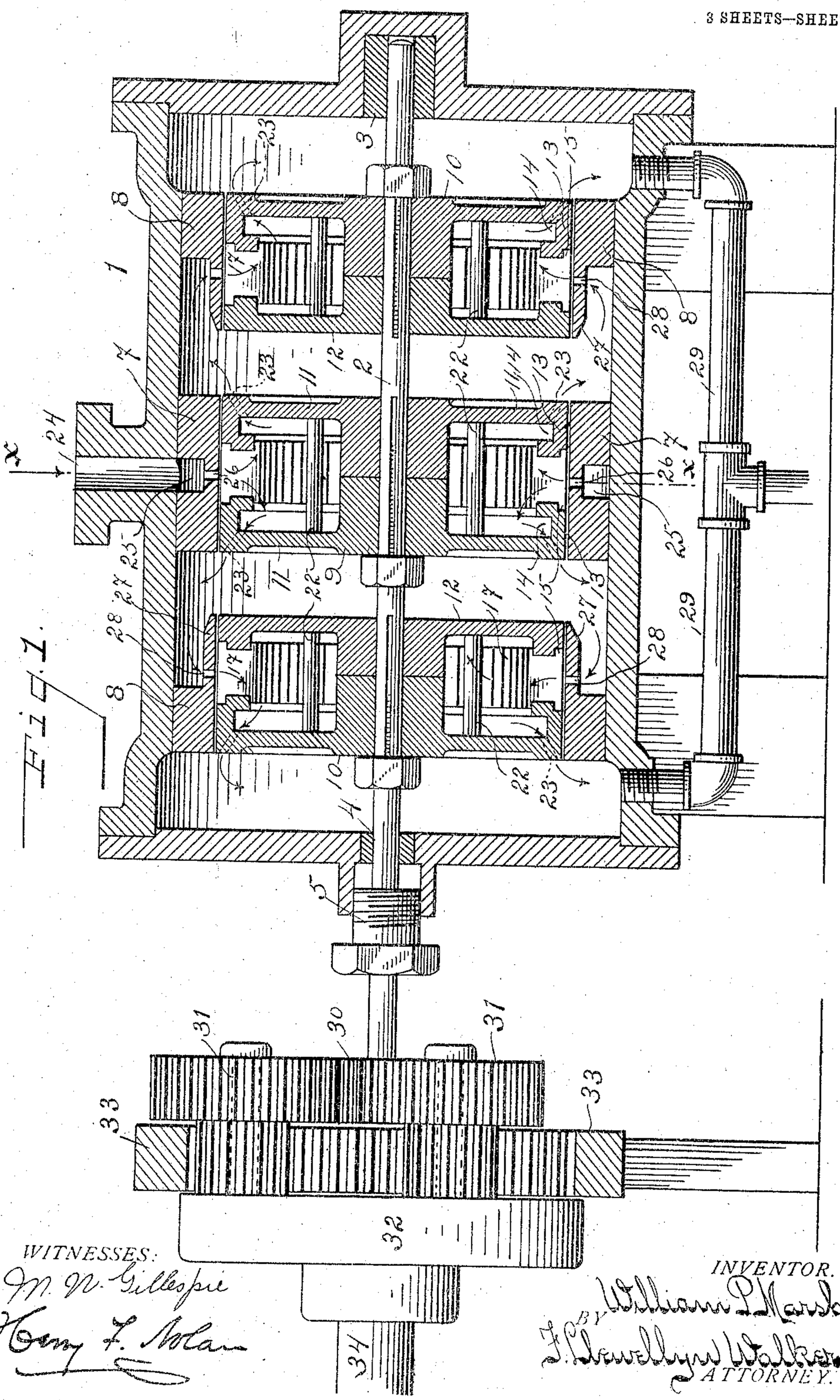
No. 850,593. PATENTED APR. 16, 1907.

W. P. MARSH.

ROTARY MOTOR.

APPLICATION FILED JAN. 16, 1907.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 2.

