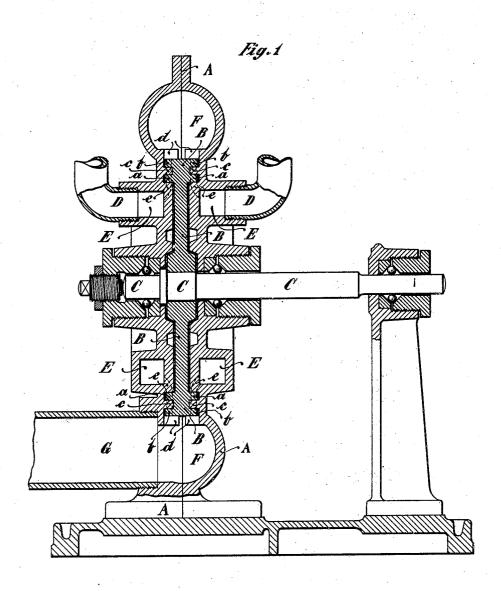
# H. THORMEYER. STEAM TURBINE.

APPLICATION FILED OCT. 1, 1902. RENEWED OCT. 26, 1904.

2 SHEETS-SHEET 1.



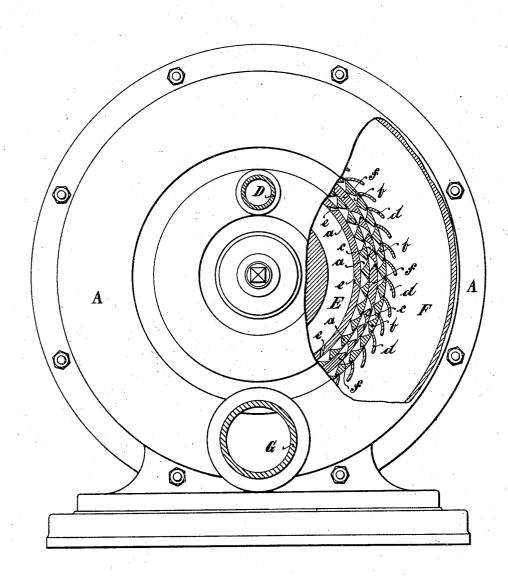
Witnesses: C.L.Davie Helm Frehsler. Hans Thorneyer, By AlAdelas attorney. No. 789,244.

# H. THORMEYER. STEAM TURBINE.

APPLICATION FILED OCT. 1, 1902. RENEWED OCT. 26, 1904.

2 SHEETS-SHEET 2.





Witnesses: C. L. David Skelen Ffecholes. Hans Thomager.
By Attacher as
Attacher.

### UNITED STATES PATENT OFFICE.

### HANS THORMEYER, OF HALLE, GERMANY.

#### STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 789,244, dated May 9, 1905.

Application filed October 1, 1902. Renewed October 26, 1904. Serial No. 230,030.

To all whom it may concern:

Be it known that I, Hans Thormeyer, a subject of the King of Prussia, German Emperor, residing at Halle, in the Kingdom of Prussia, Germany, have invented a certain new and useful Improvement in Elastic-Fluid Turbines, of which the following is a specification.

My present invention relates to a steam-turbine; and it consists in so constructing and arranging the parts that the exit-openings of the cells are closed when steam is admitted, while their inlet-openings are closed after the admission. The exit-openings of the cells are so narrowed that the high-pressure steam contained in the cells after the impingement is distributed through several of the guide-cells.

In the accompanying drawings, Figure 1 is vertical section through the turbine, and Fig. 2 an elevation showing several of the cells and steam-orifices in section.

The turbine consists of the main parts—casing A and the moving-wheel B, firmly con-

nected with the shaft C. Steam is conducted to the turbine through 25 the pipes D, which open out into the steam-chambers E. From the chambers E the steam passes through the orifices e into the inner cell series a of the wheel B. These cells are closed by the pieces f of the guide device c, connect-30 ed to the casing, when steam is being admitted into the same, so that said cells will only receive steam until the pressure therein is equal to that in the steam-chamber E. therefore cannot escape from the first series 35 of moving cells into the guide-cells, as in turbines of known construction, but must transmit its full power to the wheel. After the cells thus filled have passed the steam-inlet orifices their outlet-orifices are opened and 40 the inlet-orifices closed by the wall of the steam-chamber E. The inclosed high-pressure steam then enters the cells of the guide devices c, reacting thereon owing to its expansion. As the exit-orifices of the cells are

45 narrow and the change from cell to cell very

quick, the steam from each cell of the first se-

ries will enter several cells of the guide device

is increased, so that its power can be better

50 utilized.

