME PLACE.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 625,446, dated May 23, 1899.

Application filed February 28, 1898. Serial No. 671,946. (No model.)

To all whom it may concern:

Be it known that I, BENONI T. HINSON, a citizen of the United States, residing at the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention has for its object to produce a rotary engine which will be free from much of the wear and leakage incident to such machines as heretofore constructed.

My invention consists of features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is an enlarged vertical section of my improved rotary engine, taken on the line I I, Fig. XI, between the flanges of the shell and the outer head, the disk which fits next to the outer head being omitted. Fig. II is a detail horizontal section taken on the line II II, Fig. I. Fig. III is a horizontal section taken on the line III III, Fig. I. Fig. IV is a view, on a small scale, of the disks and the governor-ring at the receiving end of the cylinder. Fig. V is a side view of the governor-ring removed. Fig. VI is a detail sectional view taken on the line VI VI, Fig. I. Fig. VII is a detail sectional view taken on the line VII VII, Fig. I. Fig. VIII is a vertical section taken on the line VIII VIII, Fig. I. Fig. IX is an inside view of the outer head of the cylinder. Fig. X is an inside view of the piston-wheel. Fig. XI is a side view of the engine, part in section. Figs. XII, XIII, and XIV are detail views specifically described hereinafter. Fig. XV is a detail section showing a modification.

1 represents a bed-plate upon which rests my rotary engine 2.

3 is the shaft of the engine, journaled at one end in a standard 4, mounted on the bed-plate 1. The shaft is provided with a pulley 5 for transmitting the power from the engine.

The cylinder of the engine consists of a removable outer head 6 at the exhaust end and a fixed inner head 7 at the receiving end, having a shell 8 extending over to the outer head 6, the outer head and the shell being provided with flanges 9 to receive connecting bolts or screws 10. The head 6 has an internal hub forming a double cam 11, the approximately figure-eight shape of which is illustrated in Figs. I and IX, and formed upon or secured to the interior of the head 6 near its periphery are approximately crescent-shaped cams 12, that taper outwardly in both directions from their middle or central parts. (See Figs. I and IX.) The head 6 being fixed to the cylinder and the latter to the base or bed-plate 1, the cams 11 and 12 are stationary when the machine is running. The width of the cam 11 is illustrated in Fig. VIII, and the width of the cams 12 is shown in Fig. III. Secured to the shaft 3 within the cylinder is a piston-wheel 16, having a central recess or chamber 17 on one side to receive the cam 11 and having an annular groove 18 to receive the cams 12. Outside of the groove 18 the piston-wheel has a peripheral rim 16^a, (see Fig. III,) that is located between the shell 8 and the cams 12.

19 is a packing-ring against which the rim 16^a of the piston-wheel bears and which is seated in a disk 22, surrounding the cam 11 and fitting against the inner face of the head 6 of the cylinder. (See Figs. II, III, and VIII.)

20 represents a number of radial pistons or sliding wings fitting in radial grooves or recesses 20^a, made in the piston-wheel 16. (See Figs. I, VIII, and X.) I have shown four of these pistons or wings. Their inner ends at one corner, against the disk 22, are provided with antifriction-rollers 21, that bear against the periphery of the cam 11, the outer ends of the pistons or wings bearing against and having practically a steam-tight fit with the interior of the rim 16^a of the piston-wheel and with the inner faces of the cams 12 as they pass the latter, the cam 11 being shaped, as shown in Fig. I, so that the outer ends of the pistons or wings will be held against the interior of the rim 16^a of the piston-wheel and against the cams 12 as the piston-wheel turns, the pistons or wings moving endwise as they ride over the cams. The pistons or wings are of such width that they snugly fit the space between the piston-wheel and the disk 22, the disk being provided with a packing-ring 23, against which the pistons or wings slide. The disk does not turn with the pis-

ton-wheel and pistons or wings. It is fitted to the cams 11 and 12, and it is provided with holes 24, that register with holes 25ª, that communicate with an exhaust-port 25 in the head 6. As the pistons or wings revolve with the piston-wheel, including the rim 16ª of the latter, there is no wear between the parts, the only wear being on the packing-ring 23, which can readily be renewed, and between the pistons or wings and the cams 11 and 12, and to compensate for this the pistons or wings can readily be replaced when necessary, and thus provision is made for keeping the parts tight at a comparatively small expense, and what wear there is is reduced to a minimum. In order to provide for a close fit between the pistons or wings and the cams 12 at the apex of the latter and also between the apex of the cams and the inner wall of the groove 18, I bore out the cams 12 and locate cylindrical plugs 27 therein. (See Figs. I, II, and IX.) Within the plugs are loose antifriction-rollers 28, that bear against each other. The outer roller bears against the inner face of the rim 16ª of the piston-wheel, and the inner roller is engaged by the outer ends of the pistons or wings and the inner wall of the groove 18. The plugs are set so that the rollers will stand at an angle to the horizontal axis of the piston-wheel, as shown in Figs. I and IX. The plugs have extensions 29 passing through the head 6 and held by set-screws 30. By applying a wrench to the extensions and turning the plugs, after loosening the set-screws 30, the rollers may be moved toward the horizontal-axis line of the pistons, and thus any wear of the parts can be easily and quickly taken up and a close fit can always be maintained.

