No. 806,679. PATENTED DEC. 5, 1905.

W. KIESER.

REGULATING DEVICE FOR STEAM TURBINES.

APPLICATION FILED MAR. 17, 1904.

2 SHEETS—SHEET 1.

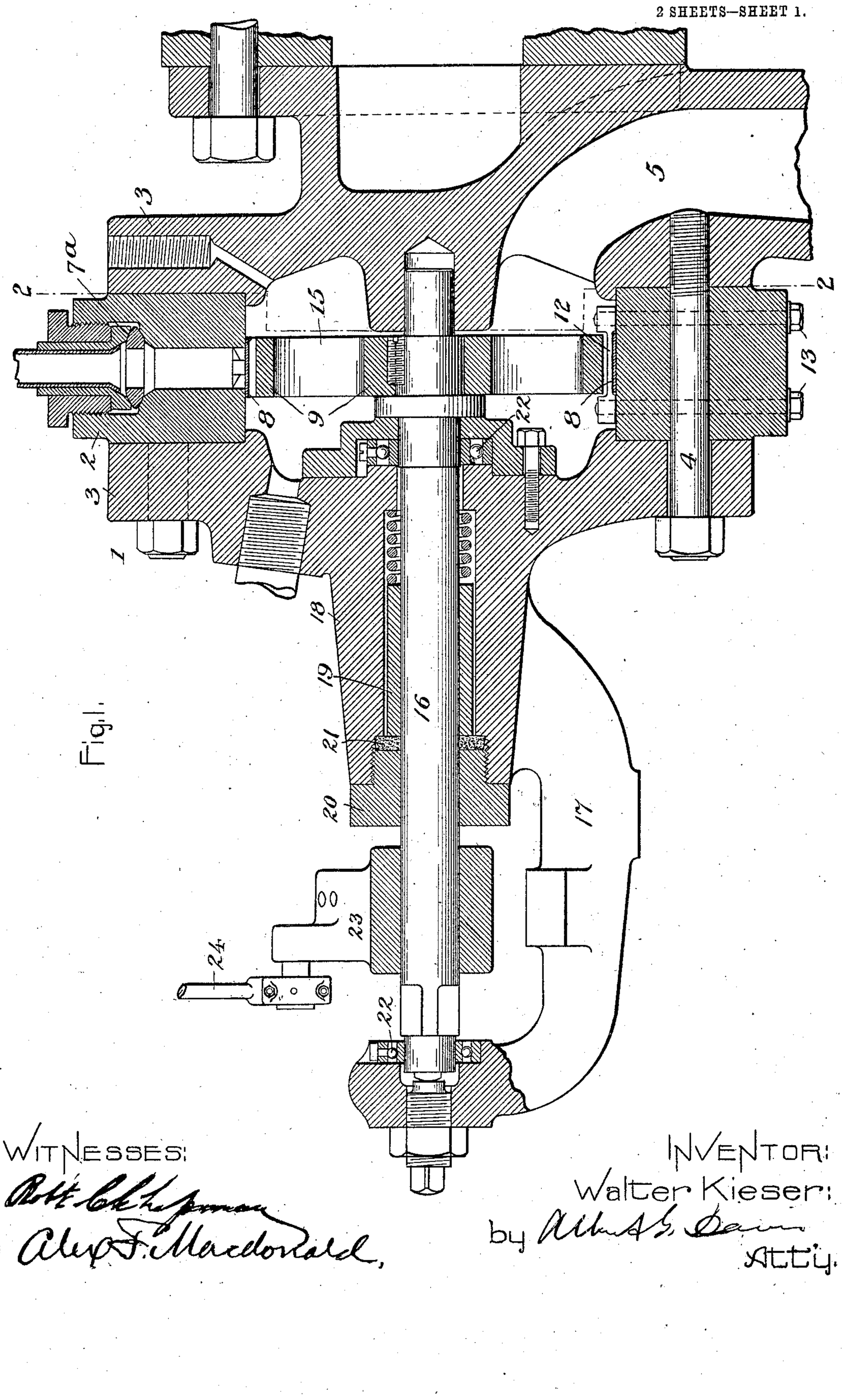


Fig. 1.

