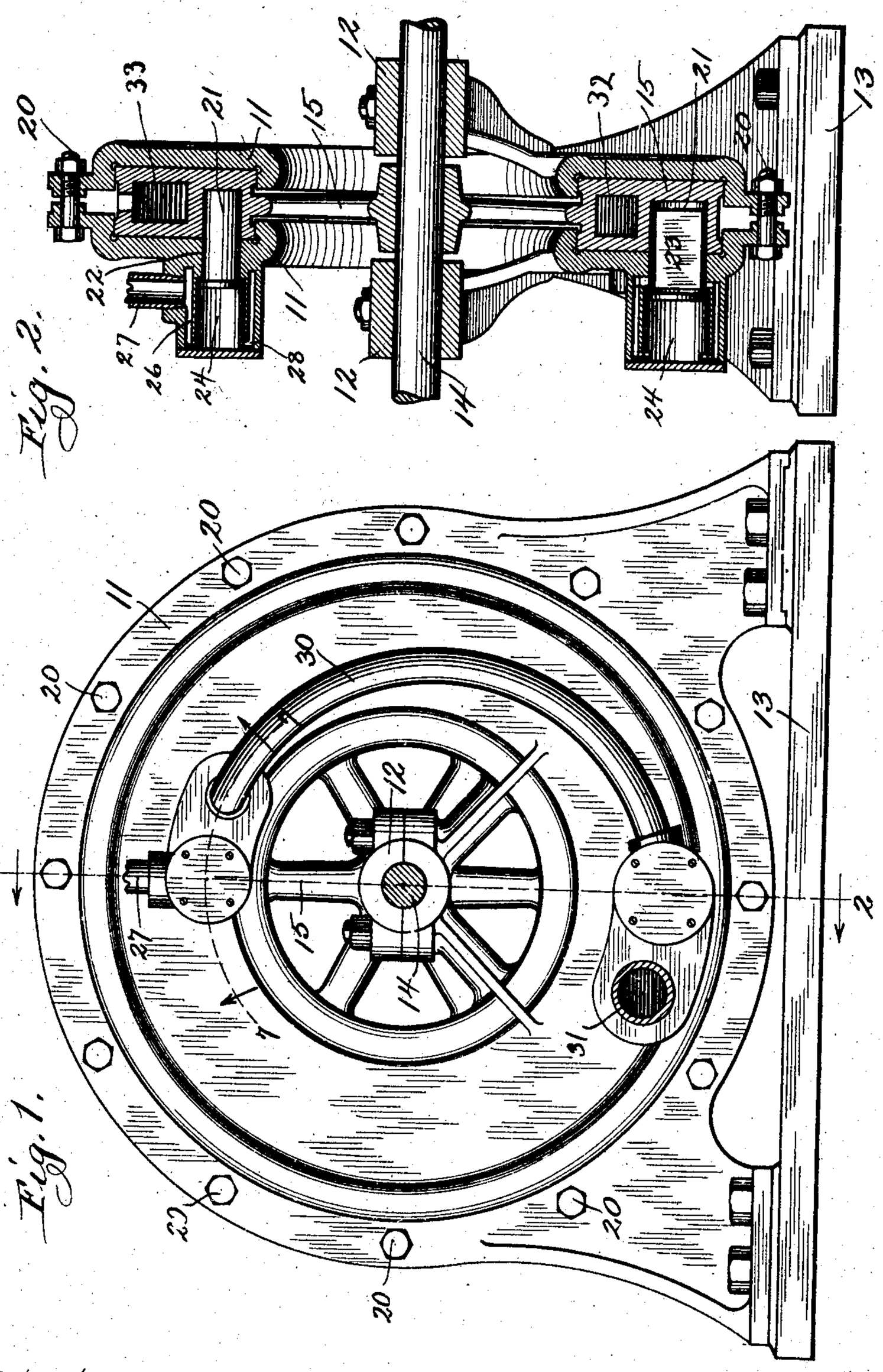
No. 834,528. PATENTED OCT. 30, 1906.

P. J. DE B. KOPS.

ROTARY ENGINE.