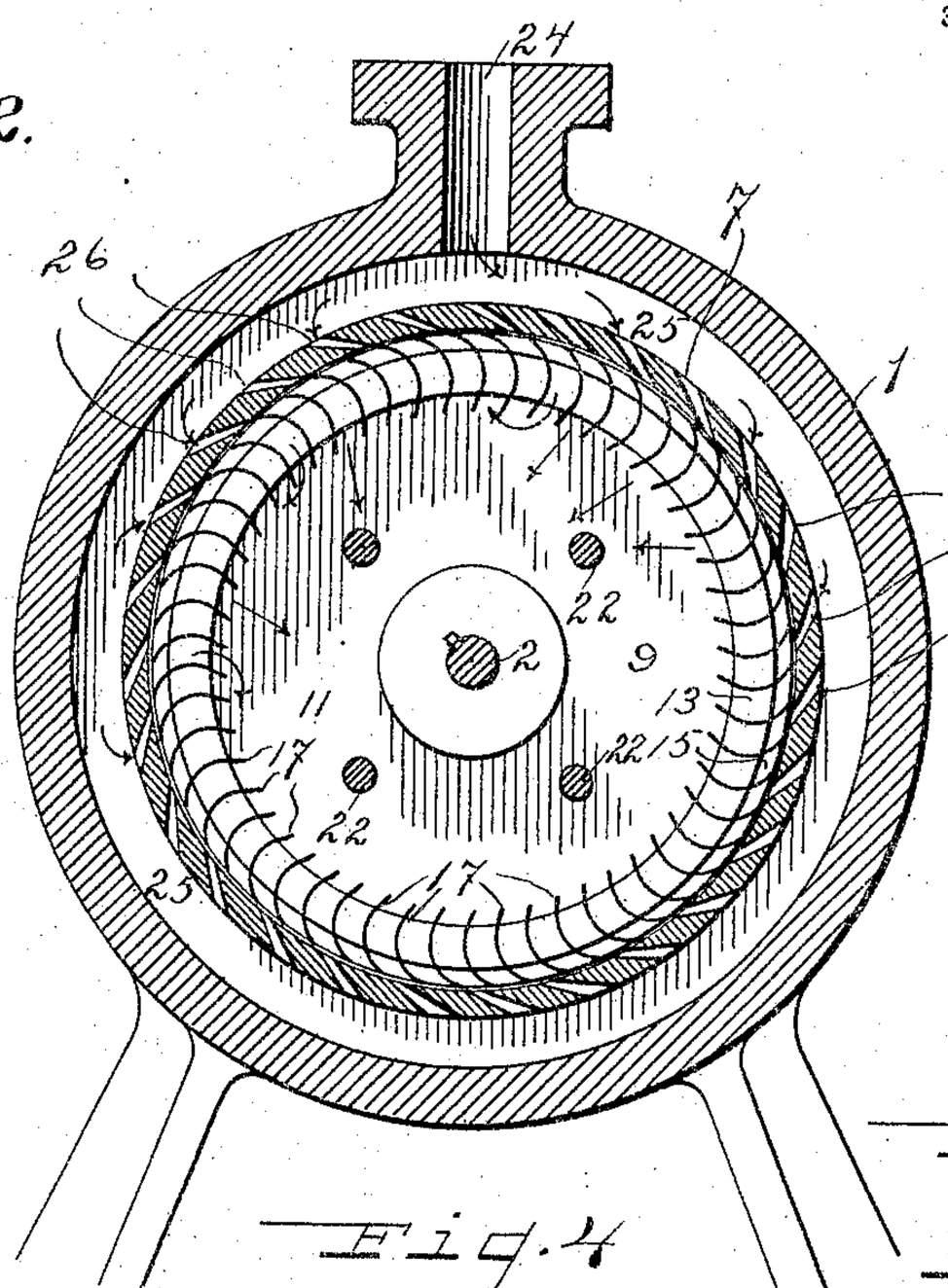


Fig. 5

Fig. 3

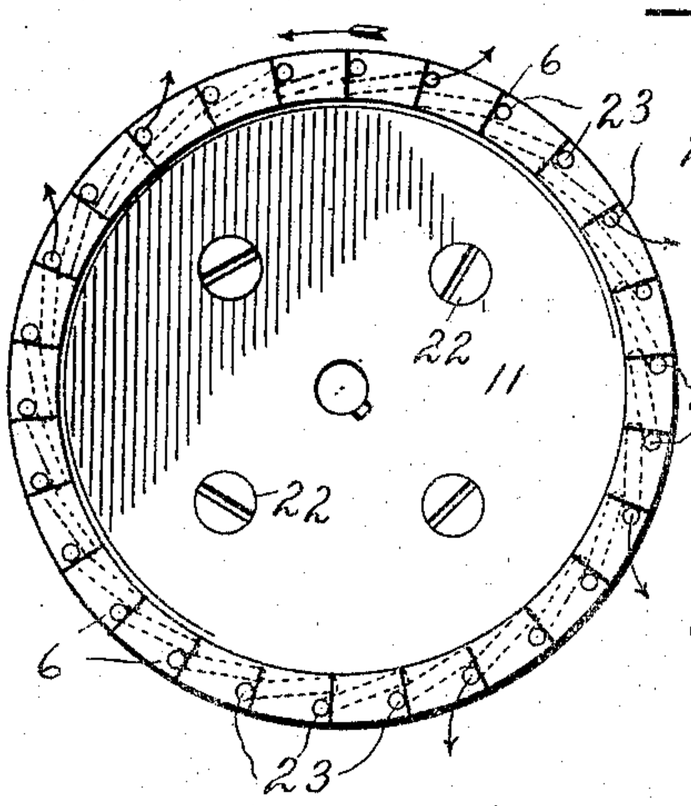
