No. 727,698. PATENTED MAY 12, 1903.

A. SCHENCK.

TURBINE.

APPLICATION FILED SEPT. 18, 1900.

NO MODEL. 3 SHEETS—SHEET 1.

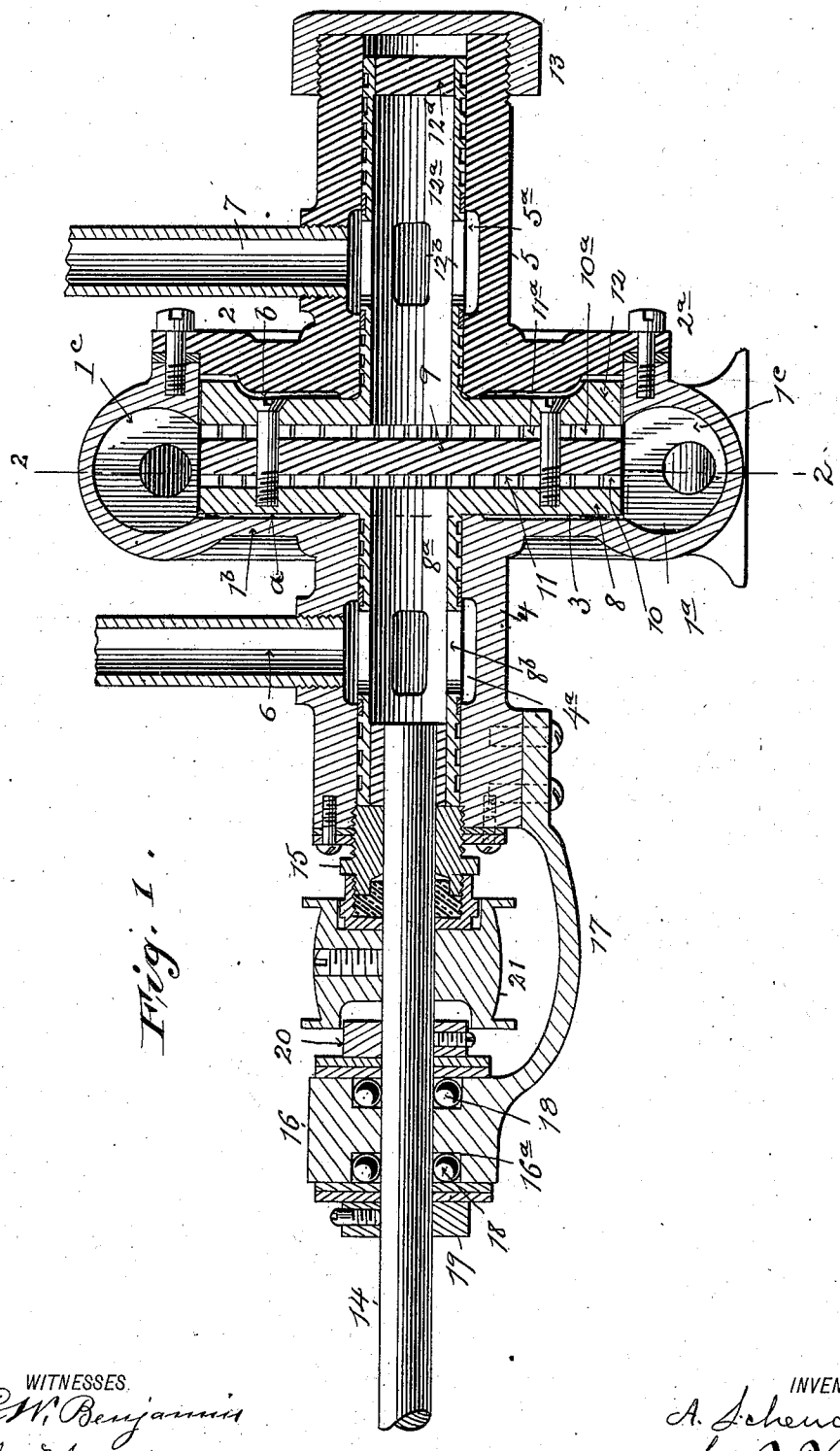

Fig. 1.