APPLICATION FILED MAY 26, 1905.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

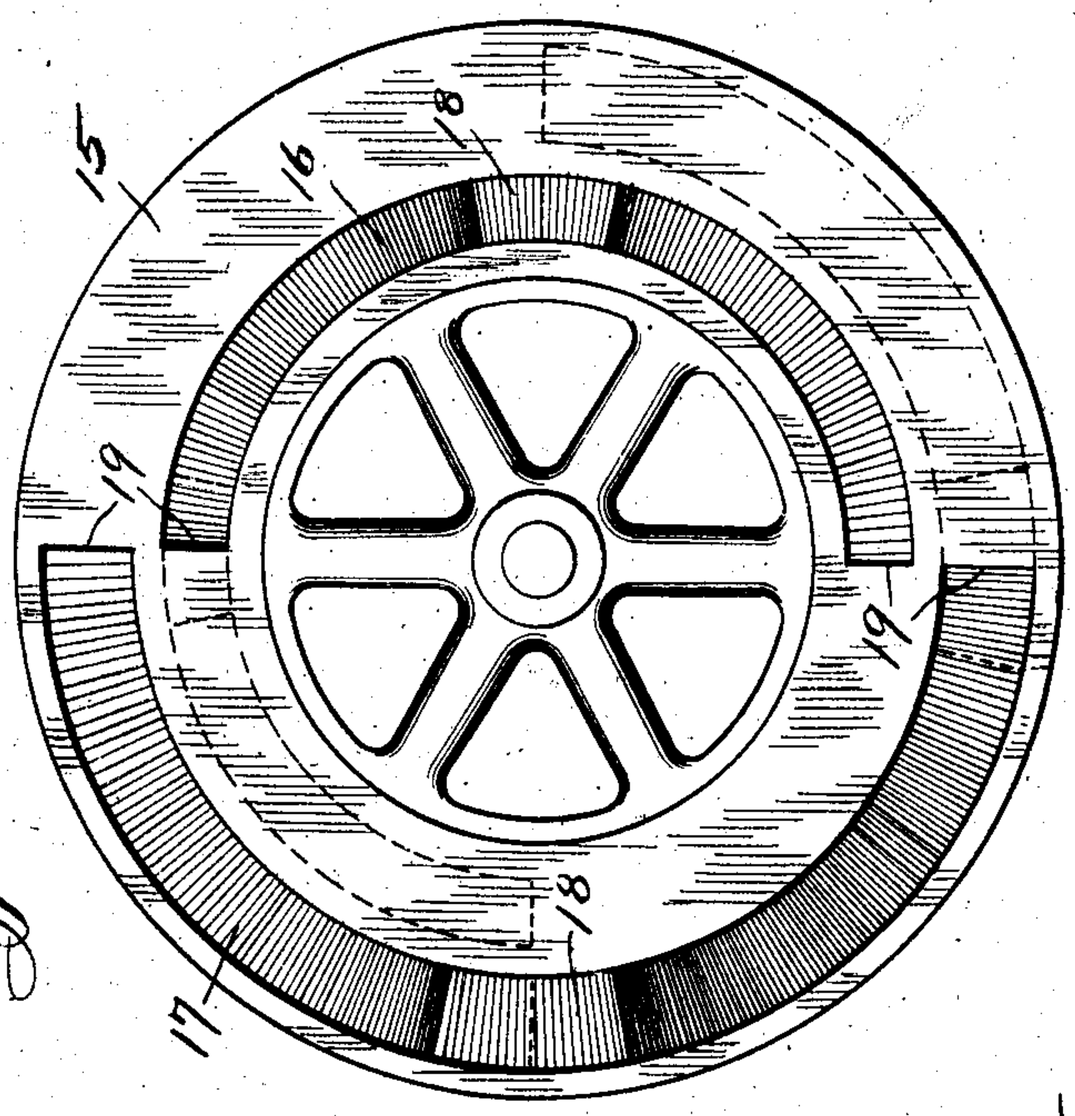

Fig. 4.

