No. 791,824. PATENTED JUNE 6, 1905.

H. C. SCHWARZE.

STEAM TURBINE.

APPLICATION FILED MAR. 2, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

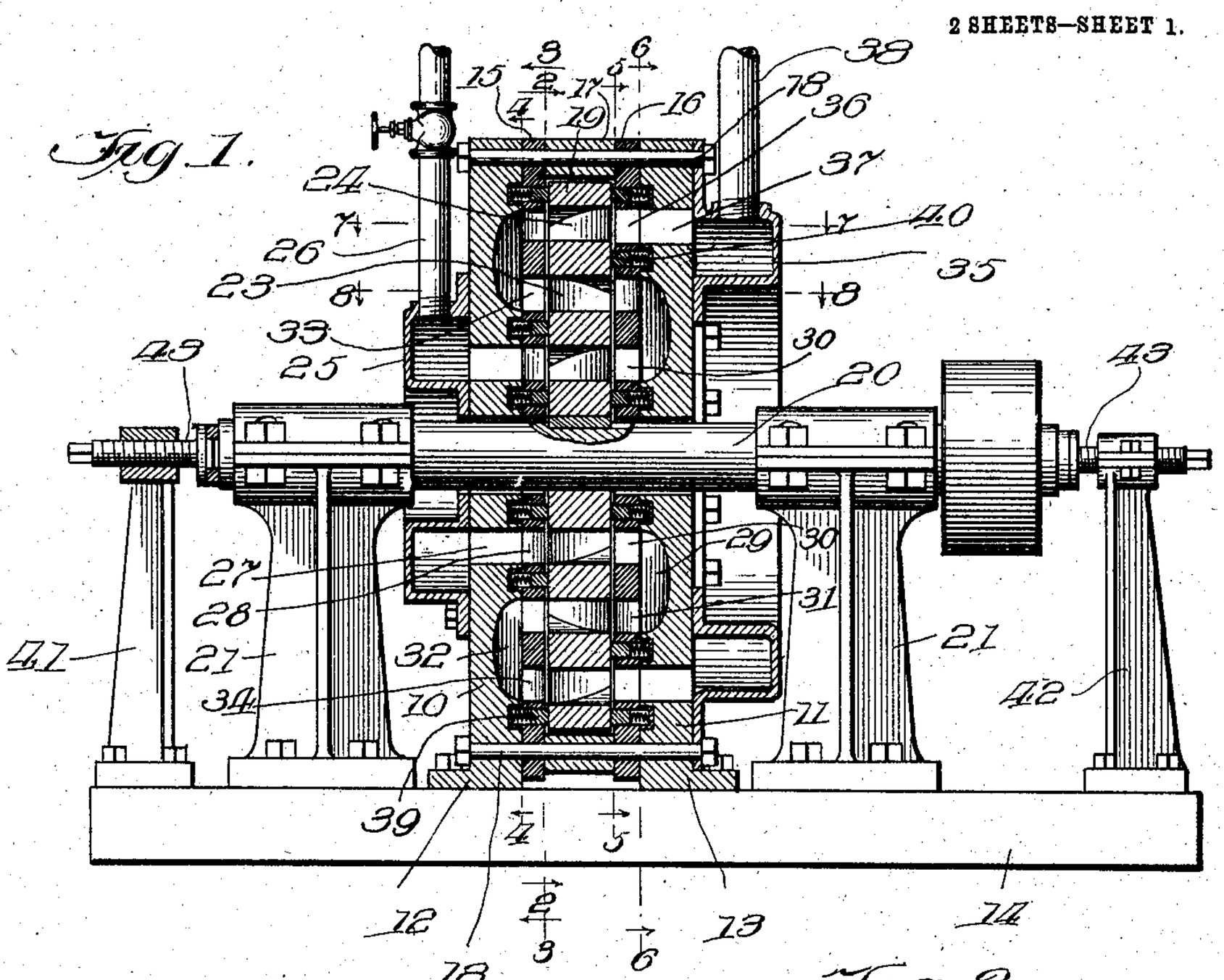
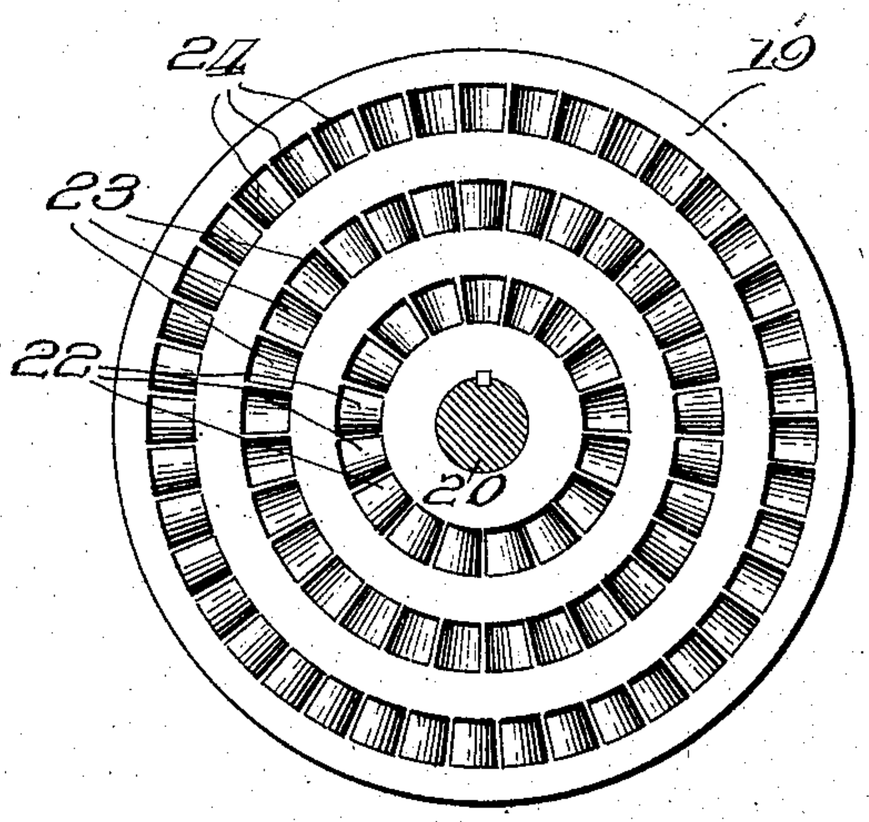
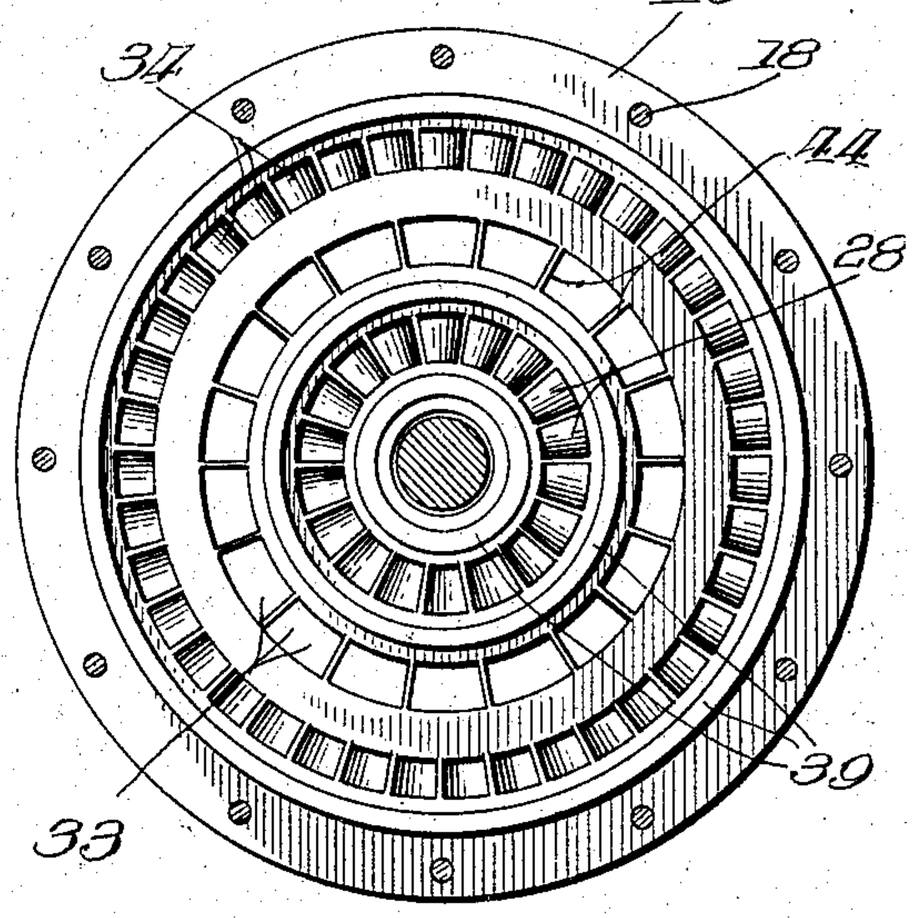