In this manner the velocity of the steam

In consequence of the continuous exhaust of the freshly-charged cells of the wheel B into the cells of the guide devices ca uniform pressure will be present in the latter cells, and this pressure will act on the second series b of cells 55 of the wheel B in the same manner as the steam issuing into the cells of the first series from the steam-orifices e, except for the difference that the pressure of the steam owing to its distribution over several channels will 60 be decreased. A larger area of exhaust is, however, provided. The pressure remaining in the cells of the second series b is utilized by reacting on the blades d. From the exhaust-chamber F the steam escapes through 65 the opening G. The breadth of the cells and the orifices is to be seen by the lines dotted through the parts e a b c, Fig. 1. For high pressures the number of the cell series must be increased.

Over other constructions my improved turbine possesses the advantages of consuming less steam, better utilizing the steam at low pressures, and full expansion of the steam independent of the steam-orifices. The turbine 75 can also be operated by compressed air or gas.

I claim—

1. In an elastic-fluid motor, a turbine-wheel having fluid-receiving cells arranged in a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such guide-cells during the reception of the motor fluid, and means for closing the inlets and uncovering the outlets as the rotation of the turbine-wheel continues.

2. In an elastic-fluid motor, a turbine-wheel having fluid-receiving cells arranged in a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such cells during the reception of the motor fluid, 90 means for closing the inlets and uncovering the outlets as the rotation of the turbine-wheel continues, and means for directing the fluid admitted to each receiving-cell to several of the guide-cells.

3. In an elastic-fluid turbine, a casing, of a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells adjacent only to its periphery extending from the center outward, 100

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means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from the wheel, means for 5 directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and means for opening such outlets and closing the inlets thereto of as the rotation of the wheel continues.

4. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or 15 cells formed in and through the flanges, a casing provided with an annular pressurefluid chamber formed in the wall thereof, inclined passages in communication with the annular pressure-fluid chamber extending toward the periphery and inward toward the central plane of rotation of the wheel in communication with the wheel-chamber at the peripheral shoulder or edge of the flange-holding portion of the wheel-chamber, guide-vanes 25 carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the disk or wheel.

5. In an elastic-fluid turbine, a turbine disk 30 wheel provided on either side adjacent to the periphery with two annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with 35 two annular pressure-fluid chambers formed in the wall thereof on opposite sides of the wheel-chamber, inclined passages in communication with the annular pressure-fluid chamber extending toward the periphery and inward toward the central plane of rotation of the wheel in communication with the wheelchamber at the peripheral shoulder or edge of the flange-holding portion of the wheelchamber, guide-vanes carried by the casing 45 lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the disk or wheel.

6. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined 55 passages in communication with the annular pressure-fluid chamber extending toward the periphery and inward toward the central plane of rotation of the wheel in communication with the wheel-chamber at the peripheral 60 shoulder or edge of the flange-holding portion of the wheel-chamber, guide-vanes carried by the casing lying in the annular space between the flanges of the wheel and vanes carried by the casing arranged exterior to the disk or 65 wheel, the inclined pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel.

7. In an elastic-fluid turbine, a turbine disk wheel provided on either side adjacent to the periphery with two annular flanges extending 7c outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with two annular pressure-fluid chambers formed in the wall thereof on opposite sides of the wheel-cham- 75 ber, inclined passages in communication with the annular pressure-fluid chamber extending toward the periphery and inward toward the central plane of rotation of the wheel in communication with the wheel-chamber at the pe- 80 ripheral shoulder or edge of the flange-holding portion of the wheel-chamber, guide-vanes carried by the casing lying in the annular space between the flanges of the wheel and vanes carried by the casing arranged exterior 85 to the disk or wheel, the inclined pressurefluid passages being less in number than the fluid passages or cells of the flanges of the wheel.

