No. 751,209. PATENTED FEB. 2, 1904.

H. C. SCHWARZE.

STEAM TURBINE.

APPLICATION FILED OCT. 13, 1903.

NO MODEL.

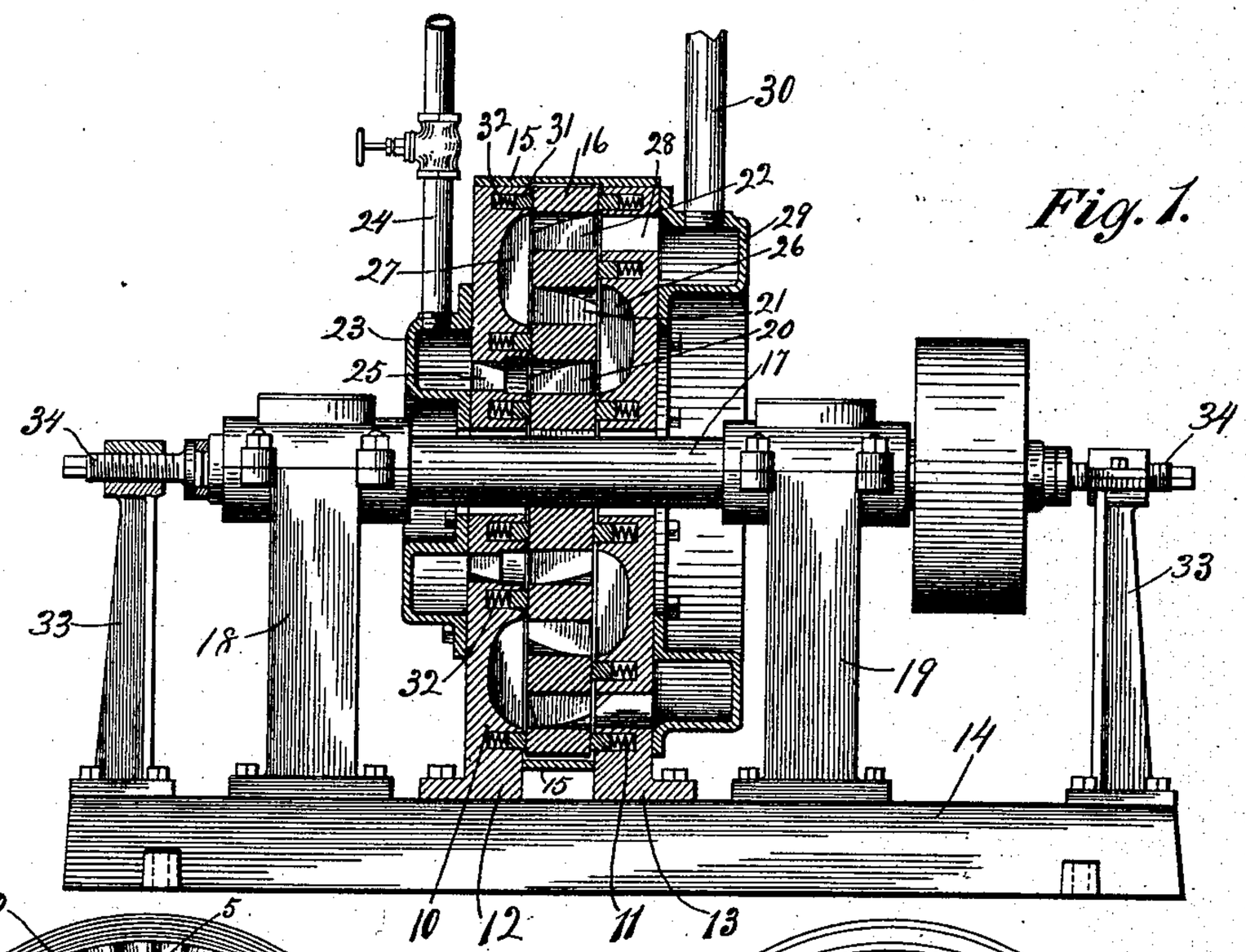

Fig. 1.