Fig. 2.

Fig. 3.





Witnesses:

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Inventor:

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Fig. 4.

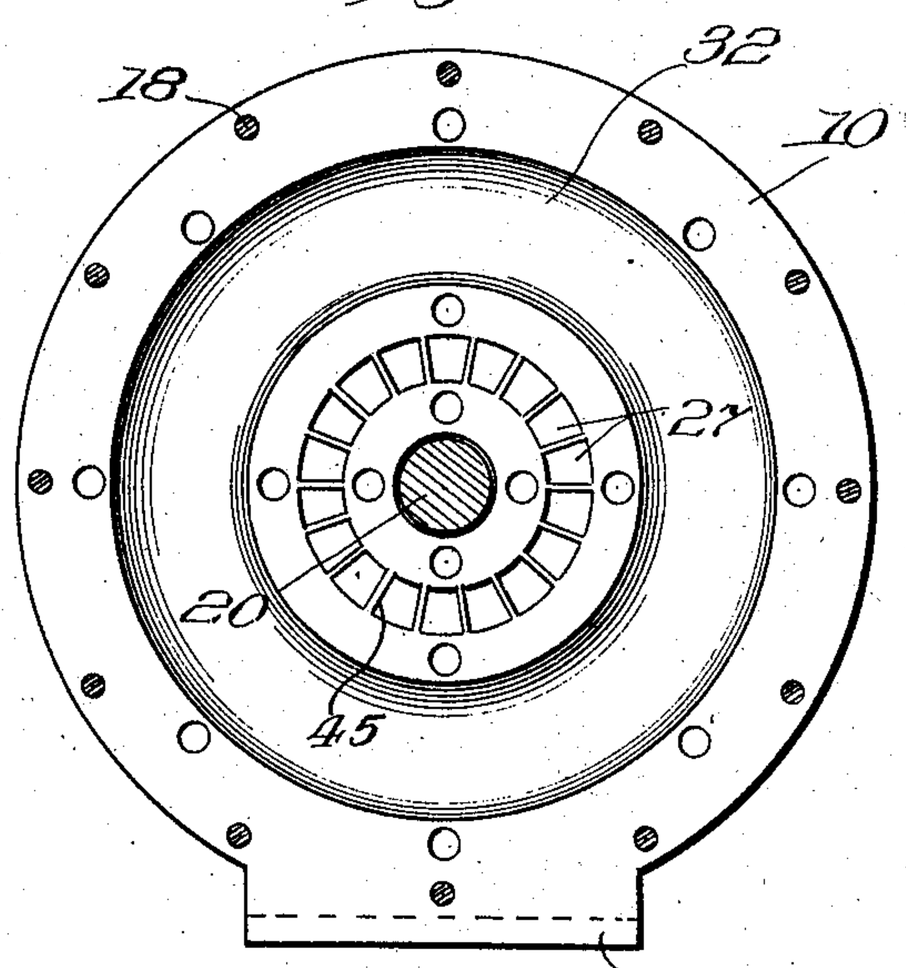


Fig. 5.