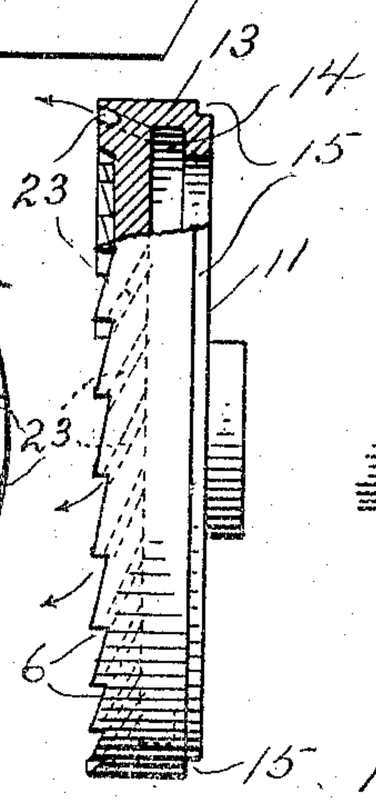


Fig. 4



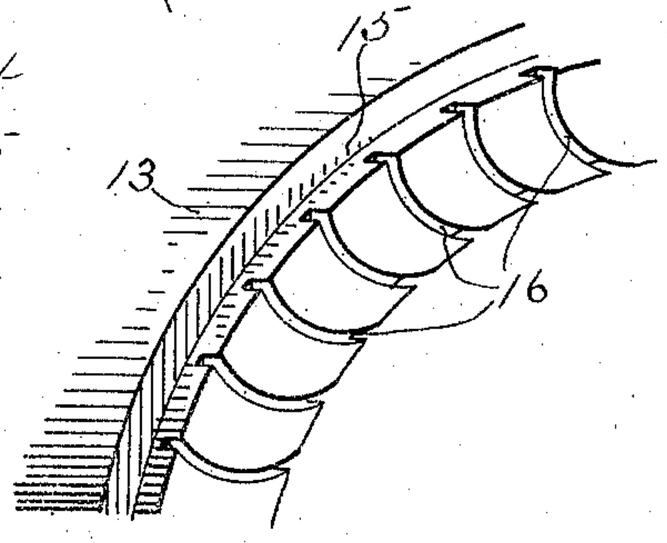
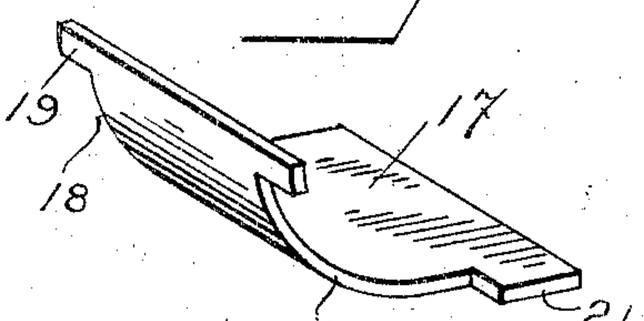