8. In an elastic-fluid turbine, a turbine disk 90 wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with an annular pressure-fluid 95 chamber formed in the wall thereof, inclined passages in communication with the annular pressure-fluid chamber extending toward the periphery in communication with the wheelchamber at the peripheral shoulder or edge 100. of the flange-holding portion of the wheelchamber, guide-vanes carried by the casing lying in the annular space between the flanges of the wheel and vanes carried by the casing arranged exterior to the disk or wheel, the 105 inclined pressure-fluid passages, being less in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plurality of series by solid por- 110 tions of greater peripheral length than any one cell.

9. In an elastic-fluid turbine, a turbine disk wheel provided on either side adjacent to the periphery with two annular flanges extending 115 outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with two annular pressure-fluid chambers formed in the wall thereof on opposite sides of the wheel-cham- 120 ber, inclined passages in communication with the annular pressure-fluid chambers extending toward the periphery in communication with the wheel-chamber at the peripheral shoulder or edge of the flange-holding portion of the 125 wheel-chamber, guide-vanes carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the disk or wheel, the inclined pressure-fluid passages being less 130

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in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plurality of series by solid por-5 tions of greater peripheral length than any one cell.

10. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel 10 with the axis, a plurality of fluid passages or cells formed in and through the flanges, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages in communication with the annular pressure-fluid chamber extending toward the periphery in communication with the wheelchamber at the peripheral shoulder or edge of the flange-holding portion of the wheel-chamber, guide-vanes carried by the casing lying 20 in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the disk or wheel, the inclined pressure-fluid passages being less in number than the fluid passages or cells of the 25 flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plurality of series by solid portions of greater peripheral length than any one cell, and of the same peripheral length as 30 each series of cells.

11. In an elastic-fluid turbine, a turbine disk wheel provided on either side adjacent to the periphery with two annular flanges extending outward parallel with the axis, a plurality of 35 fluid passages or cells formed in and through the flanges, a casing provided with two annular pressure-fluid chambers formed in the wall thereof on opposite sides of the wheel-chamber, inclined passages in communication with 40 the annular pressure-fluid chamber extending toward the periphery in communication with the wheel-chamber at the peripheral shoulder or edge of the flange-holding portion of the wheel-chamber, guide-vanes carried by the 45 casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the disk or wheel, the inclined pressure-fluid passages being less in number than the fluid passages or cells of 50 the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plurality of series by solid portions of greater peripheral length than any one cell, and of the same peripheral length as

55 each series of cells.
12. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or
60 cells formed in and through the flanges, passages for directing the pressure fluid to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of points, guide-cells carried by the casing ly-

ing in the annular space between the flanges 65 of the wheel, and vanes carried by the casing arranged exterior to the wheel, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the peripheral distance between 70 the outlets of any two of the fluid-pressure passages being not less than the distance between any three of the abutting inlets of the fluid passages or cells of the wheel-flanges.

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13. In an elastic-fluid turbine, a turbine disk 75 wheel provided on either side adjacent to the periphery with two annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pres- 80 sure fluid to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes 85 carried by the casing arranged exterior to the wheel, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the peripheral distance between the outlets of any two of 90 the fluid-pressure passages being not less than the distance between any three of the abutting inlets of the fluid passages or cells of the wheel-flanges.

14. In an elastic-fluid turbine, a turbine disk 95 wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to the 100 inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing 105 arranged exterior to the wheel, the pressurefluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plu- 110 rality of series by solid portions of greater peripheral length than any one cell.

15. In an elastic-fluid turbine, a turbine disk wheel provided on either side adjacent to the periphery with two annular flanges extending 115 outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to the inner opening of the fluid passages or cells of the inner flanges of the 120 wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the wheel, the pressure-fluid passages being less 125 in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being

divided into a plurality of series by solid portions of greater peripheral length than any

16. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, vanes carried by the 15 casing arranged exterior to the wheel, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a 20 plurality of series by solid portions of greater peripheral length than any one cell, and of the same peripheral length as each series of cells.

17. In an elastic-fluid turbine, a turbine disk wheel provided on either side adjacent to the periphery with two annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to the inner opening of the fluid 30 passages or cells of the inner flange of the wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the 35 wheel, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the guide-cells between the two flanges of the wheel being divided into a plurality of series by solid por-40 tions of greater peripheral length than any one cell, and of the same peripheral length as each series of cells.

18. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, a turbine-wheel having fluidreceiving cells, guide-cells in the turbine-cas-50 ing arranged in a plurality of series, means for closing the outlets to such guide-cells during the reception of the motor fluid, and means for closing the inlets and uncovering the outlets as the rotation of the turbine-55 wheel continues, substantially as shown and described.

19. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 60 directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, a turbine-wheel having fluidreceiving cells, guide-cells in the turbine-casing arranged in a plurality of series, means 65 for closing the outlets to the wheel-cells dur-

ing the reception of the motor fluid, means for closing the inlets and uncovering the outlets as the rotation of the turbine-wheel continues, and means for directing the fluid admitted to each receiving-cell to several of the guide- 70

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20. In an elastic-fluid turbine, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages directed toward the periphery and inward to- 75 ward the central plane of rotation of the wheel leading from the annular pressure-fluid chamber to the wheel-chamber, a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or 80 cells located adjacent to its periphery, extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from 85 the wheel-cells, and means for directing the fluid to the inner end of the cells.

21. In an elastic-fluid turbine, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 90 directed toward the periphery leading from the annular pressure - fluid chamber to the wheel-chamber, of a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells at 95 its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from the wheel, means 100 for directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and means for opening such outlets and closing the inlets thereof 10! as the rotation of the wheel continues.

22. In an elastic-fluid motor, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed 110 toward the periphery leading from such annular chambers to the wheel-chamber, a turbine-wheel having fluid-receiving cells, guidecells in the turbine-casing arranged in a plurality of series, means for closing the outlets 11! to the wheel-cells during the reception of the motor fluid, and means for closing the inlets and uncovering the outlets as the rotation of the wheel continues.

23. In an elastic-fluid motor, a casing pro- 120 vided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such annular chambers to the wheel-chamber, a turbine- 125 wheel having fluid-receiving cells, guide-cells in the turbine-casing arranged in a plurality of series, means for closing the outlets to such cells during the reception of the motor fluid, means for closing the inlets and uncovering 13c

the outlets as the rotation of the turbinewheel continues, and means for directing the fluid admitted to each receiving-cell to several

of the guide-cells.

24. In an elastic-fluid turbine, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery and inward toward the to central plane of rotation of the wheel leading from such annular chambers to the wheelchamber, a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells located adja-15 cent to the periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from the wheel-20 cells, and means for directing the fluid to the inner end of the cells.

25. In an elastic-fluid turbine, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side 25 walls of the casing, inclined passages directed toward the periphery leading from such annular chambers to the wheel-chamber, of a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of 30 fluid passages or cells at its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes 35 from the wheel, means for directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and means for opening such outlets 40 and closing the inlets thereof as the rotation of the wheel continues.

26. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 45 directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, an annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-50 wheel having fluid-receiving cells arranged in a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such guide-cells during the reception of the motor fluid, and means for closing the inlets 55 and uncovering the outlets as the rotation of

the turbine-wheel continues.

27. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 60 directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, an annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-65 wheel having fluid-receiving cells arranged in

a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such cells during the reception of the motor fluid, means for closing the inlets and uncovering the outlets as the rotation of the tur- 70 bine-wheel continues, and means for directing the fluid admitted to each receiving-cell to

several of the guide-cells.

28. In an elastic-fluid turbine, a casing provided with an annular pressure-fluid chamber 75 formed in the wall thereof, inclined passages directed toward the periphery, and inward toward the central plane of rotation of the wheel leading from the annular pressure-fluid chamber to the wheel-chamber, an annular periph- 80 eral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbinewheel consisting of a disk revolubly mounted in the casing, having a plurality of fluid passages or cells located adjacent to its periphery, 85 extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from the wheel-cells, and means for directing 90 the fluid to the inner end of the cells.

29. In an elastic-fluid turbine, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages directed toward the periphery leading from 95 the annular pressure-fluid chamber to the wheel-chamber, an annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, of a turbinewheel consisting of a disk revolubly mounted 100 in the casing having a plurality of fluid passages or cells at its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the cas- 105 ing to receive the fluid as it escapes from the wheel, means for directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and 110 means for opening such outlets and closing the inlets thereof as the rotation of the wheel continues.