WITNESSES.
C. W. Benjamin
M. Manning

INVENTOR
A. Schenck,
by T. F. Bourne
his ATTY

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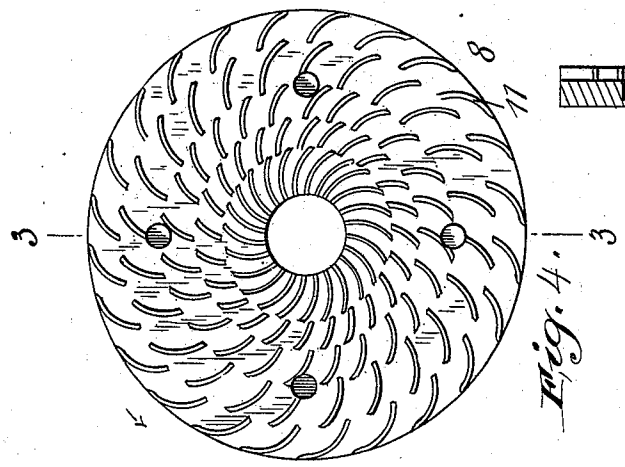

Fig. 4.

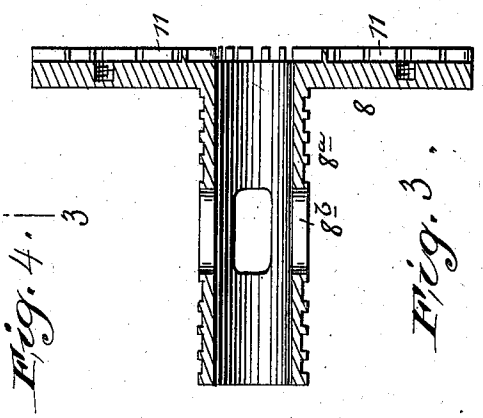

Fig. 3.

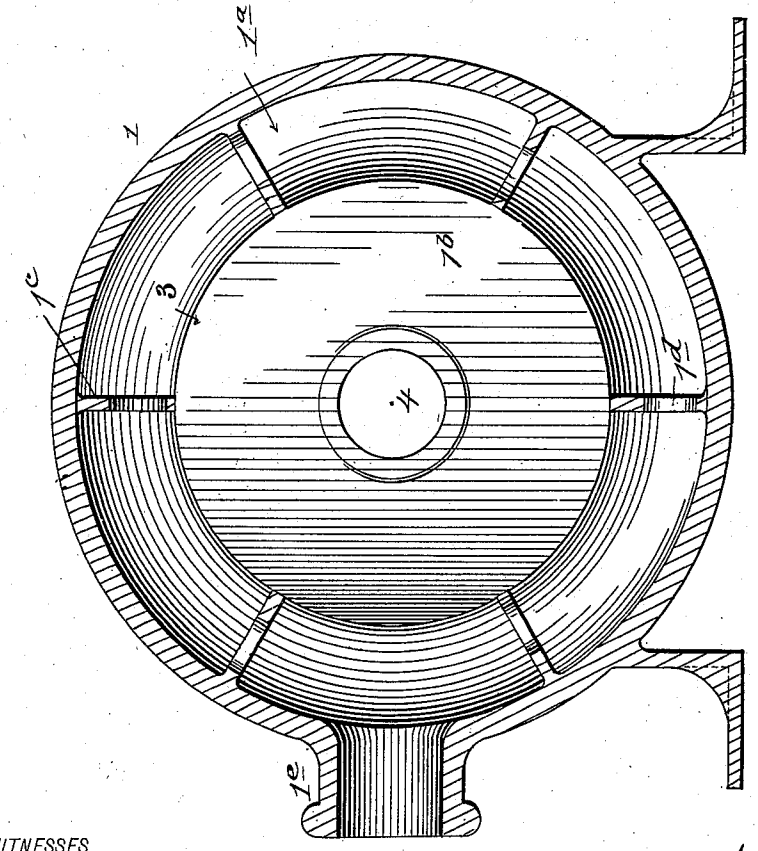

Fig. 2.