Fig. 6



WITNESSES.
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3 SHEETS—SHEET 3.

Fig. 8

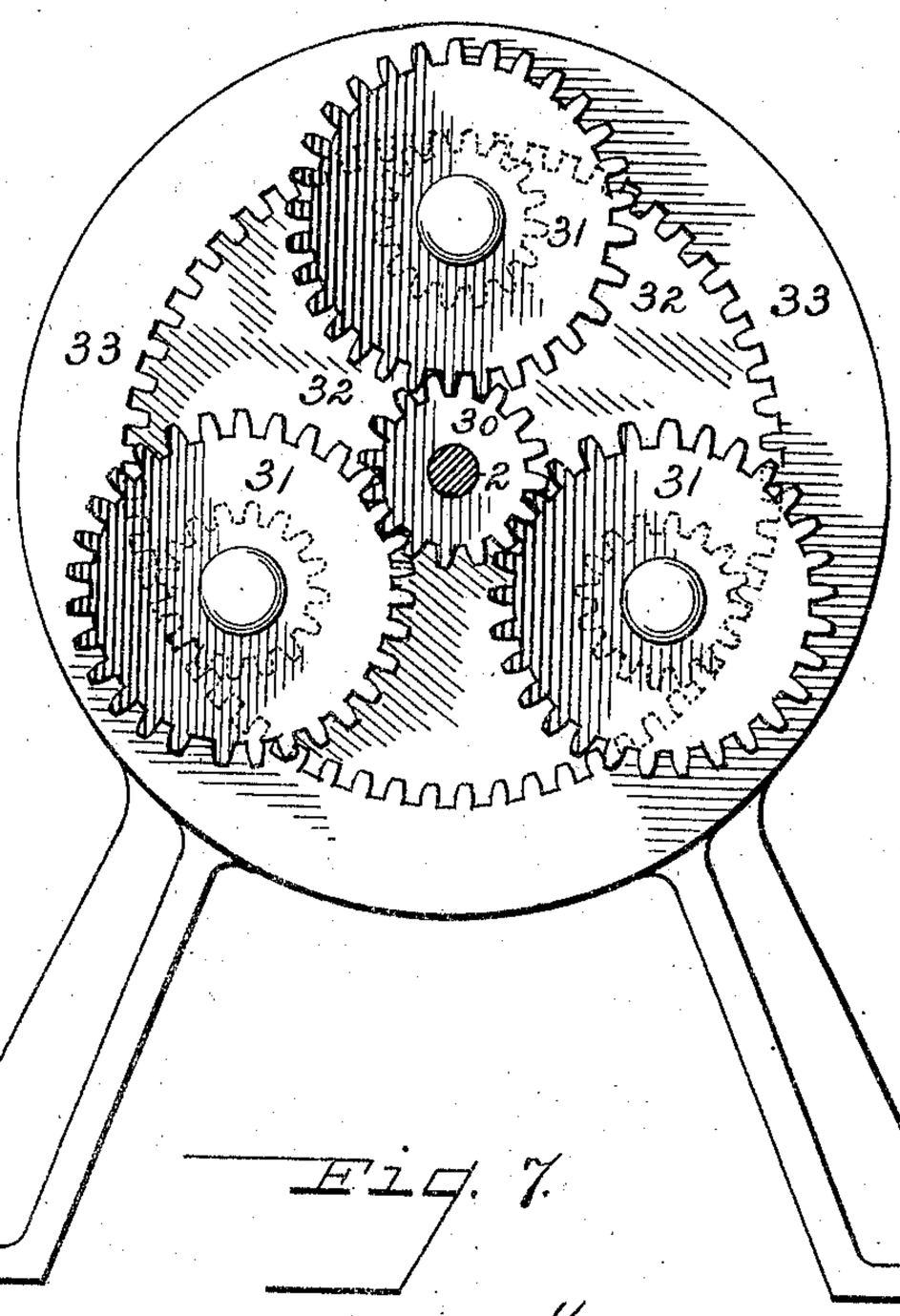
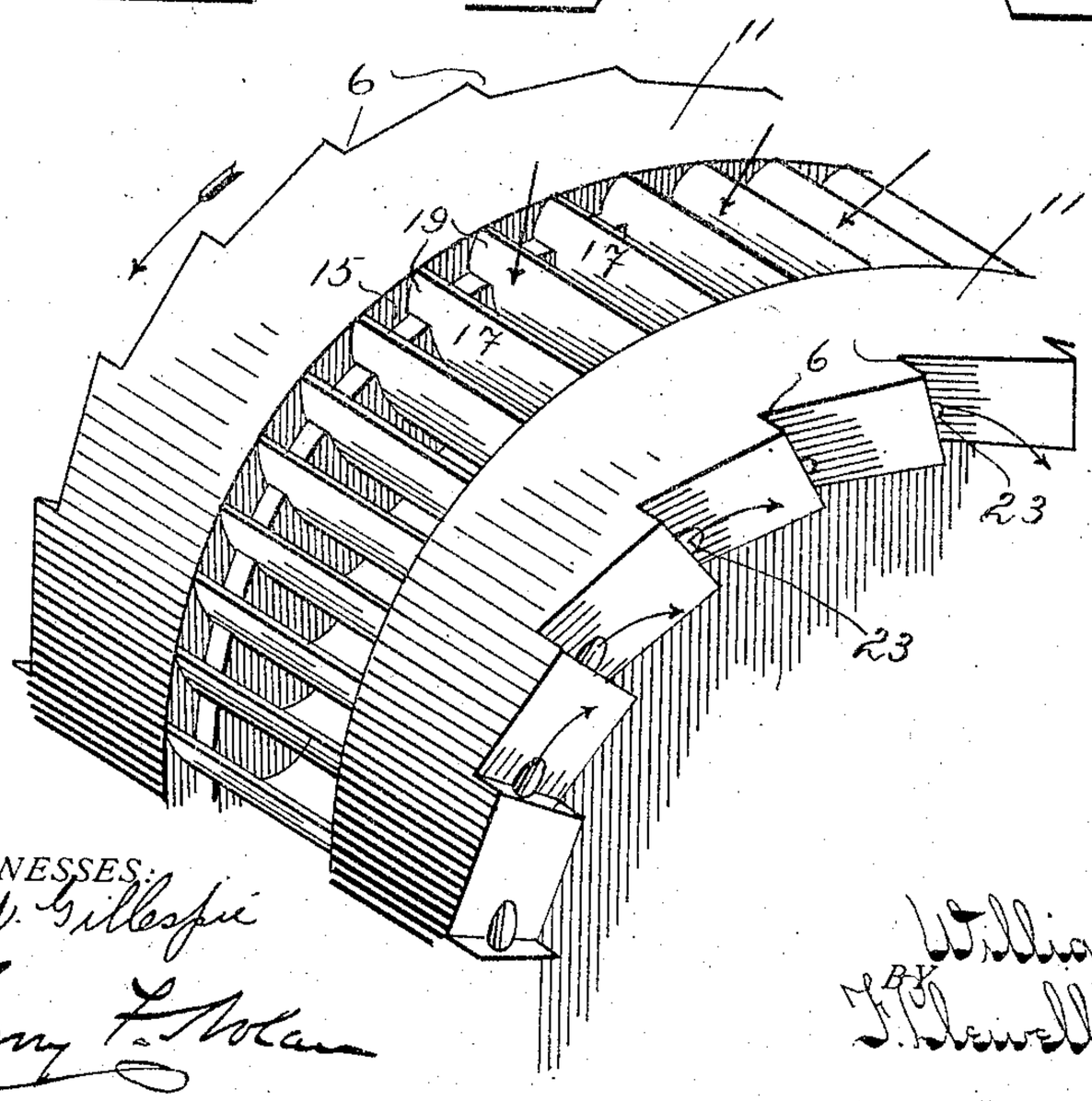


