L. CUBELIC.

ATTACHMENT OF TURBINE BLADES.

APPLICATION FILED JULY 31, 1913.

Patented Jan. 27, 1914.

1,085,325

Fig. 2.

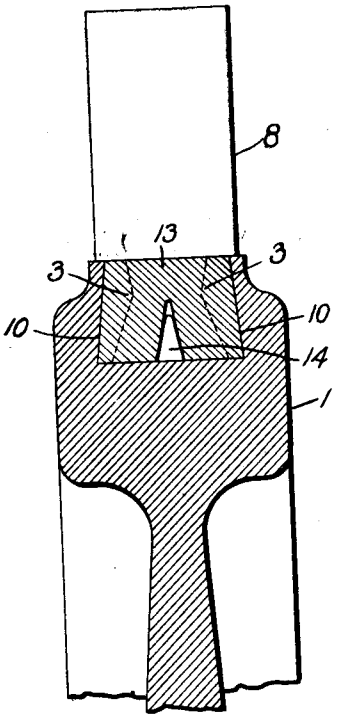


Fig. 3.

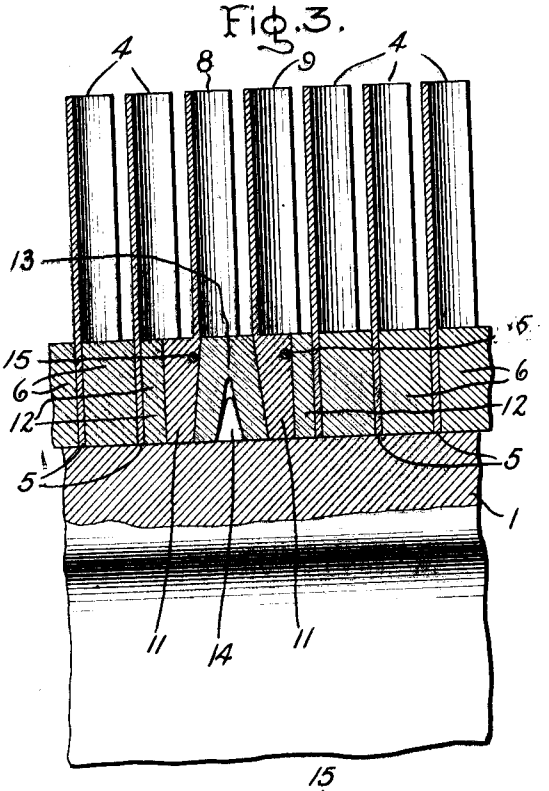
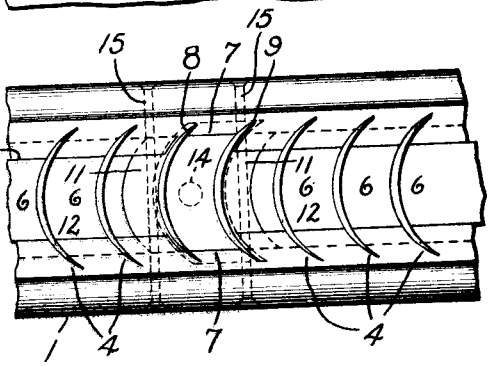


Fig. 1.



Witnesses:

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His Attorney.

UNITED STATES PATENT OFFICE.

LUDWIG CUBELIC, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

ATTACHMENT OF TURBINE-BLADES.

1,085,325. Specification of Letters Patent. Patented Jan. 27, 1914.

Application filed July 31, 1913. Serial No. 782,228.

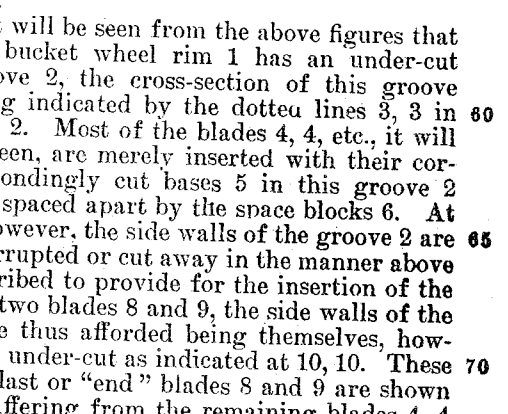
To all whom it may concern:

Be it known that I, LUDWIG CUBELIC, a subject of the King of Prussia, residing at Charlottenburg, Germany, have invented certain new and useful Improvements in the Attachment of Turbine-Blades, of which the following is a specification.