WITNESSES

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NO MODEL. 3 SHEETS—SHEET 3.

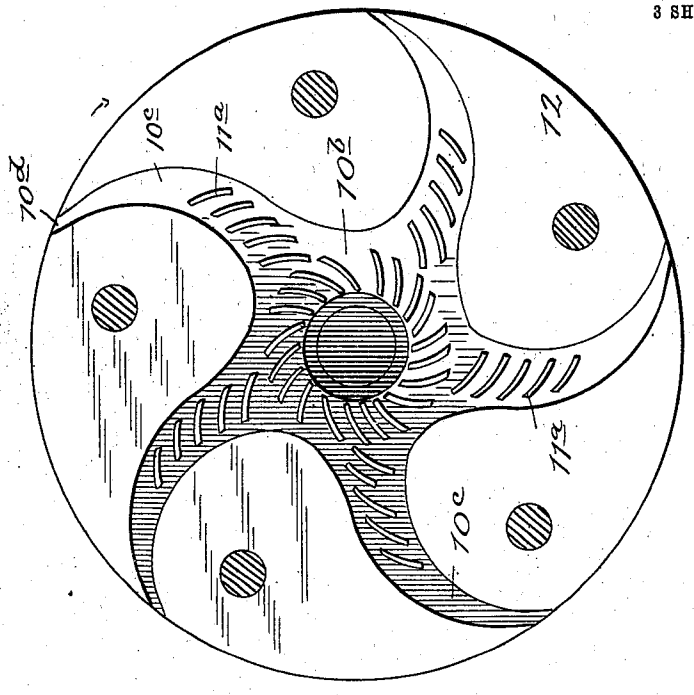

Fig. 6.

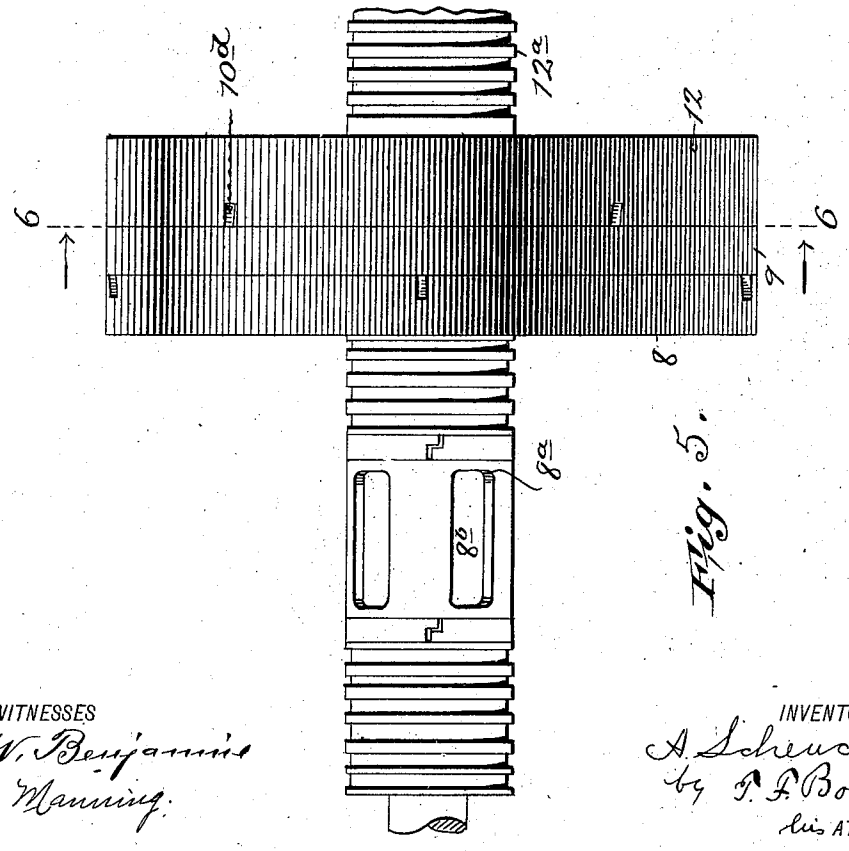

Fig. 5.