30. In an elastic-fluid motor, a casing provided with two oppositely-located annular 115 pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such annular chambers, to the wheel-chamber, an annular peripheral exhaust-chamber in commu- 120 nication with the wheel-chamber at the periphery, a turbine-wheel having fluid-receiving cells arranged in a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such guide-cells during 125 the reception of the motor fluid, and means for closing the inlets and uncovering the outlets as the rotation of the wheel continues.

31. In an elastic-fluid motor, a casing provided with two oppositely-located annular pres- 130

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sure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such annular chamber to the wheel-chamber, an annular periph-5 eral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbinewheel having fluid-receiving cells, guide-cells in the turbine-casing arranged in a plurality of series, means for closing the outlets to such 10 cells during the reception of the motor fluid, means for closing the inlets and uncovering the outlets as the rotation of the wheel continues, and means for directing the fluid from each receiving-cell to several of the guide-15 cells.

32. In an elastic-fluid turbine, a casing provided with two oppositely-located annular pressure-chambers formed in the side walls of the casing, inclined passages directed toward 20 the periphery, and inward toward the central plane of rotation of the wheel leading from such annular chamber to the wheel-chamber, an annular peripheral exhaust-chamber in communication with the wheel-chamber at the 25 periphery, a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells located adjacent to the periphery, extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it escapes from the wheel-cells, and means for directing the fluid to the inner end of the cells.

33. In an elastic-fluid turbine, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such an-40 nular chambers to the wheel-chamber, an annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-wheel consisting of a disk revolubly mounted in the casing having a plu-45 rality of fluid passages or cells at its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried by the casing to receive the fluid as it 5° escapes from the wheel, means for directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and means for opening such 55 outlets and closing the inlets thereof as the rotation of the wheel continues.

34. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 60 directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a tur-65 bine-wheel having fluid-receiving cells, guide-

cells in the turbine-casing, arranged in a plurality of series, means for closing the outlets to such guide-cells during the reception of the motor fluid, and means for closing the inlets as the rotation of the wheel continues.

35. In an elastic-fluid motor, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periph- 75 ery, a turbine-wheel having fluid-receiving cells, guide-cells in the turbine-casing arranged in a plurality of series, means for closing the outlets to such cells during the reception of the motor fluid, means for closing the 80 inlets and uncovering the outlets as the rotation of the turbine-wheel continues, and means for directing the fluid admitted to each receiving-cell to several of the guide-cells.

36. In an elastic-fluid turbine, a casing pro- 85 vided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages directed toward the periphery, and inward toward the central plane of rotation of the wheel leading from the annular pressure-fluid 90 chamber to the wheel-chamber, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-wheel consisting of a disk revolubly mounted in the casing having 95 a plurality of fluid passages or cells located adjacent to its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, and guide-vanes carried by the cas- 100 ing to receive the fluid as it escapes from the wheel-cells.

37. In an elastic-fluid turbine, a casing provided with an annular pressure-fluid chamber formed in the wall thereof, inclined passages 105 directed toward the periphery leading from the annular pressure-fluid chamber to the wheel-chamber, an enlarged annular exhaustchamber in communication with the wheelchamber at the periphery, a turbine-wheel con- 110 sisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells at its periphery extending from the center outward, guide-vanes carried by the casing to receive the fluid as it escapes from the 115 wheel, means for closing the outlet ends of the fluid passages or cells while the motor fluid is being admitted thereto, and means for opening the outlets and closing the inlets thereof as the rotation of the wheel continues. 120

38. In an elastic-fluid motor, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such an- 125 nular chambers to the wheel-chamber, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-wheel having fluid-receiving cells, guide-cells in the turbine-casing 130

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arranged in a plurality of series, means for closing the outlets to such guide-cells during the reception of the motor fluid, and means for closing the inlets and uncovering the out-5 lets as the rotation of the turbine-wheel con-

39. In an elastic-fluid motor, a casing provided with two oppositely-located annular pressure-fluid chambers formed in the side walls of the casing, inclined passages directed toward the periphery leading from such annular chambers to the wheel-chamber, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the 5 periphery, a turbine-wheel having fluid-receiving cells arranged in a plurality of series, guide-cells in the turbine-casing, means for closing the outlets to such cells during the reception of the motor fluid, means for closing to the inlets and uncovering the outlets as the rotation of the turbine-wheel continues, and means for directing the fluid of each receivingcell to several of the guide-cells.

