

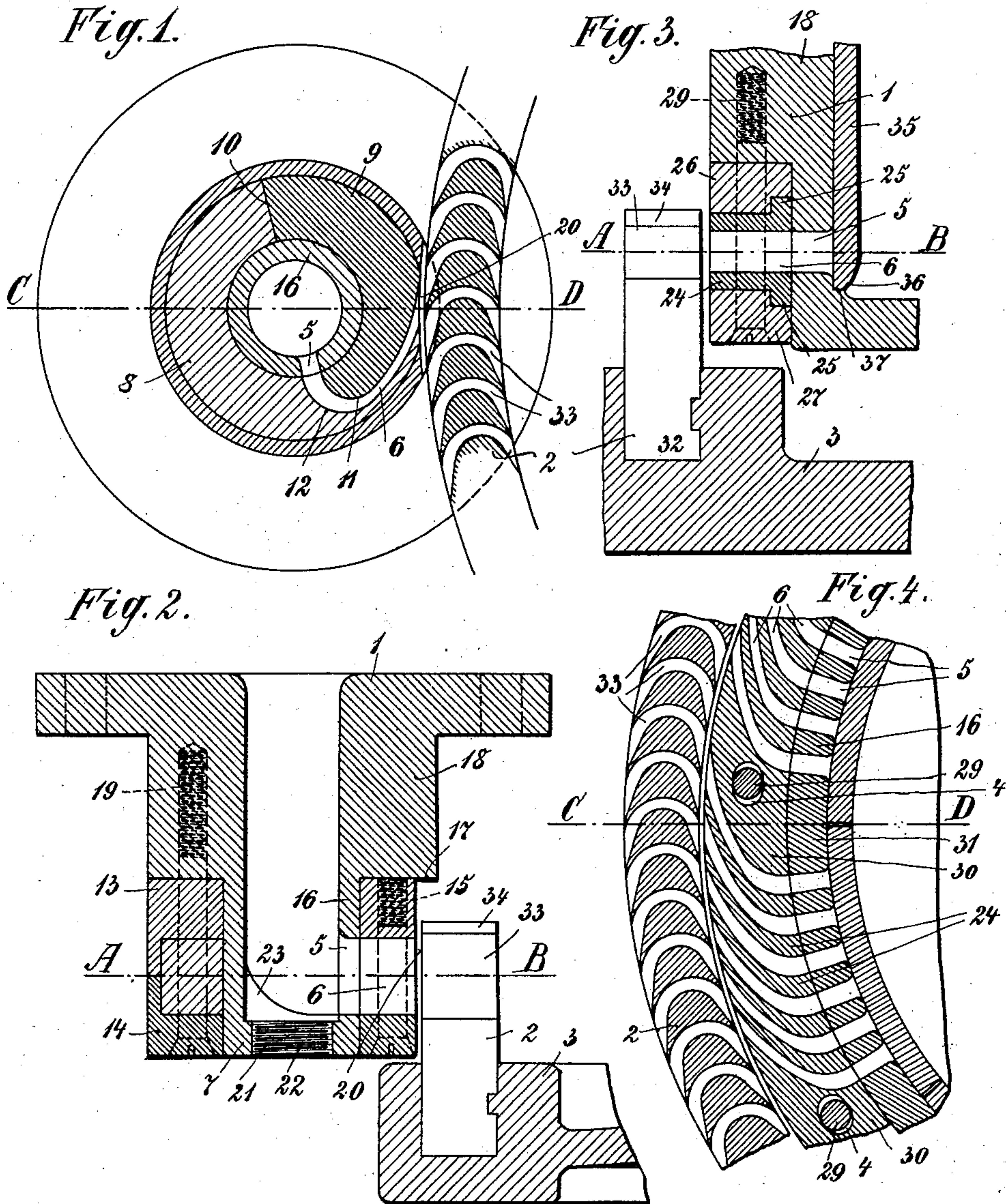
No. 753,769.

PATENTED MAR. 1, 1904.

C. WEICHEL.
SUPPLY NOZZLE FOR TURBINES.

APPLICATION FILED APR. 15, 1903.

NO MODEL.



WITNESSES:

C. P. Goepel.
Henry J. Schrier

INVENTOR
Carl Weichelt
BY Goepel & Schrier
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CARL WEICHELT, OF MOSCOW, RUSSIA.

SUPPLY-NOZZLE FOR TURBINES.

SPECIFICATION forming part of Letters Patent No. 753,769, dated March 1, 1904.

Application filed April 15, 1903. Serial No. 152,687. (No model.)

To all whom it may concern:

Be it known that I, CARL WEICHELT, engineer, a citizen of the German Empire, and a resident of 1 Charitoniewski Pereulok, Moscow, Russia, have invented certain new and useful Improvements in Nozzles for Elastic-Fluid Turbines, of which the following is a specification.

The steam-nozzles hitherto employed for the operation of steam-turbines and provided with passages of circular cross-section present the defect that the round stream of steam issuing therefrom does not completely fill the rectangular vane-passage of the turbine-wheel which it enters, thus causing considerable loss of energy.

The object of this invention is to obviate this defect by forming the supply passage or passages in the nozzle for the motor medium of rectangular cross-section and carrying them as long as possible in the direction best adapted for the supply of the motor medium to the vane-crown, this being attained by a special formation of the passages and of the nozzle-bodies containing them.