WITNESSES

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No. 727,698. Patented May 12, 1903.

UNITED STATES PATENT OFFICE.

ALEXANDER SCHENCK, OF NEW YORK, N. Y.

TURBINE.

SPECIFICATION forming part of Letters Patent No. 727,698, dated May 12, 1903.

Application filed September 18, 1900. Serial No. 30,402. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER SCHENCK, a resident of the city of New York, borough of Manhattan, State of New York, have invented certain new and useful Improvements in Turbines, of which the following is a specification.

The object of my invention is to provide a turbine or motor in which the main rotative or driving member will be practically balanced under the pressure of the steam or other propulsive medium used, and to this end I provide a rotative member or head with an interior transversely-disposed chamber or space adapted to receive steam or the like, and said chamber has outwardly or substantially radially extending channels forming abutments upon which the steam or the like is adapted to act. The rotative member or head has a hollow shaft provided with a port or ports adapted to receive steam or the like to conduct it to said chamber, whereby as the steam or the like travels through the chamber it will act upon the abutments therein to cause the head to rotate. If the turbine is intended to operate in one direction only, I provide a single chamber in the head; but if the turbine is to operate in opposite directions I provide two of such chambers, with the channels facing in opposite directions, whereby the direction of rotation of the head can be governed by passing steam or the like into the corresponding chamber in said head.

The invention further consists in the novel details of improvement that will be more fully hereinafter set forth and then pointed out in claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a vertical central section of a turbine embodying my invention. Fig. 2 is a vertical section of the casing on the line 2 2 in Fig. 1. Fig. 3 is a detail sectional view on the line 3 3 in Fig. 4 of part of the rotative member or head. Fig. 4 is a face view of the working face of the rotative head looking from the right in Fig. 3. Fig. 5 is a detail side view of the rotative head adapted for rotation in opposite directions, also illustrating a modification; and Fig. 6 is a cross-section on the line 6 6 in Fig. 5, illustrating a modification of the abutments or blades in the working space of the rotative head.

Similar characters of reference indicate corresponding parts in the several views.

In the accompanying drawings, 1 indicates a casing, which may be of suitable construction. It is shown substantially circular in form and provided with a peripheral exhaust-receiving chamber 1^a, that is located beyond a transverse wall 1^b, and 2 is a cover or closure for the casing, which corresponds, substantially, to the wall 1^b and may be secured to the casing 1 in suitable manner, as by screws 2^a or the like. The wall 1^b and cover 2 form within the casing a centrally-disposed chamber 3, within which the rotative member or head of the turbine is located. By preference the exhaust-chamber 1^a is provided with a plurality of radially-disposed webs or walls 1^c, located at suitable distances apart and which have openings 1^d, whereby the continuity of the exhaust-chamber 1^a is broken or interrupted. The casing 1 is provided with an exhaust port or outlet 1^e, that communicates with the exhaust-chamber 1^a. (See Fig. 2.)

The wall 1^b of casing 1 is shown provided with a hollow hub or extension 4, and the cover 2 is provided with a corresponding hub 5, the bores of which hubs are in alinement and in communication with the central chamber 3 of the casing. (See Fig. 1.) Inlet-pipes 6 and 7 communicate with the bores in hubs 4 and 5, respectively, which inlets may communicate with a steam or other source of propulsive medium in any suitable manner and may be provided with cocks to control the flow of steam or the like to the turbine.

While the casing and other parts above described are those which I now consider to be of advantageous form and construction, it will be understood that the same may be altered in such manner as may be found desirable, and it will also be understood that if the turbine is to be operated in one direction only one of the hubs 4 or 5 may be dispensed with and the adjacent wall or cover be tightly closed or imperforate.