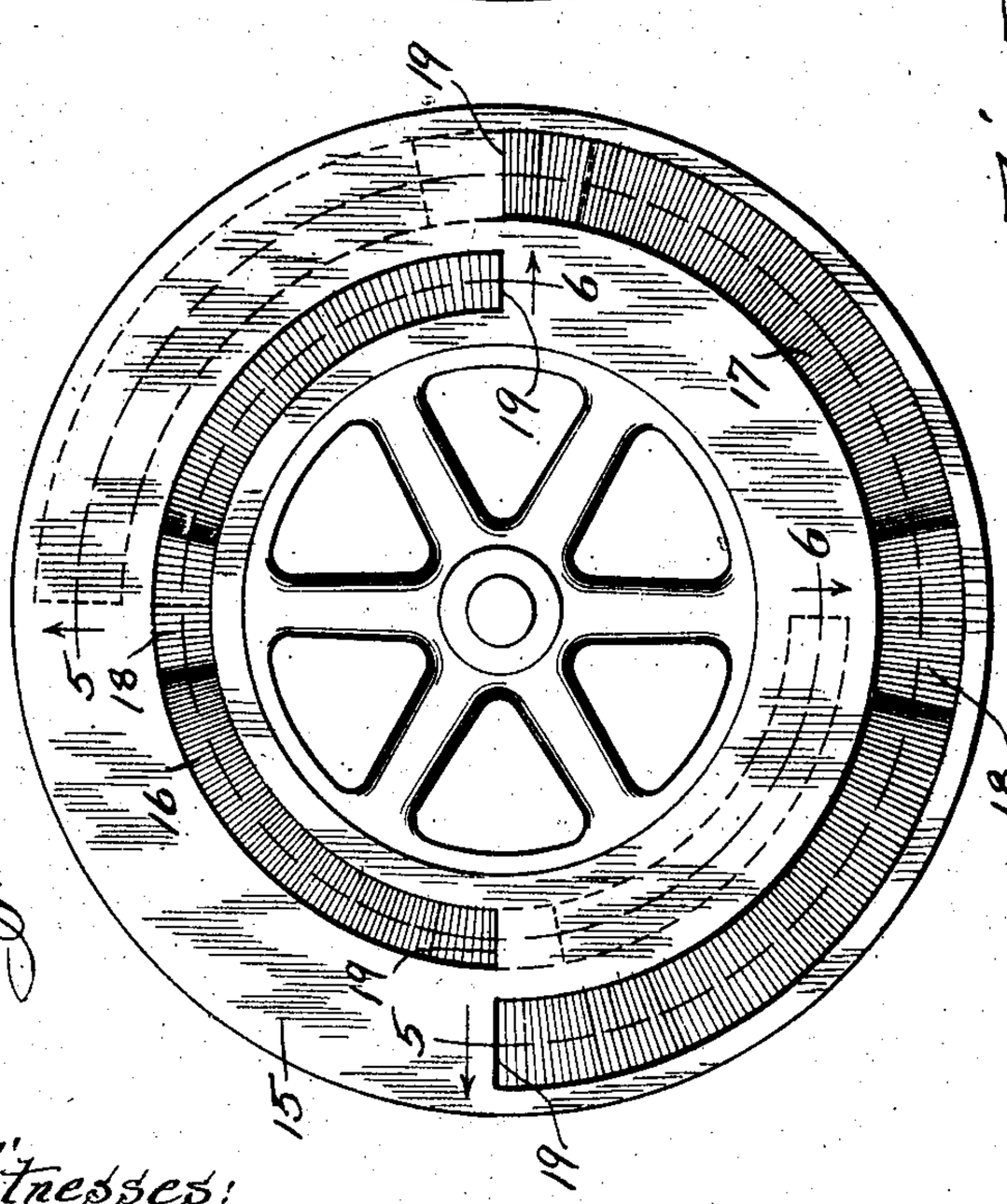

Fig. 3.

Fig. 5.

Fig. 6.

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3 SHEETS—SHEET 3.

Fig. 7.

