

Dec. 1, 1931.

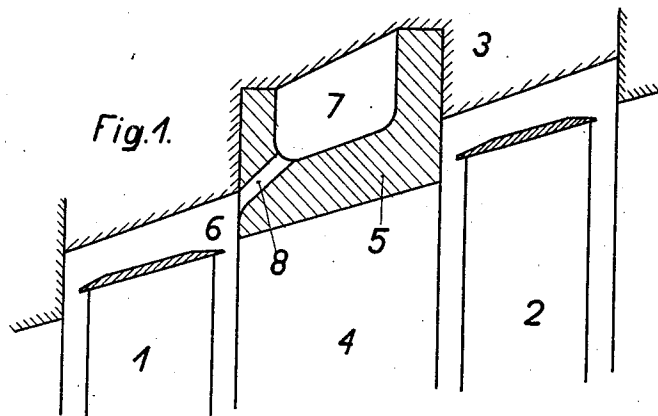
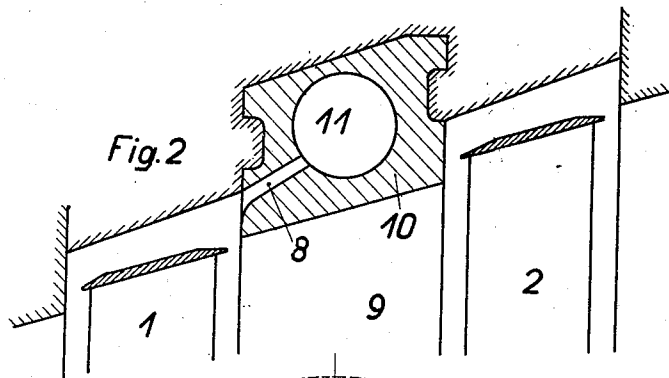
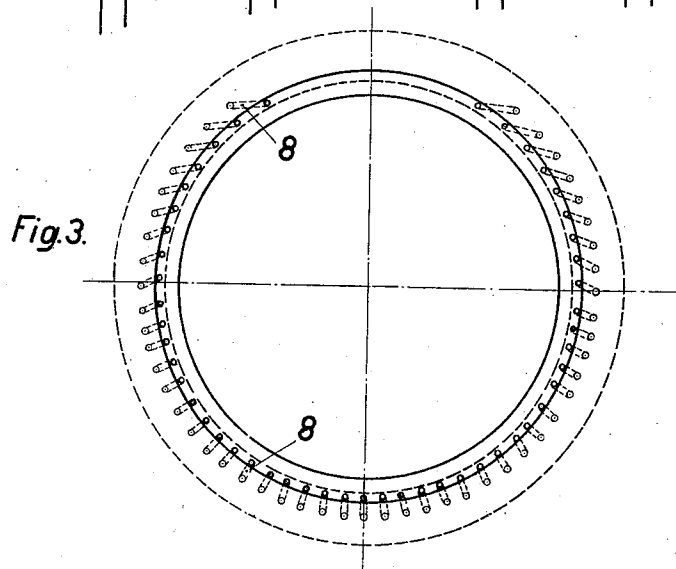
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1,834,451

STEAM TURBINE CONSTRUCTION

Filed Dec. 29, 1927

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

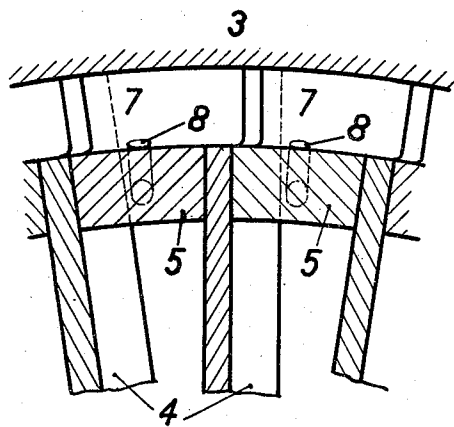


Fig. 4

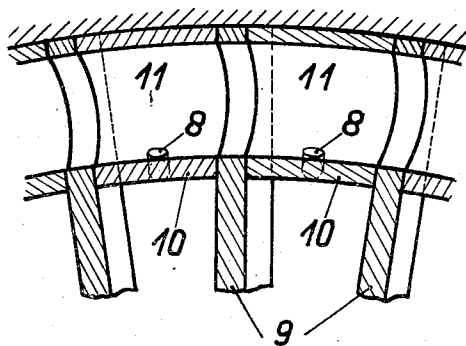


Fig. 5

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UNITED STATES PATENT OFFICE

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STEAM TURBINE CONSTRUCTION

Application filed December 29, 1927, Serial No. 243,450, and in Switzerland December 30, 1926.