40. In an elastic-fluid turbine, a casing pro-5 vided with two oppositely-located annular pressure-chambers formed in the side walls of the casing, inclined passages directed toward the periphery and inward toward the central plane of rotation of the wheel leading from so such annular chambers to the wheel-chamber, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, a turbine-wheel consisting of a disk revolubly mounted in the casing having a plurality of fluid passages or cells located adjacent to the periphery extending from the center outward, means for admitting the motor fluid to such passages or cells at the inner side, guide-vanes carried by the casing to to receive the fluid as it escapes from the wheel-cells, and means for directing the fluid

to the inner end of the cells.

41. In an elastic-fluid motor, a casing provided with two oppositely-located annular 45 pressure-fluid chambers formed in the side walls of the casing, an enlarged annular peripheral exhaust-chamber in communication with the wheel-chamber at the periphery, of a turbine-wheel consisting of a disk revolu-50 bly mounted in the casing having a plurality of fluid passages or cells at its periphery extending from the center outward, means for admitting the motor fluid to the fluid passages or cells at the inner side, guide-vanes carried 55 by the casing to receive the fluid as it escapes from the wheel to the exhaust-chamber, means for directing the fluid to the inner end of the cells, means for closing the outlet ends of the fluid passages or cells while the motor fluid is 60 being admitted thereto, and means for opening such outlets and closing the inlets thereof as the rotation of the wheel continues.

42. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with 65 annular flanges extending outward parallel

with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of 70 points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the wheel, the construction being such that the peripheral distance be- 75 tween any two of the pressure-fluid-directing passages is such that a greater number of the fluid-passages of the wheel will be cut off from the fluid-pressure supply, than are in communication therewith, the pressure-fluid passages 80 being less in number than the fluid passages or cells of the flanges of the wheel, and the peripheral distance between the outlets of any two of the fluid-pressure passages being not less than the distance between any three of the abutting 85 inlets of the fluid passages or cells of the wheel-

flanges.

43. In an elastic-fluid turbine, a turbine disk wheel, provided adjacent to the periphery with annular flanges extending outward parallel 90 with the axis, a plurality of fluid passages or cells formed in and through the flanges, passages for directing the pressure fluid to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality 95 of points, guide-cells carried by the casing lying in the annular space between the flanges of the wheel, and vanes carried by the casing arranged exterior to the wheel, the construction being such that the peripheral distance 100 between any two of the pressure-fluid-directing passages is such that a greater number of the fluid-passages of the wheel will be cut off from the fluid-pressure supply, than are in communication therewith, and that one-half of 105 the fluid passages or cells of the outer flange of the wheel will always be cut off from the fluid-pressure supply, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and 110 the peripheral distance between the outlets of any two of the fluid-pressure passages being not less than the distance between any three of the abutting inlets of the fluid passages or cells of the wheel-flanges.

44. In an elastic-fluid turbine, a turbine disk wheel provided adjacent to the periphery with annular flanges extending outward parallel with the axis, a plurality of fluid passages or cells formed in and through the flanges, pas- 120 sages for directing the pressure fluid to the inner opening of the fluid passages or cells of the inner flanges of the wheel at a plurality of points, guide-cells carried by the casing lying in the annular space between the flanges 125 of the wheel, and vanes carried by the casing arranged exterior to the wheel, the construction being such that the peripheral distance between any two of the pressure-fluid-directing passages is such that a greater number of 130

the fluid-passages of the wheel will be cut off from the fluid-pressure supply, than are in communication therewith, and that one-half of the fluid passages or cells of the outer flange of the wheel will always be cut off from the fluid-pressure supply, in series of three, the pressure-fluid passages being less in number than the fluid passages or cells of the flanges of the wheel, and the peripheral distance between the outlets of any two of the fluid-pres-

sure passages being not less than the distance between any three of the abutting inlets of the fluid passages or cells of the wheel-flanges.

In witness whereof I have hereunto set my hand in presence of two witnesses.

#### HANS THORMEYER.

Witnesses:

Woldemar Haupt, Henry Hasper.