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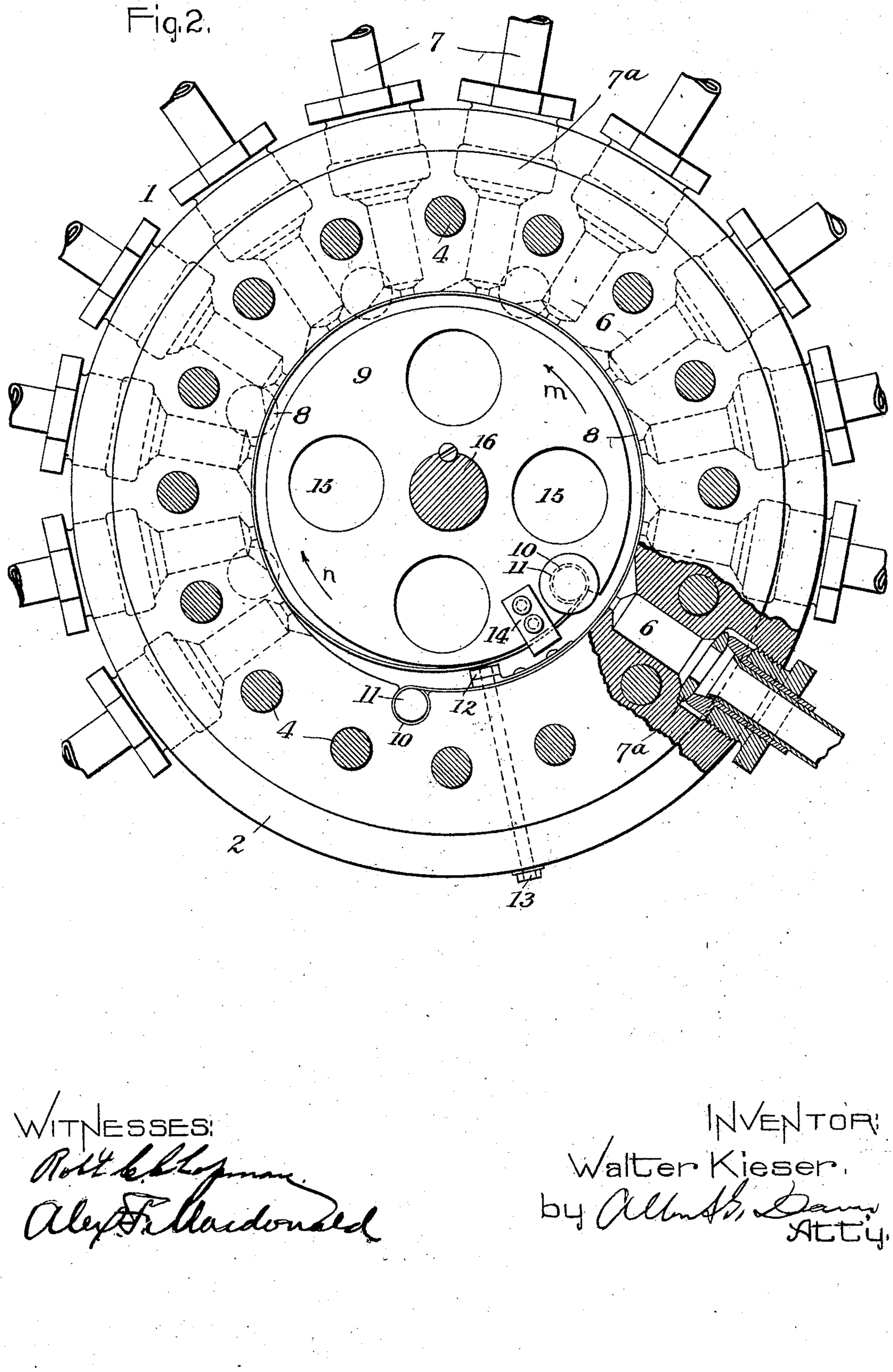
2 SHEETS—SHEET 2.

Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## REGULATING DEVICE FOR STEAM-TURBINES.

No. 806,679. Specification of Letters Patent. Patented Dec. 5, 1905.

Application filed March 17, 1904. Serial No. 198,687.

*To all whom it may concern:*

Be it known that I, WALTER KIESER, a citizen of Switzerland, residing at Berlin, Germany, have invented certain new and useful Improvements in Regulating Devices for Steam-Turbines, of which the following is a specification.

My invention relates to a governing mechanism for elastic-fluid turbines, whereby the supply of motive fluid may be controlled by successively cutting the fluid-discharging devices into or out of service; and it has for its object to provide a simple and inexpensive governing mechanism which shall be efficient and reliable in operation.