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM P. MARSH, OF DAYTON, OHIO.

ROTARY MOTOR.

No. 850,593. Specification of Letters Patent. Patented April 16, 1907.

Application filed January 16, 1907. Serial No. 352,587.

To all whom it may concern:

Be it known that I, WILLIAM P. MARSH, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Rotary Motors, of which the following is a specification.

My invention relates to improvements in motors, and particularly to rotary engines or turbines.

The motor herein described is especially adapted to the use of steam, but is capable of being driven by gas, water, or compressed air.

The object of the invention is to simplify the construction, as well as the means and mode of operation, of such devices, whereby they are not only cheapened in construction, but are rendered more efficient and economical in operation and unlikely to get out of repair.

A further object is to provide a structure adapted to utilize both the impact force and the recoil of the actuating medium.

A further object is to provide a construction especially adapted to motors of small size and adapted to conditions where high horse-power is not required.

With the above primary and other incidental objects in view, as will appear from the specification, the invention consists of the means, mechanism, construction, and mode of operation or their equivalents hereinafter described, and set forth in the claims.

Referring to the drawings, Figure 1 is a longitudinal vertical sectional view of the assembled machine. Fig. 2 is a transverse sectional view on line X X of Fig. 1. Fig. 3 is a reverse view of the rotor-disk shown in Fig. 2. Fig. 4 is an edge view of said disk, partly broken away. Fig. 5 is a detail perspective view of a portion of the rotor-disk. Fig. 6 is a perspective view of one of the curved vanes. Fig. 7 is a detail perspective view of a portion of the assembled rotor. Fig. 8 is an elevation of the speed-reducing mechanism.

Like parts are indicated by similar characters of reference throughout the several views.

In the drawings, 1 is the casing, cylindrical in form, having a shaft 2 extending throughout and mounted in suitable bearings 3 and 4 in the respective heads of said case. The bearing 3 is preferably a closed bearing, as shown. Adjacent to the bearing 4 is a stuffing-box 5. Mounted on the shaft 2 and rotating within rings 7 and 8 are a primary rotor 9 and a plurality of secondary rotors 10.

The rotors are similar in construction, and a description of the primary rotor will suffice for all. The rotor comprises two parallel disks 11 11, mounted on the shaft 2. Each disk has an inward-projecting flange 13, having an interior annular recess 14 and a peripheral rabbet 15. The adjacent faces of the flanges 13 have curved slots or recesses 16, as in Fig. 5. A series of curved vanes 17 are interposed between the disks 11 11, with the recessed portion 18 engaging in the slots 16 and the projection 19 projecting into the rabbet 15, while the portion 21 projects beyond the flange 13 within the rotor. The structure is secured in its adjusted form by bolts 22 passing through the disks 11 11, impinging the vanes 17 between the disks. By this construction there is formed a hollow rotor having peripheral inlet-ports intermediate the curved vanes 17. Outlet-ports 23 are provided in each of the disks 11 of the primary rotor, but in only one disk of the secondary rotors, as indicated, the disk 12 of said sec ondary rotors being devoid of such outlet-ports. The outlet-ports 23 are arranged in a direction diagonal to the axis of the rotor—that is, they are arranged tangent to a common circle concentric with the shaft 2 and are likewise inclined longitudinally with said shaft, as shown in Figs. 3 and 4. In the drawings, the disks 11 are shown with a series of serrations or notches 6. These notches 6 are not essential, but facilitate the location and drilling of the outlet-ports 23.