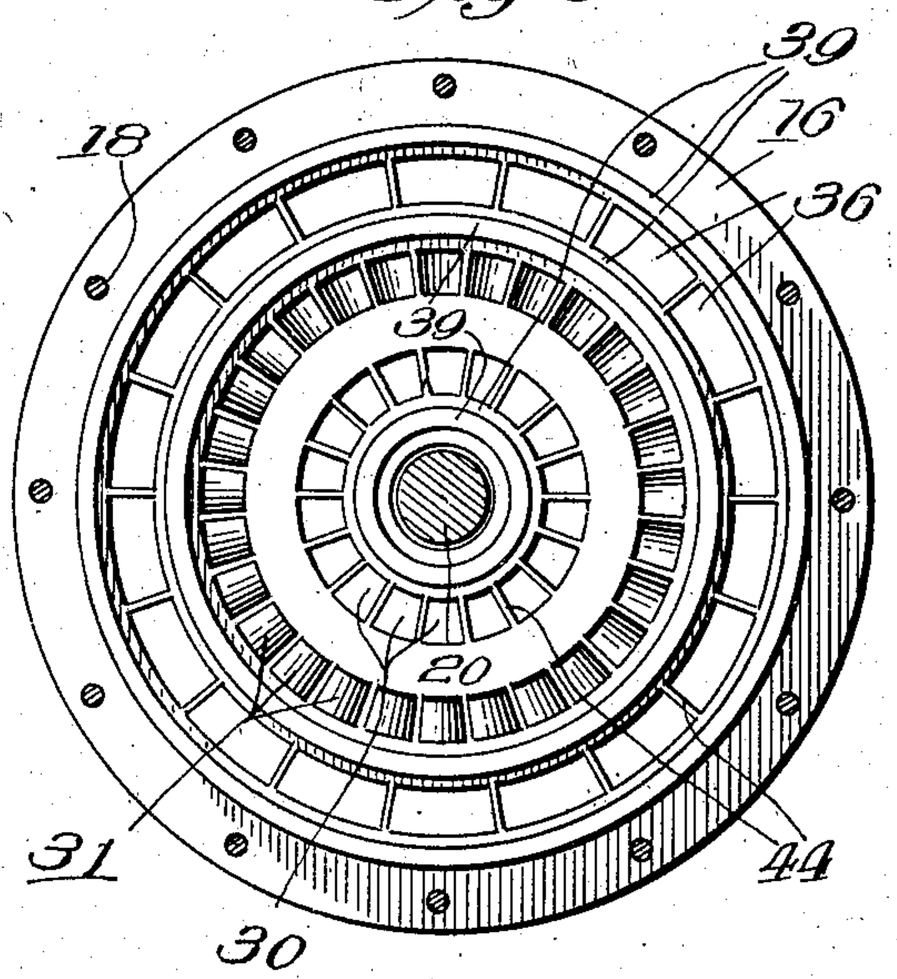


Fig. 6