This invention has to do with steam turbine construction and particularly with the arrangement of the cylinder blade mountings for the disposal of water condensed in the turbine.

The general object of the invention is the provision of a construction whereby water of condensation may be discharged or withdrawn from the cylinder blading, and which may be built economically and without weakening the cylinder or adding to its weight or bulk.

Another object is the provision of a construction which enables water of condensation to be withdrawn and at the same time prevents such water from running back into the blading.

Other objects will be pointed out or indicated hereinafter or will be obvious to one skilled in the art upon an understanding of the present disclosure.

Any increase in the efficiency of steam turbines involving an improvement of the vacuum is attended by an increasing condensation of steam in the low-pressure stages, resulting in loss of energy and erosion of the blading. It has already been proposed to provide channels either outside or inside the blading for the purpose of conducting off this condensate.

Such constructions, however, provide no means for preventing the condensate, after it has been drained into the channels, from returning to the blading in the upper part of the turbine casing by gravity. The moving blades will therefore be exposed to considerable danger of erosion in this region, particularly in those constructions where the water is led from stage to stage along channels through the guide blades.

The present invention overcomes these drawbacks by arranging for the discharge of water to take place through annular channels accommodated in the roots of the guide blading and communicating with the interior of the casing by means of suitable passages. In this way the expense of constructing special channels in the casing itself is avoided.

The nature of the invention will be understood more in detail from the illustrative

forms shown. In the accompanying drawings two embodiments of the invention are shown diagrammatically, but it is to be understood that these are examples only, and do not limit the scope of the invention.

Figures 1 and 2 show each an axial section, and the associated Figures 4 and 5 a cross section through respective turbines, two arrangements, given by way of example, for the removal of water for bladings, which together with their intermediate members are inserted directly into the housing wall. Figure 3 is a transverse sectional elevation through a turbine showing the arrangement of the discharge channels.

In Figures 1 and 4, between the two rows of moving blades 1 and 2, in the housing 3, are arranged the guide blades 4, the intermediate members or spacers 5 of which together with the roots of the guide blades 4 contain recesses combined to form an annular space 7, the outer wall of the said recesses being formed by the housing itself. The water separating in space 6 of the moving blading 1 is transferred through small channels 8 into the collecting annular space 7, in order to flow down therein, from whence it can be drained off through a connection at the bottom of the housing at a point of less pressure, for instance into the condenser.

Figures 2 and 5 show in a similar way to Figures 1 and 4, another example for a blading, which is also inserted together with its intermediate members directly in the wall of the housing. Between the moving blading 1 and 2 is inserted the guide blading 9, the intermediate members or spacers 10 of which have as recess a bore 11. Here too for the purpose of obtaining a closed annular space, the blade roots are recessed or bored in the same way. In a similar manner to the first example the water separating out is transferred through the channels 8 into the annular space 11 formed by bores. The form of the drainage channels is naturally susceptible of modification to suit particular cases. For example at the inlet end these channels may be formed in the blading only, and at the exhaust end by the casing. In this way the stress in the casing is maintained uniform.

In the upper part of the casing the action of gravity will be opposed to the suction in the annular channels 7 and will thus tend to cause the return of the water in this region.

- 5 This effect may be counteracted by arranging the passages 8 to have a continuous fall, as is shown in the cross-section of a turbine illustrated in Figure 3. Here the passages in the upper half of the casing are not arranged
10 radially, as they are in the lower half, but are all inclined more or less downward, thus facilitating the draining off of the water of condensation and obviating any tendency to flow back into the blading.

- 15 Having now described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a steam turbine construction, the combination with a casing, of fixed blades
20 mounted in said casing and having their roots extending into same, spacers separating the blades and likewise extending into the casing, an annular channel traversing the blade roots and spacers and passages connecting said
25 channel with the interior of said casing.

2. A construction as in claim 1 in which all the passages between the casing interior and the channel have a downward slope towards the channel.

- 30 In testimony whereof I have signed my name to this specification.

KARL FREY.

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