Within the chamber 3 of casing 1 is located the main rotative member or head of the turbine, and in the drawings I have

shown the same constructed in such manner that said head is provided with a transversely-disposed chamber or space into which the steam or other propulsive medium is conducted, and it can escape from there into the exhaust-chamber 1^a of casing 1, whereby the rotative head is balanced or its equilibrium maintained. The arrangement I have shown is as follows:

8 is a head or disk provided with a tubular extension or shaft 8^a, fitted to rotate within the bore of hub 4 and provided with one or more ports 8^b in communication with a space 4^a within hub 4, which space communicates with the inlet-pipe 6, the outer end of extension 8^a being closed. Suitable packing is provided between the bore of hub 4 and the periphery of extension 8^a.

9 is a disk or the like secured to head 8, concentrically thereof but at a distance from the main face thereof, so as to provide a transversely-disposed chamber or space 10, (see Fig. 1,) that is in communication with the bore of extension 8^a, said chamber leading to the exhaust-chamber 1^a. Within the chamber 10 are outwardly or substantially radially disposed channels formed by abutments or blades 11, which lie in the path of and are adapted to be engaged by the steam that passes from the bore of extension 8^a through chamber 10 into the exhaust-chamber 1^a of casing 1. The arrangement of the abutments or blades 11 which I find to be advantageous is clearly shown in Fig. 4, it being understood that said abutments or blades are arranged with spaces between them and project a suitable distance axially from the face of disk 8, the disk 9 being clamped against them so as to provide a plurality of circuitous channels in the space 10, leading in an outward or substantially radial direction from the axis thereof. The abutments or blades 11 may be formed directly in the material of the disk 8, as by casting, or in separate pieces secured thereto. The abutments or blades 11 may have any suitable contour that will cause the passing steam to so act upon them as to rotate the disks 8 and 9. I have shown the abutments or blades 11 of curved form and so set as to cross at an oblique angle the radii of the disk. Furthermore, I have shown in Fig. 4 the abutments or blades as arranged in concentric circles on the face of disk 8, the blades of each circle breaking joints with and being interposed in a line between the blades of the adjacent series. As the disks 8 and 9 are secured together, the steam that enters the chamber 10 will act against the exposed surfaces with substantially equal pressure in all directions, so as not to press the movable parts in any one direction more than another, whereby the rotative head and its extension will be balanced within the casing and the bearings, and thus wear on the moving parts is reduced to a minimum. It will be understood that by the arrangement and location of the abutments or blades 11 the steam as it enters the chamber 10 at the axis of disk 8 is enabled to expand as it travels outwardly, thereby giving increased efficiency. If the turbine is intended to rotate in one direction only, the rotative member or head may have a single chamber 10, provided with the abutments or blades 11; but if rotation be desired in reverse directions then said head will be provided with another chamber 10^a, formed between the disk 9 and a disk 12, similar to disk 8 and provided with a hollow extension 12^a, having one or more inlet-ports 12^b and fitted to rotate within the bore of hub 5, (see Fig. 1,) abutments or blades 11^a being provided in the chamber 10^a, similar to the abutments or blades 11 in chamber 10, but placed in the reverse direction to those shown in Fig. 4, so that when steam passes from bore 12^a into chamber 10^a and acts upon the blades 11^a it will cause the head to rotate in a direction reverse to the direction of rotation caused by blades 11.