The exhaust-port in the head 6 of the cylinder extends all the way around, and with it connects an exhaust-pipe 31. (See Fig. III.)

The inner face of the head 7 is provided with an annular live-steam port 32, with which connects the steam-pipe 33. (See Fig. III.)

Between the head 7 and the back of the piston-wheel 16 are located two disks 34 and 35, the outer disk 34 being secured to the head 7 by screws or bolts 36 (see Fig. III) and the inner disk 35 being secured to the piston 16 by screws or bolts 37.

The piston-wheel is provided with ports 38, the inner disk 35 with ports 39, and the outer disk 34 with ports 40, which when registering form a communication between the port 32 and the groove 18 in the piston-wheel. Between the disks 34 and 35 is placed a governor-ring 41, having ports 42, registering with the ports 39 and 40. The ring 41 is connected (see Fig. VII) by a pin 43 and link 44 to a crank-shaft 45, journaled in the head 7 and to which is connected the shaft 46 of a suitable governor. (Not shown.) The pin 43 fits in a slot 47 in the disk 34, so that as the governor rocks the shaft 45 it will through the described connections move the ring 41, thus controlling the volume of steam passing through the ports 38, 39, and 40, and thereby governing the speed of the engine. As the ports 38 and 39 pass the ports 40 and 42 as the piston-wheel rotates, the engine takes steam, which enters the groove or chamber 18 of the piston-wheel on the near side of the centers of the cams 12 at the points A A, Fig. I. The ports are so disposed that the steam enters as the pistons or wings 20 pass the points A A, and the steam being thus imprisoned between the cams 12 and the body of the piston-wheel—that is to say, the inner wall of the groove 18, which bears against the apex of the cams behind the pistons or wings 20—propels the piston-wheel forward. As the pistons or wings pass the ports 24 the engine exhausts.

In order to make the engine reversible, I provide the disk 34, which may be termed a "reversing-disk," with additional ports 50 (one on each side of the machine) and the governor-ring with additional ports 51. (See Fig. VI.) The screws 36, that hold the disk 34 to the head 7, fit in slots in the head, thus permitting the disk 34 to be shifted to bring the ports 50 opposite the ports 51, and as a means for thus shifting the disk I have shown a lever 52, that is connected to a shaft 53, journaled in the head 7 of the cylinder. (See Fig. VII.) The shaft has a crank 54 on its inner end, that is connected by a link 55 to a pin 55ª on the disk 34. By moving the lever the disk 34 is shifted, as stated. The lever is provided with a dog 56, (see Fig. I,) adapted to engage notches in a segment 57 to hold the lever and the disk 34 to their adjustment. In reversing the engine it is also necessary to shift the disk 35 to move its ports 39 into line with the ports 50 and 51 in the disk 34 and ring 1, respectively, and in line with ports 58 in the piston-wheel, (see Figs. III and VI,) and to accomplish this I form on the disk 35 a sleeve 58ª, (see Fig. XI,) through which the shaft 3 passes. To permit the disk 35 to be shifted, the screws 37 fit in slots 59 in the disk. (See Fig. IV.) The sleeve is connected to the shaft 3 by a pin 60, (see Fig. XIV,) fitting in a horizontal slot 61 in the shaft (see Fig. XII) and in oblique slots 62 in the sleeve. (See Fig. XIII.) The ends of a pin fit in a collar 63, so that the shaft 3, the sleeve 58ª, with its disk 35, and the collar 63 all turn together. To move the disk 35 to bring its ports 39 opposite the ports 51 and 58, the collar 63 is forced inward on the sleeve 58ª, thereby causing the sleeve to turn on the shaft, which carries with it the disk 35. As a means for moving the collar I have shown a lever 65, (see Figs. XI and XIV,) provided with a fork 66, having projections 67, that fit in an annular groove 68 in the collar. The lever is provided with a dog 69, adapted to engage in notches in a segment 70 to hold the parts to their adjustment. When the disks have been adjusted as described and the ports 50, 51, 39, and 58 thus brought into line, steam will enter on the other side of the apex of the cams

12, (at B B, Fig. I,) and the piston will turn in the other direction from that in which it turned before these adjustments were made.