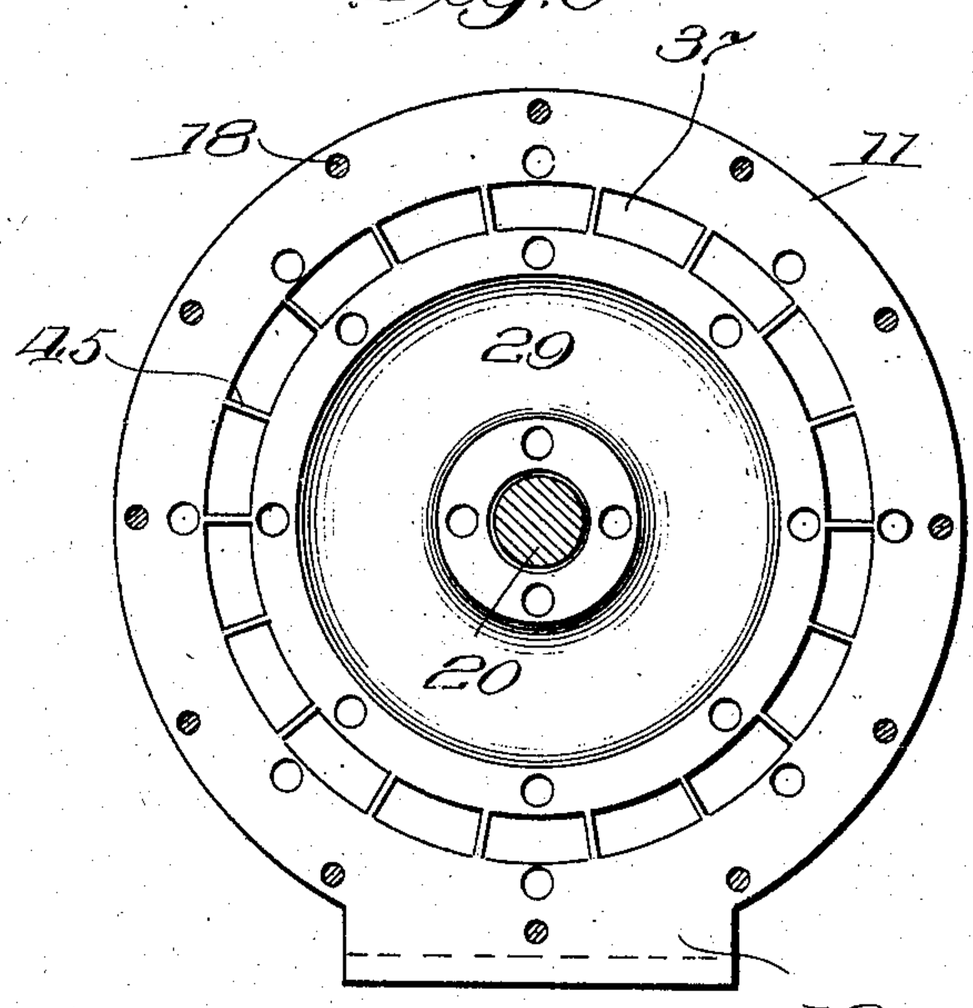


Fig. 7.