The disks 8, 9, and 12 are shown secured together by screws or the like 13, and said disks, constituting the main part of the rotative head, are confined rotatively within the chamber 3 of casing 1 between the wall 1^b and the cover 2, and as the extensions 8^a 12^a project in opposite directions into the hubs 4 and 5, which are in alinement, the rotative head is hung within the chamber 3, so as to be free to rotate in reverse directions. The exhaust-steam from the chambers 10 10^a passes into the peripheral exhaust-space 1^a, from whence it escapes through the outlet 1^e. By passing steam or other propulsive medium through the inlet 6 or 7 the direction of rotation of the rotative head can be controlled. The extensions 8^a and 12^a are closed at their outer ends, and to one of these extensions the medium for transmitting power may be secured. I have shown the extension 12^a as having a plug 12^d, a cap 13 being secured over the end of hub 5, suitable packing being provided around said extension to prevent the escape of steam from the chamber 5^a, to which the inlet 7 leads. The extension 8^a is shown connected with a shaft 14, that may be journaled in suitable bearings, the shaft 14 being secured steam-tight in the extension 8^a, thereby closing the outer end thereof.

15 is a suitable bearing for shaft 14, shown secured to hub 4, and 16 is an outer bearing, also shown secured to hub 4, as by a bracket 17, and to provide against end thrust of shaft 14, as well as to support said shaft rotatively, I have shown the bearing 16 as provided with ball-races 16^a on opposite sides receiving anti-friction-balls 18, collars 19 20, secured on shaft 14, serving to coact with said balls in preventing end thrust of the shaft, suitable washers being interposed between said collars and balls; but this arrangement of the bearing can be altered if desired.

21 is a pulley secured upon shaft 14, although any suitable means may be provided

for transmitting power from said shaft, or the shaft may be coupled directly to the part to be driven in any well-known manner.

In Fig. 1 I have shown annular spaces *a b* between the rotative head and the wall 1^b and cover 2, in which exhaust-steam from the space 1^a can enter, friction thus being reduced and a steam balance effected.

The parts so far described constitute a complete turbine in which the rotative member or head is balanced against unequal pressure; but it will be understood that the arrangement of the abutments or blades within the steam chamber or chambers of the head may be modified if desired. In Figs. 5 and 6 I have illustrated a modification of this portion of my invention, wherein the steam-chamber within the head is provided with outwardly-extending channels distinct from the channels formed between the blades 11^a. Fig. 6 represents the disk 12, although both disks 8 and 12 can be similarly made, if desired. In this case the working face of the disk is provided with a depressed or countersunk centrally-disposed space 10^b, from which a plurality of outwardly-extending channels 10^c project and open through the periphery of the disk at 10^d, the channels 10^c being shown curved in a rearward direction. In the space 10^b and the channels 10^c the blades 11^a are located and arranged substantially similarly to that described with reference to blades 11, in that they are curved and substantially cross the radii of the disk. The disk 9 being secured to the face of the disk 12 forms the steam-chamber and rests partly against the full face of disk 12 and partly against the blades 11^a, and the steam entering the hollow extension 12^a traverses the space 10^b and the channels 10^c and acts upon the blades 11^a, as before described, and also against the walls of said channels in such manner as to cause the disk to rotate. The blades and channels of disk 12 in Fig. 6 are illustrated as placed in the reverse position to the blades shown in Fig. 4, so as to indicate that the disk 12 is rotated in the direction reverse to the direction of rotation of disk 8. Fig. 5 indicates that both disks 8 and 12 are formed on the working faces like that illustrated in Fig. 6.

Where I use the term "steam" in this specification it will be understood that I mean it to include any other proper propulsive medium, as air, water, and the like, and, furthermore, it will be understood that I do not limit my invention to the precise details of construction shown and described, as they may be varied without departing from the spirit thereof.

Having now described my invention, what I claim is—

1. In a turbine a rotative member or head having a radially-disposed chamber provided with channels extending outwardly from the axis, one channel being in communication with the next adjacent channel, means for admitting a propulsive medium to said chamber, and means for rotatively supporting said member or head, substantially as described.

2. In a turbine a rotative member or head having a radially-disposed chamber provided with abutments or blades ranging from the central portion of the chamber outwardly forming outwardly-extending channels, means for admitting a propulsive medium to said chamber and means for rotatively supporting said member or head, substantially as described.

3. In a turbine a rotative member or head having a radially-disposed chamber provided with interspersed abutments or blades that extend at an angle to the radii of the head, and means for rotatively supporting said member or head, substantially as described.