The case 1 has an inlet 24 for actuating medium—steam, gas, water, or compressed air. The inlet 24 communicates with an annular groove or conduit 25 in the ring 7. The ring 7 is further provided with a series of discharge-orifices 26, tangent to a common circle and located in a vertical plane with the vanes 17 of the rotor. The arrangement is such that the actuating medium will be directed upon the periphery of the primary rotor, striking the vanes 17, will cause the rotor to revolve, and will be discharged through the vanes to the interior of the rotor. The medium will find outlet from the rotor through the outlet-ports 23 into the casing 1. The primary rotor discharges on opposite sides, as indicated by darts in Fig. 1. The outlet-ports 23, arranged about the entire periphery of the disks 11 11, provide means whereby the

medium will be given direct passage through the rotor—that is, the current of medium will not be required to make any sudden or abrupt change of direction, but will readily find an outlet in its direct course of travel, the object being to prevent giving to the current of medium a tortuous passage which would reduce its velocity.

The vanes 17 are adapted to receive the impact force of the medium discharged through the orifices 26. The outlet-ports extend outward and rearward in relation to the rotation of the rotors, and thus the medium escaping through said ports exerts a recoil force on the rotor adapted to accelerate the speed.

The rings 8 of the secondary rotors are flanged, as at 27, having their open side toward the primary rotor. The flange 27 is provided with orifices 28, similar to those 26 of the ring 7. From the primary rotor the steam passes into the case 1 intermediate the rotors, thence through the orifices 28 of the flange 27 to the vanes of the secondary rotor 10.

While in the drawings but one secondary rotor is shown on each side of the primary rotor 9, it is to be understood that the series of secondary rotors may be continued to suit conditions, the medium passing through the secondary rotors successively. From the last secondary rotor of the series the medium is discharged into case 1 and is conducted thence through outlet-pipes 29.

It has been found by experiment that the velocity of the rotors and shaft 2 will be too great for practical use. A speed-reducer is therefore provided. On the extremity of the shaft 2 is a pinion 30, meshing with the greater step of several stepped gears 31, mounted on a revoluble plate or head 32. The smaller steps of the gears 31 mesh with an internal stationary gear 33. A driven shaft 34 is secured to the head 32. The construction is such that the gears 31, driven by the pinion 30, will travel about the interior of the gear 33, revolving the head 32 and therewith the shaft 34 at a reduced speed.

From the above description it will be apparent that there is provided a rotary engine possessing the particular features of advantage before enumerated as desirable and which obviously is susceptible of modification in its form, proportion, detail construction, and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

Having thus described my invention, I claim—

1. In a motor as described a casing, a shaft, a rotor mounted on said shaft having a hollow interior, vanes arranged in the periphery of the rotor at an inclination to the radius, discharge-conduits directed to said vanes whereby the steam will strike the vanes and pass to the interior of the rotor and outlet-ports in said rotor arranged obliquely to the axis thereof, substantially as specified.

2. In a motor as described a casing, a shaft, a rotor mounted thereon having a hollow interior, vanes about the periphery of said rotor discharging to the interior thereof and outlet-ports in said rotor arranged obliquely to the axis thereof, substantially as specified.

3. In a mechanical motor a casing, a shaft, a series of rotors mounted on said shaft, inlet-ports in the periphery of said rotors, oblique outlet-ports in said rotors, means for leading the actuating medium from the outlet-ports of one rotor to the peripheral inlet-ports of the next successive rotor, substantially as specified.