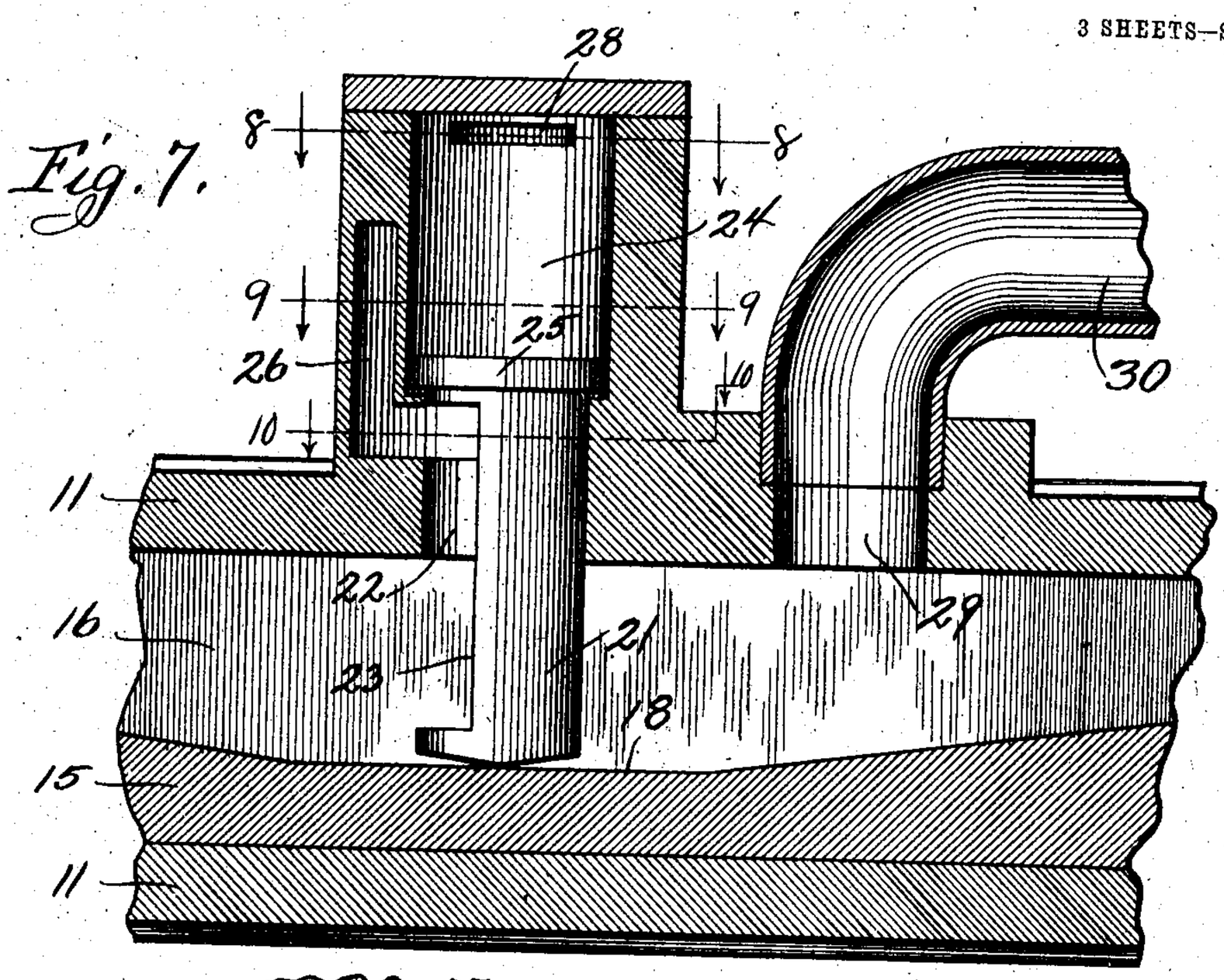


Fig. 8.

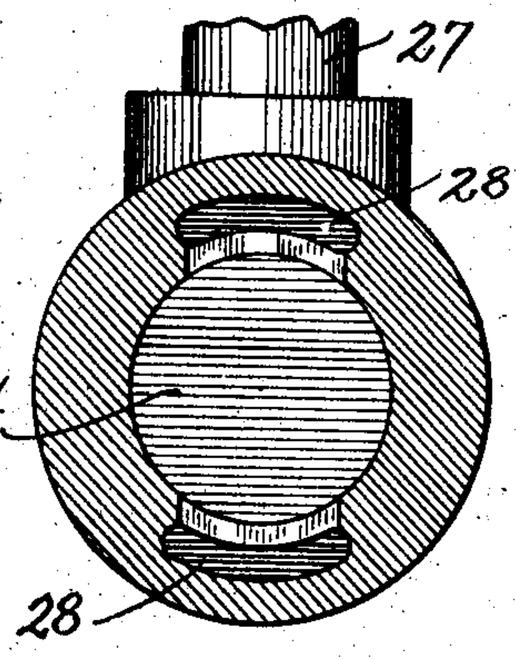


Fig. 9.