4. A turbine provided with a radially-disposed rotative head having a chamber containing curvilinear blades projecting axially and extending across the radii of the head, said blades ranging from the inner toward the outer portion of the head and being interspersed thereover, substantially as described.

5. A turbine having a radially-disposed head provided with blades extending axially and in a direction at an angle to the radii of the head, said blades being interspersed on said head and located at distances apart forming substantially radially-disposed spaces between blades, and a disk or plate secured to said head forming a chamber containing said blades between said head and disk providing outwardly-disposed channels, substantially as described.

6. In a turbine, a rotative head comprising a radially-disposed disk having a hollow extension and abutments or blades projecting from and interspersed over the face of the disk providing outwardly-disposed intercommunicating spaces between adjacent blades, and a disk or plate secured over said abutments or blades forming a chamber in communication with the bore in said extension, and means for rotatively supporting said extension, substantially as described.

7. In a turbine, a rotative member or head provided with a pair of radially-disposed substantially side-by-side chambers each having circuitous channels, hollow extensions projecting in opposite directions from said head, means to admit steam to either chamber, and means for rotatively supporting said extensions, substantially as described.

8. In a turbine, the combination of a casing having a chamber, with a radially-disposed head in said chamber, said head having a radially-disposed chamber provided with channels formed by substantially radially-disposed blades, and a hollow extension leading to said chamber, said casing having bearings for said extension, and means for admitting a propulsive medium to said extension, substantially as described.

9. In a turbine, the combination of a casing having a chamber, with a radially-disposed

head comprising a pair of disks having axially-extending abutments or blades and a disk secured between said abutments or blades forming radially-disposed chambers, the first-mentioned disks having extensions to support them, and means for conducting a propulsive medium to the chambers in said head, substantially as described.

10. In a turbine, the combination of a casing having a hub and a chamber leading thereto, with a rotative head comprising a pair of radially-disposed disks provided with a chamber between them having abutments or blades therein forming circuitous outwardly-disposed channels, one of the disks having a hollow extension journaled within said hub, and means for conducting a propulsive medium to the hollow extension, substantially as described.

11. In a turbine, the combination of a casing having a centrally-disposed chamber and a peripheral exhaust-chamber provided with transversely-disposed webs or walls having openings, with a rotative head located within said chamber and provided with a radially-disposed chamber having circuitous outwardly-disposed channels in communication with each other, means for rotatively supporting said head, and means for conducting a propulsive medium into its chamber, substantially as described.

12. The combination of a casing having a chamber, a hub projecting from one wall, and a cover over the said chamber provided with a hub, with a rotative head provided with extensions journaled in said hubs, said head having a pair of radially-disposed chambers provided with circuitous substantially radially disposed channels, and means for admitting a propulsive medium to said chambers, substantially as described.

13. A turbine having a rotative head provided with a chamber containing a plurality of annular rows of blades, one row being farther from the axis than the other forming outwardly-extending channels, substantially as described.

14. A turbine having a head provided with a plurality of annular rows of blades, the blades of one row breaking joints with the blades of the adjacent row, and a disk secured over said blades to rotate therewith, substantially as described.

15. A turbine having a head provided with a plurality of annular rows of blades, the blades of one row being nearer together than the blades of the row farther from the axis, and a disk secured over said blades providing a chamber containing said blades, substantially as described.

16. A turbine having a rotative head provided with a chamber containing a plurality of blades extending in a substantially radial direction and in series extending substantially in line outwardly from the axis, substantially as described.

17. A turbine having a head provided with axially-disposed curved blades interspersed thereover at distances apart forming outwardly-disposed channels that increase in width from the axis outwardly, and a disk secured over said blades to rotate therewith, substantially as described.

18. A turbine provided with a head having annular rows of blades, the blades of one row breaking joints with the blades of another row and the blades of one row being nearer together than the blades of another row, and a disk connected with said head over said blades to rotate therewith, substantially as described.

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Witnesses:
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M. MANNING.