My invention relates to the attachment of blades, buckets, or guides to turbine rotors or to stationary elements of the turbine casing and the like, and more particularly to the securing of such blades in under-cut slots or grooves.

Turbine blades, buckets, or guides are frequently made from drawn strips of material of suitable cross-section cut at one end in such a manner that they have dovetail or otherwise appropriately shaped base portions adapted to fit in a similarly shaped under cut groove in the periphery of the bucket wheel or drum or in the turbine casing, or some other stationary part. The blades are then inserted in the groove and spaced apart at suitable intervals by appropriately shaped space blocks. To enable the blades to be readily put in place, it is usual to interrupt the edges or the sides of the groove for a short distance to provide an opening that will accommodate the bases of the blades. After all the blades have been put in place, this opening is filled with an inset filler block or securing member which keeps the two blades between which it lies with their edges within the under-cut groove at the ends of the space or opening. This mode of construction has the defect that the bases of the blades on opposite sides of the securing block are usually but just barely in the groove, and that it sometimes happens that there is sufficient looseness or shifting of the parts to permit these blades to work out of the groove, or even that owing to poor workmanship, they are not really in the groove at all to begin with,—with the result that they are thrown out by centrifugal force during the operation of the turbine. By my invention this defect is overcome.

In the accompanying drawing, Figure 1 is a plan view of a portion of the periphery of a turbine bucket wheel showing two blades, secured in place according to my invention; Fig. 2 is a transverse section through the rim of the wheel; and Fig. 3 is a mid-section through the blades and the rim.



It will be seen from the above figures that the bucket wheel rim 1 has an under-cut groove 2, the cross-section of this groove being indicated by the dotted lines 3, 3 in Fig. 2. Most of the blades 4, 4, etc., it will be seen, are merely inserted with their correspondingly cut bases 5 in this groove 2 and spaced apart by the space blocks 6. At 7, however, the side walls of the groove 2 are interrupted or cut away in the manner above described to provide for the insertion of the last two blades 8 and 9, the side walls of the space thus afforded being themselves, however, under-cut as indicated at 10, 10. These two last or "end" blades 8 and 9 are shown as differing from the remaining blades 4, 4 in that at the side of the base of each that lies away from the other there is provided an associated or even integral space-block, projection, offset, or thickening 11 which extends toward the adjacent blade 4, the space blocks 12, 12 between the shanks of these special blades 8 and 9 and those of the next blades 4 on either side being made correspondingly thinner. When, therefore, the securing filler block 13 is inserted in the space 7 and secured in place by being forced home on the conical pin 14, the two end blades 8 and 9 have quite an extended grip in the under-cut groove 2, so that no looseness which might exist could possibly result in their becoming displaced. If desired, transverse pins 15 may for greater security be passed through holes in the wheel rim 1 and in the projections 11 on the blades 8 and 9 and riveted in place.

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. The combination with a member having an under-cut groove therein and a plurality of turbine blades with their ends engaged in said groove, of two adjacent blades each having a shank portion with an offset

at the side thereof which lies away from the other, said blades being arranged at opposite ends of a space where the sides of the groove are interrupted with their offset portions extending into the groove, and a filler block secured in said space between said blades.

2. In an elastic fluid turbine, the combination of a rotary member having an undercut groove therein, the walls of said groove being interrupted to permit of the insertion of the blades, a plurality of blades having bases which are fitted into said groove, space blocks between said bases, and a pair of special blades located at said interruption, said blades having on opposite sides space blocks formed integral therewith, and a filling block secured between said special blades.

In witness whereof, I have hereunto set my hand this 15 day of July 1913.

LUDWIG CUBELIC.

Witnesses:
FRIEDRICH GANZERS,
OTTO SCHMIDT.