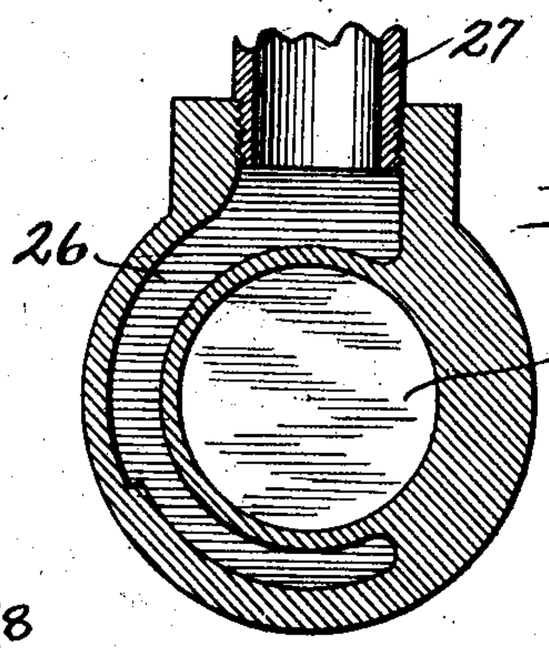
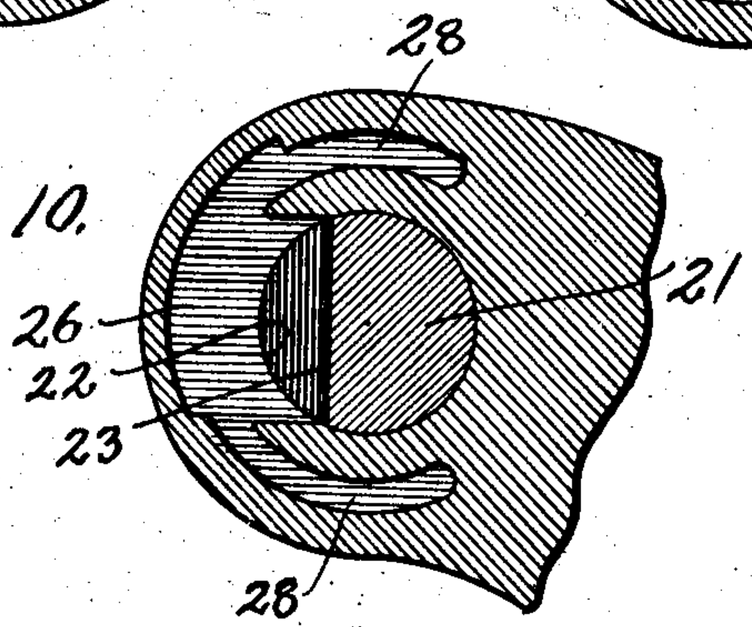


Fig. 10.



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UNITED STATES PATENT OFFICE.

PAUL J. DE BRUYN KOPS, OF WAKE, VIRGINIA.

ROTARY ENGINE.

No. 834,528. Specification of Letters Patent. Patented Oct. 30, 1906.

Application filed May 26, 1905. Serial No. 262,967.

To all whom it may concern:

Be it known that I, PAUL J. DE BRUYN KOPS, a citizen of the United States, residing at Wake, in the county of Middlesex and State of Virginia, have invented a new and useful Rotary Engine, of which the following is a specification.

My invention relates to rotary engines in which a pressure fluid, as steam, is used to drive or rotate the piston; and the objects of my improvements are, first, to provide a compact and durable construction; second, to make the operating parts of simple construction; third, to have the fluid-pressure-supply valve operate automatically without any lever-rod connections, and other objects to become apparent from the description to follow.

The objectionable features presented with rotary engines as they have heretofore been made was that especially when running at high speed the necessary lever-and-rod connections provided to operate the valves would soon get out of order and refuse to operate properly, and no provision was made for compounding the fluid-pressure, and a great many so-called "rotary" engines were too complicated to be of practical use. These objectionable features are entirely overcome by the construction embodied in my invention, which consists of practically three pieces—a piston and two side frames—besides a valve for admitting the fluid-pressure. The piston is in the form of a wheel mounted on a shaft, and one or both sides of the rim of the wheel are provided with arcuate grooves which are deepest in the middle of their length and taper up to the surface at either end. A pin is mounted in the side frame, which covers the slot and is arranged to fit into the groove in the piston, being normally held in against the bottom of the groove by the fluid-pressure which drives the engine. This pin has a portion of one side cut away, so as admit fluid-pressure from a supply-pipe into the chamber formed by the groove on one side of the pin, and thus force the piston around.