In carrying out the invention a valve-casing is provided having a curved wall or surface. By preference this wall is made in the form of a cylinder or segment of a cylinder. The wall is provided with a number of ports communicating with passages or conduits leading to the turbine to be governed. These ports may be arranged singly or in groups in a row extending entirely or partially around the wall, as desired. Coöperating with the wall is a flexible member or band fixed at one point to a stationary part and at another point to a movable carrier, whereby the band as it is moved toward and away from the wall—as, for example, by unrolling and rolling it—by the carrier will cover or uncover the ports, and thus regulate the admission of motive fluid to the turbine. This band may be disposed wholly or partially around the carrier, as desired. The band thus constitutes a valve and is preferably made of a steel strip or other metal capable of standing a high temperature without destruction. The arrangement of the band is such that by a slight rocking movement of the carrier the band is wound or unwound, thereby successively uncovering or covering the valve ports or ends of the conduits. The carrier may be and preferably is connected with a speed-responsive device, so that the valve is automatically actuated to vary the number of nozzles or fluid-discharging devices in service in accordance with changes in load.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a longitudinal section of the valve mechanism and means for actuating the same, and Fig. 2 is a transverse section on line 2 2, Fig. 1.

Referring to the drawings, 1 is a valve-casing of any suitable construction, which may be secured to the shell or other part of the turbine. According to the preferred construction the casing comprises a ring 2 and heads 3 on opposite sides thereof, which are secured together by a number of bolts 4. (Shown more clearly in Fig. 2.) Communicating with the casing is a supply-conduit 5, cast in one of the heads. The interior wall of the ring is cylindrical and is carefully finished to form a circular valve-seat, such being a simple and satisfactory construction. Extending radially through the ring are passages or conduits 6, whose inner ends terminate in ports and whose outer ends are connected to supply-pipes 7, the latter communicating with the nozzles or other fluid-discharging devices. The connection $7^a$ between the conduits and the supply-pipes may be of any approved construction capable of making a steam-tight joint.

Arranged within the ring and adjacent to the interior wall thereof is a flexible band 8, (shown clearly in Fig. 2,) which constitutes a valve for controlling communication between the conduits 6 and the interior of the casing. This band is preferably of steel or other metal having a certain degree of resiliency and capable of standing high temperatures. One end of the band is anchored to a stationary part of the casing, while the other end is attached to a movable carrier 9. The ends are turned into eyes 10, which fit around pins 11, secured in the wall of the casing and in the carrier 9, respectively. The fixed end of the band is further secured by means of a plate 12, which is held by bolts 13, extending through the ring and screwing into tapped openings in the plate. The movable end of the band is secured to the carrier by means of an angular or U-shaped piece 14, which is bolted or otherwise secured to the latter.

The carrier is preferably a circular disk mounted to rock on its axis and is located centrally in the casing. The web of the disk is provided with openings 15 to permit the free passage of fluid to both sides of the disk. The disk is keyed to a rock-shaft 16, which extends through one of the heads of the valve-casing and is supported at its outer end in an arm 17, extending laterally from the same head. Any suitable packing may be provided around the shaft where it enters the casing.

In the present instance a stuffing-box 18 is formed in the head through which the shaft extends, the same comprising the base of the arm 17. Within the stuffing-box is a spring-pressed sleeve 19 on the shaft, and between the outer end of the sleeve and a gland 20 is a soft packing-ring 21, which prevents the escape of fluid from the casing. Ball-bearings 22 are provided at the ends of the shaft, one of which is arranged in the supporting-arm 17 and the other suitably housed in the valve-casing.

The rock-shaft may be actuated either manually or automatically, as desired. I prefer, however, to connect the same to the speed-responsive device, (not shown,) so as to control the valve automatically by variations in the speed of the turbine-shaft. For this purpose a crank-arm 23 is secured on the rock-shaft and a link 24 serves to connect the same with the speed-responsive device.

With the arrangement described a movement of the carrier 9 in a direction indicated by the arrow *m*, Fig. 2, causes the valve 8 to gradually wind up, while movement in the direction indicated by the arrow *n* causes the valve to gradually unwind. This winding or unwinding of the valve progressively opens or closes communication between the valve-casing and the several independent conduits, thereby admitting or cutting off the supply of motive fluid to the nozzles or discharge devices of the turbine. In operation, as the load increases on the turbine the governor responding to the change in speed causes the valve to uncover more than the normal number of supply-conduits, and when the load decreases the valve is caused to close more of the conduits.

While I have described the interior wall of the valve-seat as cylindrical, it is not necessarily limited to this shape. Whatever the shape of the wall desired the general contour of the valve is preferably approximately similar thereto, so that a comparatively small movement of the valve will open or close all the conduits.