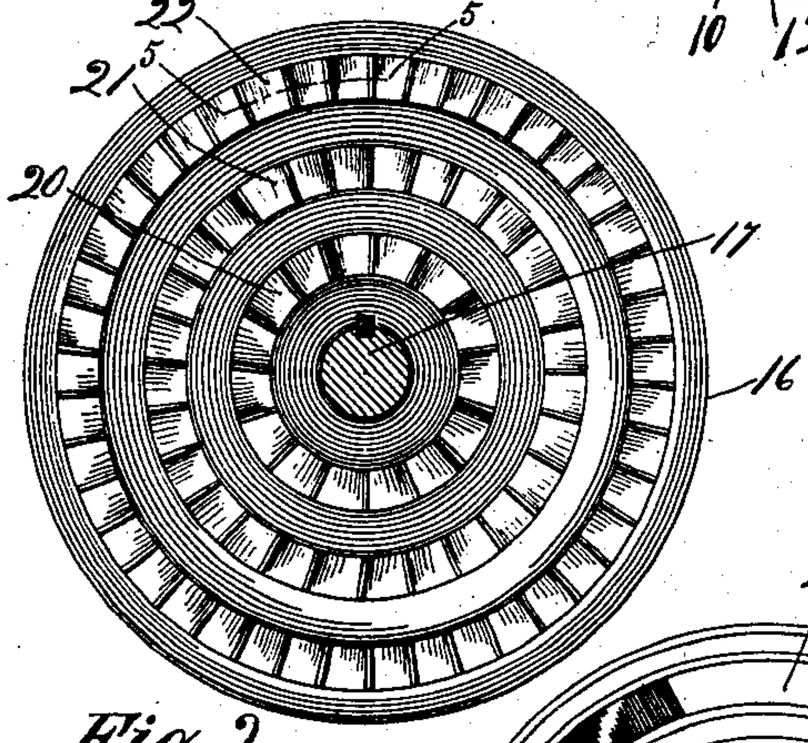

Fig. 2.

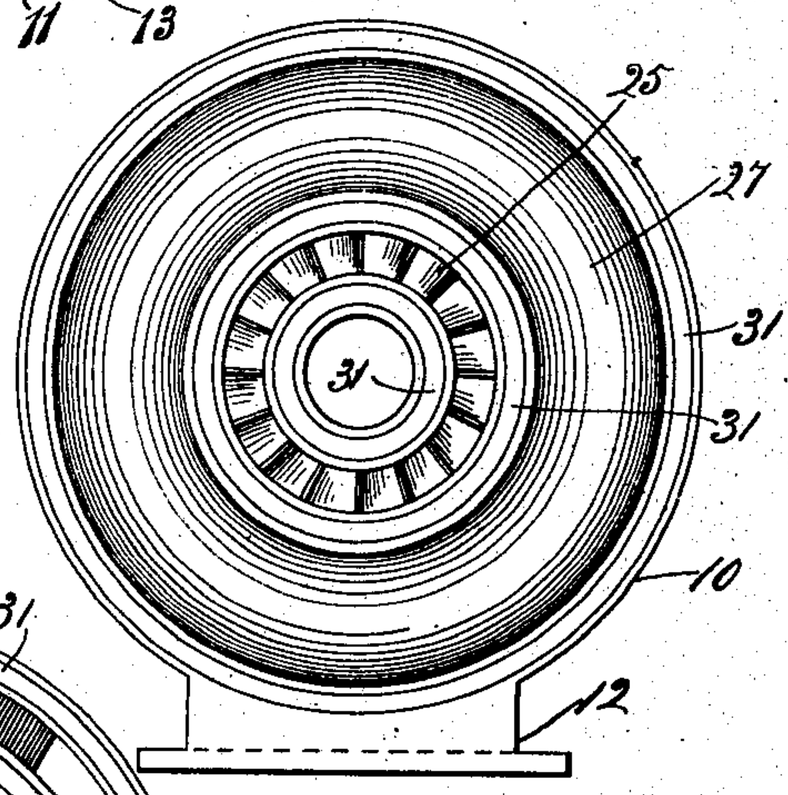

Fig. 3.

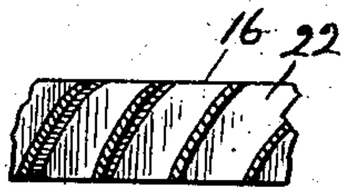

Fig. 5.

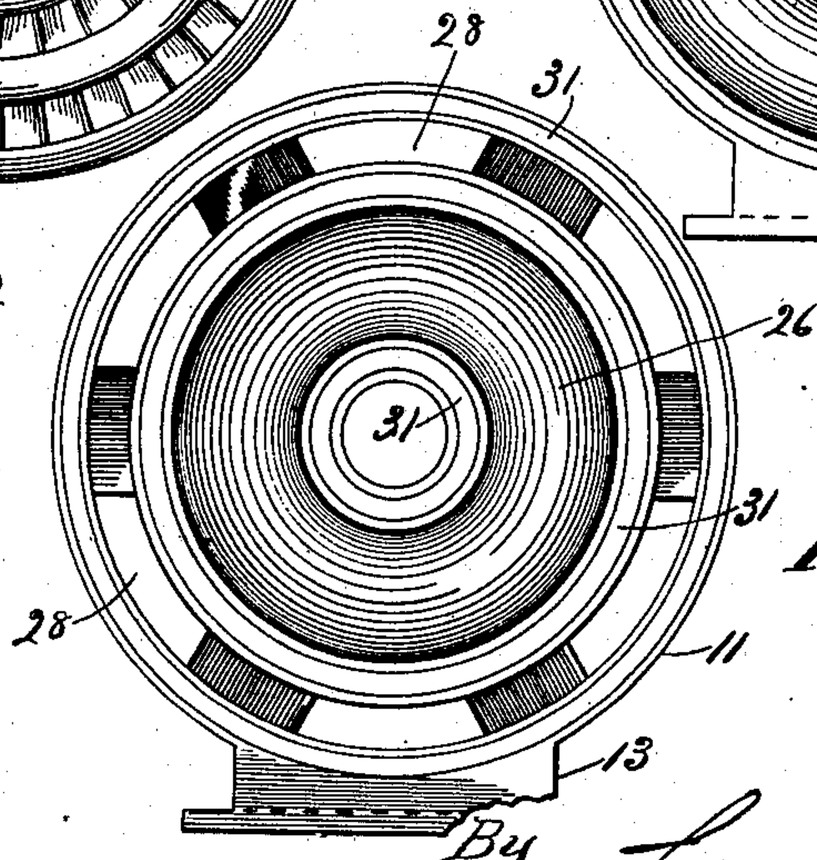

Fig. 4.