To be enabled to make use of steam expansion after it is exhausted from the first piston-chamber, an additional groove of greater capacity may be provided in the rim of the wheel, into which the steam is admitted in the same manner as into the first piston groove or chamber.

To intelligently describe my invention so that others versed in the art to which it pertains can sufficiently understand it to make and use the same, I have illustrated an engine embodying my invention on the accompanying three sheets of drawings, forming a part of this specification, in which—

Figure 1 is a side elevation. Fig. 2 is a section on line 2 2 of Fig. 1; Fig. 3, an elevation of one side of the piston; Fig. 4, an elevation of the other side of the same; Fig. 5, a section on 5 5 of Fig. 3; Fig. 6, a section on 6 6 of Fig. 3; Fig. 7, an enlarged section on 7 7 of Fig. 1; Fig. 8, a section on 8 8 of Fig. 7; Fig. 9, a section on 9 9 of Fig. 7, and Fig. 10 a section on 10 10 of Fig. 7.

Similar reference characters refer to similar parts throughout the several views.

The frame of the engine is composed of the two similar sides 11, provided with the bearings 12 and the base 13.

The shaft 14 is mounted to rotate in the bearings 12, and has secured thereto between the bearings 12 the wheel-piston 15. The rim of the wheel-piston 15 is made of sufficient width and thickness to accommodate an inner arcuate groove 16 and an outer arcuate groove 17.

As seen in Figs. 3 and 4, the grooves 16 and 17 are provided on both sides of the piston 15. The grooves 16 and 17 are identical, except that the grooves 16 are smaller than the grooves 17. Each of the grooves 16 and 17 is deepest at the center 18, from which place the bottom of the groove gradually inclines upward in both directions and meets the surface of the piston at the ends 19.

The rim of the wheel-piston 15, provided with the grooves 16 and 17, is snugly fitted between the two side frames 11 to entirely inclose the grooves 16 and 17 and prevent any steam from escaping between the piston 15 and the frames 11. The frames 11 are secured together by a plurality of tie-bolts 20.

To exert the force of the pressure fluid against the piston in such manner as to revolve the piston, a pin or plug 21 is normally held in against the bottom of each groove 16 and 17 to form a gate or abutment for the pressure fluid. One pin 21 is arranged to cooperate with each groove 16 and 17, and each of these pins are constructed and operate the same. Hence I will describe only one of said pins and its coöperating parts.

The pin 21 is fitted to slide in a hole 22, ex-

tending laterally through the frame 11, so as to register with the groove 16 in the piston 15. A portion of one side of the pin 21 is cut away, as at 23, to permit the fluid-pressure to enter the groove 16 through the hole 22. The pin 21 fits snugly into the groove 16 and is held down against the bottom of the groove, so as to form a gate in the groove and prevent the steam from passing by.

On the exterior of the frame 11, but preferably integral therewith, is provided a cylindrical pocket 24, in which is fitted to move a piston-head 25, provided on the end of the pin 21. The head 25 is of greater cross-sectional area than the pin 21.

The wall of the pocket 24 is provided with a passage 26, having direct communication with the hole 22. The steam-supply pipe 27 is connected to communicate with the passage 26, and one or more by-passes 28 connect the passage 26 with the closed end of the pocket 24.

The pressure is constant in the pipe 27 and therefore, also, in the connecting parts—the chamber 26, by-passes 28, pocket 24, and hole 22. The end of the pin 21 is constantly held in against either the bottom of the groove 16 or the side of the piston 15, the pin being moved in and out by its end sliding in and out on the inclined bottom of the groove 16. The steam of course can only pass through the hole 22 while the groove 16 is passing it. Then the groove, completely filled with steam, continues to pass around, and when its foremost end again reaches the pin 21 the steam is prevented from passing around further in the groove and is forced out of the same through the exhaust-port 29 and is led by the pipe 30 into the steam-pipe 27, communicating with one of the grooves 17.

After leaving the groove 17 the steam is exhausted through the port 31.

To balance the piston 15 and at the same time reduce its weight, portions may be cored out, as shown at 32 and 33 in Fig. 2.