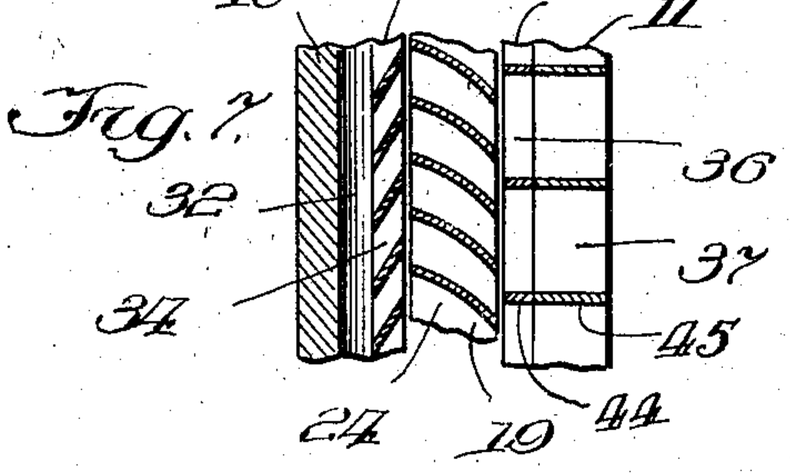
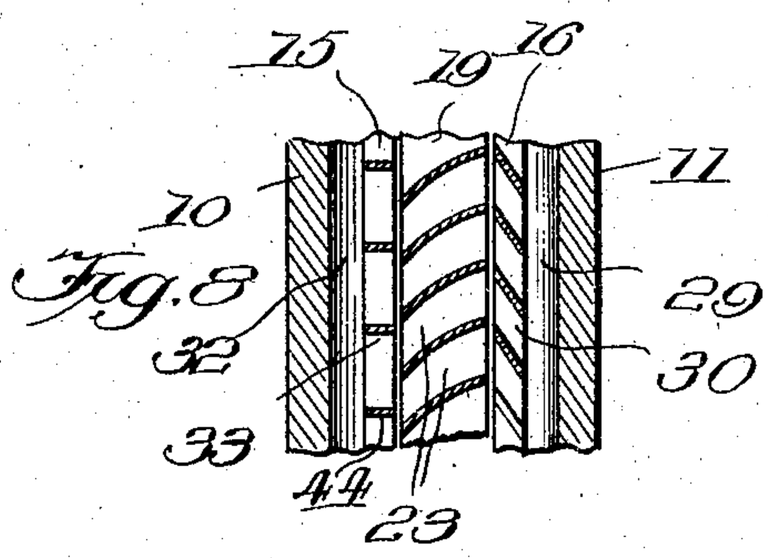


Fig. 8.



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No. 791,824. Patented June 6, 1905.

UNITED STATES PATENT OFFICE.

HENRY C. SCHWARZE, OF CHICAGO, ILLINOIS.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 791,824, dated June 6, 1905.

Application filed March 2, 1905. Serial No. 248,123.

To all whom it may concern:

Be it known that I, HENRY C. SCHWARZE, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Steam-Turbines, of which the following is a specification and which are illustrated in the accompanying drawings, forming a part thereof.

The invention relates to a motor in which rotation is imparted to a disk or turbine member by the impact of jets of an expansive fluid, usually steam.

More particularly, the invention relates to a motor of this class described in Letters Patent No. 751,209, granted to me February 2, 1904, and has for its object to provide a more efficient and economical distribution of the steam and to simplify the formation of the several parts from which the motor is constructed.

The invention consists in certain details of construction, as hereinafter pointed out and as illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal vertical section of the motor, some of the parts appearing in elevation. Fig. 2 is an end elevation of the turbine-disk as viewed from the line 2 2 in Fig. 1 and showing the driving-shaft in vertical cross-section. Fig. 3 is a vertical cross-section on the line 3 3 of Fig. 1, showing the arrangement of ports for the distribution of steam on the steam side of the motor. Fig. 4 is a vertical cross-section on the line 4 4 of Fig. 1, showing in elevation the inner face of the steam side of the casing. Fig. 5 is a view similar to Fig. 3, but showing the arrangement of ports at the opposite side of the turbine, its position being shown by the line 5 5, Fig. 1. Fig. 6 is a sectional view on the line 6 6 of Fig. 1, showing in elevation the inner face of the exhaust side of the casing. Figs. 7 and 8 are sectional details on the lines 7 7 and 8 8, respectively, of Fig. 1.

The frame of the motor includes side members 10 and 11, each provided with feet, as 12 and 13, by means of which it may be secured to a bed-plate 14. Each of these side members has applied to its inner face an apertured plate 15 16, and they are drawn together upon the sides of a spacing-ring 17 by the bolts 18, so as to provide an inclined cylindrical chamber within which revolves the turbine-disk 19. This disk is keyed to a shaft 20, which is journaled in suitable standards 21 21, rising from the bed-plate 14, and is secured against longitudinal displacement by end bearings 43 43, supported in the floor-hangers 41 42, also mounted on the bed-plate 14.

The turbine-disk is provided with a plurality of annular series of apertures, as 22 23 24, most clearly shown in Fig. 2. Each of the apertures of these series have walls disposed radial to the axis of the disk and oblique to its direction of rotation, the walls of the apertures of adjacent series being inclined in opposite directions.