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

No. 751,209. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

HENRY C. SCHWARZE, OF CHICAGO, ILLINOIS.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 751,209, dated February 2, 1904.

Application filed October 13, 1903. Serial No. 176,894. (No model.)

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 that class of steam-turbines in which a rotary disk or turbine is provided with cells or ports having inclined walls against which steam-jets are directed.

The object of the invention is to simplify motors of this kind and increase their efficiency; and it consists in the structure hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical central section of the engine, partly in elevation. Fig. 2 is a side view of the turbine-disk, the shaft being shown in section. Fig. 3 is an inside elevation of the steam side of the casing. Fig. 4 is an inside elevation of the exhaust side of the case, and Fig. 5 is a sectional detail on the line 5 5 of Fig. 2.

The case of the engine consists of two side plates 10 and 11, each provided with a foot, as 12 and 13, by means of which it may be securely bolted to a bed-plate 14. The two sides are spaced apart, as shown, and to their peripheries there is applied a band 15, which covers the interspace, so as to form an inclosed chamber.

The turbine-disk 16 is keyed upon a shaft 17, which is journaled in suitable standards, as 18 and 19, rising from the bed 14. The turbine-disk is provided with a plurality of annularly-disposed ports, as 20, 21, and 22, such ports extending entirely through the disk and each having one of its walls disposed upon radii of the disk and oblique to the direction of rotation, the inclination of such oblique walls of adjacent series of ports being opposite.

An annular steam-chest 23 is secured to the outer face of the side 10 of the casing, and to this chest steam is led through the pipe 24. An annular series of ports 25, formed through the side 10, lead from the chamber of the chest 23 and register with the ports 20 of the turbine. These ports 25 are preferably inclined in the opposite direction from the inclination of the oblique face of the ports 20, so that a jet of steam entering therethrough will be thrown substantially perpendicularly against such inclined face of the turbine-port.

An annular cavity 26 is formed in the inner face of the side 11 of the casing, overlapping the series 20 and 21 of the turbine-ports, and a similar cavity 27 is formed in the inner face of the side 10 of the casing, overlapping the series of ports 21 and 22.

An annular series of exhaust-ports 28 is provided in the side 11 of the casing, these ports being in register with the ports 22 and in communication with an annular chest 29, secured to the outer face of the side 11 and from which there leads an exhaust-pipe 30. Steam entering the engine through the pipe 24 is successively directed against the inclined faces of the three series of turbine-ports and then discharged through the exhaust-pipe 30. While I have shown three series of turbine-ports, it is obvious that the number may be varied as desired.

Suitable packing-rings, as 31, are fitted within recesses formed in the inner faces of the casing sides 10 and 11, such rings being located at each side of the various casing-ports. I prefer to employ packing-rings seated upon springs, as 32, which hold them in contact with the face of the turbine, though any other means for securing this contact may be employed. The peripheral casing 15 is necessary only to prevent the escape of steam which might pass the packing-ring.

Inasmuch as it may be difficult to secure an absolute balance of axial pressure upon the two sides of the turbine-disk, and in the engine, as illustrated, there has not been an attempt to secure such balance, it is preferable to provide end thrust-bearings for the shaft 17. For this purpose I show brackets 33 33, rising from the bed 14 and each provided with a threaded rod 34 34 for bearing against the end of the shaft.

I claim as my invention—

1. In a steam-turbine, in combination, a rotative disk having a plurality of annular series of apertures each having a radially-dis-

posed axially-oblique wall, the oblique walls of apertures of adjacent series being oppositely inclined; side casing-plates bearing against the disk-walls, each plate having ports registering with one of the series of disk-apertures, an annular cavity overlapping two other series thereof, and an annular chest on the outer face of each plate and in communication with the ports thereof.

2. In a steam-turbine, in combination, a rotative disk having a plurality of annular series of apertures each having a radially-disposed axially-oblique wall, the oblique walls of apertures of adjacent series being oppositely inclined; side casing-plates bearing against the disk-walls; an annular series of steam-induction ports in one of the side plates and registering with one series of disk-ports; an annular series of exhaust-ports in one of the side plates and registering with a different series of disk-ports, and annular chests on the outer face of the side plates, in communication, respectively, with the series of induction-ports and the series of exhaust-ports and an annular channel in the face of one of the side plates connecting two series of disk-apertures.

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