4. In a mechanical motor as described a casing, a shaft, a rotor mounted on said shaft, a conduit for actuating medium in said case and surrounding said rotor, discharge-nozzles leading from said conduit arranged tangent to a common circle concentric with said shaft and in a plane common with said rotor outlet-ports in the side of said rotor arranged oblique to the axis thereof, substantially as specified.

5. In a mechanical motor, a casing, a shaft, a rotor mounted on said shaft comprising two parallel disks, curved vanes intermediate said disks, and adjacent to the periphery thereof, outlet-ports extending through said disks in a direction at an angle to the axis thereof, substantially as specified.

6. In a mechanical motor, a case, a shaft, a rotor on said shaft including parallel disks, annular flanges on the adjacent faces of said disks, recesses in said annular flanges, curved vanes extending within said recesses, projecting portions on said vanes extending on opposite sides of said annular flanges beyond the depth of said recesses, means to hold said disks in their adjusted positions, and means for conducting actuating medium to said rotor, substantially as specified.

7. In a mechanical motor, a case, a shaft, a rotor on said shaft comprising parallel disks, inward-projecting flanges on said disks, said flanges having a peripheral rabbet curved vanes having recessed ends adapted to engage said flanges and means for impinging said vanes between said flanges, substantially as specified.

8. In a motor as described, a case, a shaft, a rotor on said shaft comprising parallel disks, inward-projecting flanges on said disks, curved recesses in the adjacent faces of said flanges, curved vanes having recessed ends engaging said curved recesses, said flanges-projecting within the recessed ends of the curved vanes, means for retaining said disks in their adjusted relation and means for conducting actuating medium to said vanes, substantially as specified.

9. In a motor as described, a case, a shaft,

a rotor mounted thereon comprising parallel disks, curved vanes intermediate said disks and adjacent to the periphery thereof forming inlet-ports to the interior of said rotor, outlet-ports extending diagonally through one of said disks, substantially as specified.

10. In a motor as described, a case, a shaft, a rotor thereon comprising parallel disks, inward-projecting flanges on said disks having internal annular recesses, curved vanes interposed between said projecting flanges, outlet-opening extending from said annular recess to the exterior of the disk and means for conducting actuating medium to said vanes, substantially as specified.

11. In a motor as described, a case, a shaft, a primary rotor on said shaft adapted to receive the actuating medium on the periphery thereof, outlet-ports in the sides of said rotor adapted to discharge the same laterally in opposite directions, a plurality of secondary rotors also on said shaft adapted to receive the medium on the peripheries thereof having outlet-ports in the sides thereof adapted to discharge the same laterally in a direction away from the primary rotor to the next successive secondary rotor of the series, substantially as specified.

12. In a motor as described, a casing, a shaft, a series of rotors having hollow interiors and adapted to receive the actuating medium on the periphery thereof and to discharge the same laterally into said casing, a ring having an annular conduit therein and discharge-openings leading therefrom directed to the periphery of the primary rotor flanged rings surrounding the secondary rotors, said rings being open on the side adjacent the next preceding rotor, discharge-conduits in the flange of said ring, said discharge-conduits being directed to the periphery of said secondary rotor, substantially as specified.

13. In a motor as described, a case, a shaft, a series of rotors mounted on said shaft having hollow interiors, a primary rotor adapted to receive the actuating medium through the periphery thereof and discharge same laterally through outlet-ports in the sides of said rotor in opposite directions, secondary rotors adapted to receive the medium through the periphery thereof and discharge same laterally through outlet-ports in the sides thereof away from said primary rotor, and exhaust-outlet conduits adjacent to the ends of said case, substantially as specified.

In testimony whereof I have hereunto set my hand this 12th day of January, A. D. 1907.

WILLIAM P. MARSH.

Witnesses:
HARRY F. NOLAN,
FRANK L. WALKER.