In accordance with the provisions of the patent statutes I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a governing mechanism, the combination of a valve-casing having a curved wall, conduits extending through the wall and terminating in ports, a resilient valve having the general contour of the wall, and means for flexing or bending the valve in a manner to open and close the ports.

2. In a governing mechanism for elastic-fluid turbines, the combination of a valve-casing having a circular wall, radial fluid-conveying conduits therein, a resilient member having the general contour of the wall, and means for flexing or bending the member to open or close the conduits successively.

3. In a governing mechanism, for elastic-fluid turbines, the combination of a valve-casing, a plurality of independent fluid-conveying conduits communicating with the casing and extending outwardly therefrom, and a single flexible band-shaped valve for opening and closing the conduits successively.

4. In a governing mechanism for elastic-fluid turbines, the combination of a valve-casing, a plurality of conduits arranged in the wall of the same, an elastic metallic band-supported stationary at one end and disposed adjacent to the wall for controlling communication between the conduits and casing, and means attached to the other end of the band for imparting a winding or unwinding movement thereto.

5. In a governing mechanism for elastic-fluid turbines, the combination of a valve-casing having a cylindrical wall, conduits extending through the wall and communicating with the casing, a flexible member for controlling communication between the casing and the conduits, and means for winding or unwinding the member to cover or uncover the conduits.

6. In a governing mechanism, the combination of a valve-casing comprising a circular ring having passages therein, end plates or heads secured on opposite sides of the ring, and a flexible member for opening or closing said passages.

7. In a governing mechanism, the combination of a casing having a curved wall, a plurality of conduits in the wall, a circular disk-shaped carrier arranged concentric with the wall, a valve secured between the casing and carrier and disposed around the latter, and means for actuating the carrier to move the valve to uncover or cover the conduits.

8. In a valve mechanism, the combination of a casing having a curved wall, a plurality of conduits in the wall extending outwardly therefrom, a carrier in the casing, a valve extending along said curved wall and attached to the casing and carrier, a rock-shaft upon which the carrier is mounted, and means for actuating the shaft and carrier to cause the valve to cover or uncover the conduits successively.

9. In a valve mechanism, the combination of a casing, a plurality of conduits communicating therewith, an arm extending laterally from the casing, a shaft supported by the arm and casing, means for rocking the shaft, and a valve adapted to be expanded or contracted by movement of the shaft to cover or uncover the conduits.

10. In a valve mechanism, the combination

of a casing comprising a ring provided with conduits, heads on opposite sides of the ring, bolts for securing the heads and ring together, a supply-circuit communicating with the casing, a circular band or valve adapted to open or close the conduits, a carrier for the valve, and a rock-shaft for actuating the carrier.

11. In a valve mechanism, the combination of a casing comprising a ring having radially-disposed conduits, heads on opposite sides of the ring, bolts for securing the parts together, a central rock-shaft, an arm formed on one of the heads for supporting the shaft, a packing aroun the shaft, a circular resilient band or valve for controlling the conduits, and a carrier for the valve which is mounted in the casing on the shaft.

12. In a governing mechanism for turbines, the combination of a stationary curved wall provided with independent apertures, a flexible valve adapted to cover and close said apertures, and means for bending said valve away from said wall to successively uncover the said apertures.

13. In a governing mechanism for elastic-fluid turbines, the combination of a plurality of fluid-conveying conduits whose corresponding ends form valve-ports, a flexible valve which is adapted to successively cover or uncover the ports, and means for flexing or bending the valve to control the ports.

14. In a governing mechanism for elastic-fluid turbines, the combination of a plurality of fluid-conveying conduits whose corresponding ends form valve-ports, a valve which is adapted to successively cover or uncover the ports, and means for progressively flexing or bending the valve to control the ports.

15. In a governing mechanism for elastic-fluid turbines, the combination of a plurality of fluid-conveying conduits whose corresponding ends are arranged in the same surface and form valve-ports, and a flexible valve which is adapted to be flexed or bent toward or away from the ports to successively open or close the same.

16. In a governing mechanism for elastic-fluid turbines, the combination of a plurality of fluid-conveying conduits whose corresponding ends form valve-ports, a flexible valve anchored at one point, and means attached to the valve at another point for progressively flexing or bending the same to cover or uncover the ports successively.

17. In a governing mechanism for turbines, the combination of a wall provided with individual ports, separate conduits each connected to a port through which motive fluid passes to the turbine, a flexible valve adapted to cover and close said ports, and a means for bending the valve away from said wall to uncover the ports.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 24th day of February, 1904.

WALTER KIESER.

Witnesses:
WOLDEMAR HAUPT,
WILLIAM MAYNER.