In the accompanying drawings, Figure 1 is a cross-section on the line A B of Fig. 2 through a simple form of the novel nozzle provided with only one passage, which is intended for operating a radial steam-turbine with only one crown of vanes in the turbine-wheel. Fig. 2 is a longitudinal section on the line C D of Fig. 1. Fig. 3 is a longitudinal section through a multiple form of the novel nozzle on the line C D of Fig. 4, and Fig. 4 is a cross-section on the line A B of Fig. 3.

The simple form of nozzle 1, Figs. 1 and 2, may be formed outside of the one crown of vanes 2 of the turbine-wheel 3 and conduct the stream of steam from the outside to the inside or within the crown of vanes, in which case it conducts the stream of steam from the inside to the outside to the vane-passages of the turbine-wheel. The formation of the narrow curved steam-outlet passage of the nozzle 1 is facilitated owing to the fact that it is composed of two parts 5 and 6, of which the straight, wider, and readily-formed part 5 is arranged in the wall 16 of the box or main supply-channel, while the narrow, curved, and

more difficultly formed part or throat 6 is constituted by two parts or members 8 and 9 of a ring, which at 10 lie close together, but at 11 and 12 leave the necessary play for the formation of the portion 6 of the passage and are there correspondingly curved, Fig. 1. With the object of connecting the annular parts 8 and 9 and covering the passage 6 the annular parts are surrounded by two covering-rings 13 and 14 of angular cross-section, which are connected one with the other and with the annular parts 8 and 9 by means of screws 15, Fig. 2, so that when thus screwed together they constitute a whole which when passed upon the slightly-conical smaller part 16 of the nozzle-box wall bears against the shoulder 17 of the stronger part 18 of the nozzle-box wall and is connected therewith by means of screws 19. In order to leave the outlet-opening of the passage 6 free, a corresponding part of the covering-rings 13 14 is cut away at the point 20. The opening 21, formed in the bottom 7 of the nozzle-box for facilitating the formation of the portion 5 of the passage, is closed by a screw 22, the head 23 of which is shaped so as to facilitate the displacement of the motor medium. When suitably arranged, this nozzle may also be employed for axial steam or gas turbines.

The multiple motor-medium nozzle provided with outlet-passages rectangular in cross-section for a multiple crowned or stepped steam or gas turbine, which is represented in Figs. 3 and 4, is constructed on the same principle. The straight, wide, and readily-formed part 5 of the passage is here also arranged in the narrower somewhat-conically-formed portion of the wall 16 of the box or main supply-channel 1, Fig. 3, while the narrow, curved, and difficultly-formed part or throat 6 is formed by the curved or concave faces of the closely-adjacent vanes or members 24. These latter are arranged around the smaller slightly-conical part 16 of the nozzle-box present thereon both sides projections 25 and lie clamped between two cover-rings 26 27, which are recessed in correspondence with the projections 25, are held together by means of screws, and in this manner form a whole in themselves and with the vanes 24, which is connected to

the stronger part 18 of the nozzle-box by means of the screws 29. In order to provide room for the connecting and fixing screws, there are arranged at suitable intervals between the vanes 24 wider intermediate pieces 30, with passages 4 for the said screws, these intermediate pieces also being provided with projections 25. The intermediate wall portions 31 in proximity to these pieces 30 are also correspondingly widened. Instead of the large number of passages 5 in each of the divisions so formed by the omission of the narrow intermediate walls of the box portions 16 and corresponding widening of the intermediate walls 31 a large passage may be formed in each case from which the passages 6 are fed. The projections 25 prevent the vanes 24 or the wider intermediate parts 30 from falling out of the rings 28 27. 3 is a portion of the turbine-wheel. 32 is the vane-foot of a vane of the first vane-crown 2 in the turbine-wheel. 33 is the vane-passage, and 34 the closing wall of the same. 35 represents the distributing-valves, the thin end 36 of which bears steam-tight upon the seat 37, which when the turbine is not fully supplied with motor fluid serve to close or open the passages 5 by divisions and always two divisions lying opposite to each other.

30 The advantage of the arrangement of the single or multiple nozzle described above consists, in the first place, of the facility with which the passages of the same, rectangular in cross-section and long and curved, may be formed, and, further, in the higher efficiency obtained as compared with nozzles of circular cross-section.

40 Having thus described my invention, I claim as new and desire to secure by Letters Patent of the United States—

1. In an elastic-fluid turbine, a nozzle consisting of a plurality of members forming chan-

nels, and cover-rings for said members for holding them in position, substantially as set forth.

2. In an elastic-fluid turbine, a sectional nozzle at the end of the wall of the main supply-channel, consisting of curved members forming a curved channel, cover-rings above and below said curved members for holding them in position, and means for securing said cover-rings and curved members to the wall of the main supply-channel, substantially as set forth.

3. In an elastic-fluid turbine, a sectional nozzle at the end of the wall of the main supply-channel, consisting of curved members forming curved channels, a passage in the wall of the main supply-channel communicating with the curved channel formed by said members, cover-rings above and below said members for holding them in position, and means for securing said cover-rings and members to the wall of the main supply-channel, substantially as set forth.

4. In an elastic-fluid turbine, a sectional nozzle consisting of curved members forming curved channels, a passage in the wall of the main supply-channel communicating with the curved channel formed by the members, a slide-valve for opening or closing the passage in the wall of the main supply-channel, cover-rings above and below said members for holding them in position, and means for securing said cover-rings and members to the wall of the main supply-channel, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

CARL WEICHELT.

Witnesses :

HENRY HASPER,
WOLDEMAR HAUPT.