While I have shown and described the machine as having two cams 12, yet it is evident that only one or more than two may be used, the cam 11 and the supply and exhaust ports being formed to suit the number of cams 12 that are used.

In the modification shown in Fig. XV the ports 50 in the disk 34 are made opposite the ports 51 in the disk 41, and the disk 35 is provided with an additional port 39^a, which when the disk is shifted to reverse the engine will register with the ports 50, 51, and 58, this shifting of the disk blinding the port 38. When the ports are thus made, the disk 35 becomes the "reversing-disk," and the means for shifting the disk 34 may be dispensed with and the disk held immovably to the head 7 by the screws 36.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear, said peripheral rim being adapted to rotate between the cylinder and the outer cams; substantially as set forth.

2. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim being adapted to rotate between the cylinder and the outer cams and said outer cams being tapered outwardly in both directions from their central portion, substantially as set forth.

3. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, fixed outer cams against which the outer ends of the pistons or wings bear, plugs located in said outer cams and rollers located within the plugs, said peripheral rim being adapted to rotate between the cylinder and the outer cams; substantially as set forth.

4. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, fixed outer cams against which the outer ends of the pistons or wings bear, plugs mounted in the outer cams and rollers carried by the plugs; said plugs being provided with means for turning them and holding them to their adjustment; substantially as set forth.

5. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and an inner wall providing an annular groove and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim being adapted to bear on the outer wall of the outer cams, and the inner wall of the groove being adapted to bear on the inner wall of the outer cams; substantially as set forth.

6. A rotary engine, comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim, an inner wall providing an annular groove and a central recess and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; the central recess receiving the central cam, and the annular groove receiving the outer cams; substantially as set forth.

7. A rotary engine, comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim, and a central portion in which the pistons or wings are supported and move and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim being adapted to rotate between the cylinder and the outer cams so as to surround the latter and the wings; substantially as set forth.

8. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner end of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim surrounding said pistons or wings and the outer cams, substantially as set forth.

9. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a central recess, a body portion, an annular groove outside said body portion, and a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear; and fixed outer cams against which the outer ends of the pistons or wings bear; said

central recess receiving the central cam, said body portion supporting and guiding the pistons or wings, said annular groove receiving the outer cams, and said peripheral rim surrounding the pistons or wings and the outer cams; substantially as set forth.

10. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings mounted radially in the piston-wheel, a cylinder-head formed with a fixed central cam against which the inner ends of the pistons or wings bear, and with fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim being adapted to rotate between the cylinder and the outer cams; substantially as set forth.

11. A rotary engine comprising a cylinder a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, loose pistons or wings having antifriction-rollers and mounted radially in the piston-wheel, a fixed central cam against which the inner ends of the pistons or wings bear, and fixed outer cams against which the outer ends of the pistons or wings bear; said peripheral rim being adapted to rotate between the cylinder and the outer cams; substantially as set forth.

12. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, and inner and outer disks provided with ports and located between the receiving-head of the cylinder and said piston-wheel, substantially as set forth.

13. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel having a peripheral rim and secured to the shaft, and inner and outer disks located between the receiving-head of the said cylinder and said piston-wheel, and which are provided with ports and means for shifting said disks, whereby the engine may be reversed, substantially as set forth.

14. A rotary engine comprising a cylinder, a shaft traversing the cylinder, a piston-wheel secured to the shaft, disks located between the receiving-head of the cylinder and said piston-wheel, and which are provided with ports, and a governor-ring provided with ports and located between said disks, substantially as set forth.

15. A rotating engine comprising a cylinder, an inner cylinder-head formed with an annular port, an outer cylinder-head formed with an annular port having outer ports, with a central cam, of approximately figure-eight shape and with outer cams of approximately crescent shape, the bearing-disk having outlet-ports and surrounding the central cam and outer cams and fitting against the inner face of the outer cylinder-head, the piston-wheel formed with an annular body portion, with a central recess for the central cam, with radial grooves, with an annular groove for the outer cams, with a peripheral rim and with ports located between the annular body and the peripheral rim, the radial pistons adapted to slide in the radial grooves, and rotating with the piston-wheel while being reciprocated by the cams, the inner disk having ports and secured to the piston-wheel, the outer disk having ports and secured to the inner cylinder-head and the governor-ring between the inner and outer disks; substantially as set forth.

BENONI T. HINSON.

In presence of—
E. S. KNIGHT,
STANLEY STONER.