An annular steam-chest 25 is secured to the face of one of the side members, as 10. It is supplied with steam through an induction-pipe 26 and communicates with the inner series of apertures 22 in the turbine-disk through an annular chamber 27 in the side member 10 and through a series of ports 28 in the facing-plate 15, having inclined walls so as to direct the steam substantially normal onto the inclined walls of the apertures of the turbine-disk.

In the side member 11 of the casing is an annular chamber 29, of considerable volume, which overlaps the two inner series of apertures 22 23 of the turbine-disk, from the first of which it receives the steam through an annular port 30 in the facing-plate 16 and to the latter of which it delivers this steam through a series of ports 31, similar to the ports 28 in the plate 15, and the arrangement of which is shown in Fig. 8. In the side member 10 there is formed a cavity 32, similar to the cavity 29 in the member 11, but of larger volume owing to its greater circumference. This cavity receives the steam from the apertures 23 of the turbine-disk through an annular port 33 in the facing-plate 15 and delivers it to the next series of apertures 24 in the turbine-disk through a series of ports 34, having inclined walls so as to direct the steam

normally upon the walls of these apertures, as in the previous instances, Fig. 7. By a continuation of this arrangement the steam may be directed back and forth through the turbine-disk as many times as may be desired and passes from the last series of apertures into an exhaust-chamber 35, secured to the outer wall of the side member 11 through annular ports 36 and 37 in the facing-plate 16 and the side member, respectively. The steam is carried away from this exhaust-chamber in any desired manner, as by the exhaust-pipe 38.

The flow of steam between the several cavities and steam-ports in the side members 10 and 11, except by its passing through the apertures in the turbine-disk, is prevented by the introduction of packing-rings 39, set into recesses in the faces of the plates 15 and 16 and held snugly against the radial faces of the turbine-disk by a plurality of small springs 40. The annular ports in the side members 10 and 11, as the admission-port 27 and exhaust-port 37, and in the facing-plates 15 and 16, as the ports 31, 33, and 35, are crossed by webs, as 44 and 45, to maintain the integral construction of the parts in which these ports are formed.

It will be understood from the preceding description that the invention provides a series of chambers of increasing volume through which the steam flows in succession and in passing from each to the next larger is caused to impinge upon the oblique walls of apertures in the turbine-disk in such manner as to impart rotation to it.

The employment of the facing or guide plates 15 and 16 provides for directing the steam upon the turbine-blades in the most efficient manner without giving a complicated form to any of the parts or encroaching on the chambers into which the steam is discharged and expands as it leaves one set of turbine-blades and from which it is discharged upon the next set.

I claim as my invention—

1. In a steam-turbine, in combination, a rotative disk having an annular series of radially-disposed axially-oblique surfaces, side members having annular ports for the admission and exhaust of steam, and plates secured to the inner faces of the side members and having port-openings which register with the ports of the rotative and side members and having their axes substantially perpendicular to the oblique faces of the ports of the rotative member.

2. In a steam-turbine, in combination, a rotative disk having a plurality of annular series of apertures, each aperture having a radially-disposed axially-oblique wall, side members inclosing the disk, ports in the side members for the admission and exhaust of steam, an annular cavity in one of the side members overlapping two of the series of disk-apertures, and plates bearing against the radial faces of the disk for covering the mouths of the ports and of the cavity and having annularly-arranged openings for the admission of steam to the cavity and the exhaust-port, and annular series of openings for directing the steam from the admission-port and the cavity substantially perpendicularly, onto the walls of the disk-apertures.

3. In a steam-turbine, in combination, a pair of wall-plates having annular steam-chambers; a rotative disk between the wall-plates and apertured to form annular series of radially-disposed axially-oblique blades; and a pair of plates interposed between the wall-plates and the disk and being apertured to form annular series of ports leading from the steam-chambers and being directed substantially perpendicular to the faces of the blades.

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Witnesses:

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