I desire to reserve the right to make grooves in the piston of any desired form and to hold the pins 21 in said grooves by any means without departing from the spirit of the invention.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a rotary engine, a rotatable disk provided with a depressed surface having circumferentially-inclined approaches secured to a shaft, a suitable frame inclosing said depressed surface and a pin guided by said frame serving as an inlet-valve for the steam arranged to move in and out of said depressed surface.

2. In a rotary engine a rotatable disk provided with a depressed surface on either side, each having circumferentially-inclined approaches, a suitable frame inclosing said depressed surfaces, pins guided by said frame serving as inlet-valves for the steam arranged to be moved in and out of said depressed surfaces.

3. In a rotary engine, a rotatable disk provided on one side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surface, a pin guided by said frame arranged to move in and out of said depressed surface laterally and a portion of said pin cut away to serve as a passage for steam.

4. In a rotary engine, a rotatable disk provided on one side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surface and a pin guided by said frame arranged to move in and out of said depressed portion laterally serving as an abutment for the steam and an inlet-valve for the steam.

5. In a rotary engine, a rotatable disk provided on one side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said groove, a pin guided by said frame arranged to move in and out of said groove laterally and a portion of said pin cut away to serve as a passage for steam.

6. In a rotary engine, a rotatable disk provided on one side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said groove and a pin guided by said frame arranged to move in and out of said groove laterally serving as an abutment for the steam and an inlet-valve for the steam.

7. In a rotary engine, a rotatable disk provided on either side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said grooves and pins serving as inlet-valves for the steam guided by said frame and arranged to move in and out of said grooves laterally.

8. In a rotary engine, a rotatable disk provided on either side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said grooves, pins guided by said frame arranged to move in and out of said grooves laterally and a portion of each pin cut away to serve as a passage for steam.

9. In a rotary engine, a rotatable disk provided on either side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said grooves and pins guided by said frame arranged to move in and out of said grooves laterally serving as abutments for the steam and as inlet-valves for the steam.

10. In a rotary engine, a rotatable disk provided on either side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surfaces, pins guided by said frame

arranged to move in and out of said depressed portion laterally and a portion of each pin cut away to serve as a passage for steam.

11. In a rotary engine, a rotatable disk provided on one side with two arcuate grooves of different areas having circumferentially-inclined approaches, a suitable frame inclosing said grooves, pins guided by said frame arranged to move in and out of said grooves laterally and a portion of each pin cut away to form a passage-way for steam.

12. In a rotary engine, a rotatable disk provided on one side with two arcuate grooves of different areas having circumferentially-inclined approaches, a suitable frame inclosing said grooves, and pins guided by said frame arranged to move in and out of said grooves laterally serving as abutments for the steam and as inlet-valves for steam.

13. In a rotary engine, a rotatable disk provided on either side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surfaces and pins guided by said frame arranged to move in and out of said depressed portions laterally serving as abutments for the steam and as inlet-valves for the steam.

14. In a rotary engine, a rotatable disk provided on one side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surface, an abutment guided by said frame arranged to move in and out of said depressed surface laterally and a portion of said abutment cut away to serve as a passage for steam.

15. In a rotary engine, a rotatable disk provided on one side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surface and an abutment guided by said frame arranged to move in and out of said depressed portion laterally serving as an abutment for the steam and an inlet-valve for steam.

16. In a rotary engine, a rotatable disk provided on either side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surfaces, abutments guided by said frame arranged to move in and out of said depressed portion laterally and a portion of each abutment cut away to serve as a passage for steam.

17. In a rotary engine, a rotatable disk provided on either side with a depressed surface having circumferentially-inclined approaches, a suitable frame inclosing said depressed surfaces and abutments guided by said frame arranged to move in and out of said depressed portions laterally serving as abutments for the steam and as inlet-valves for the steam.

18. In a rotary engine, a rotatable disk provided on one side with an arcuate groove having circumferentially-inclined approaches, a suitable frame inclosing said groove, and a pin serving as an inlet-valve for steam guided by said frame arranged to move in and out of said groove laterally.

In testimony whereof I have signed my name to this specification, in presence of two subscribing witnesses, this 12th day of May 1905, at Chicago, Illinois.

PAUL J. DE BRUYN KOPS.

Witnesses:
R. J. JACKER,
FRED J. SCHAD.