No. 754,984. PATENTED MAR. 22, 1904.

E. E. F. FAGERSTRÖM.

DETACHABLE BLADE FOR STEAM TURBINES.

APPLICATION FILED APR. 1, 1903.

NO MODEL.

Fig. 1.

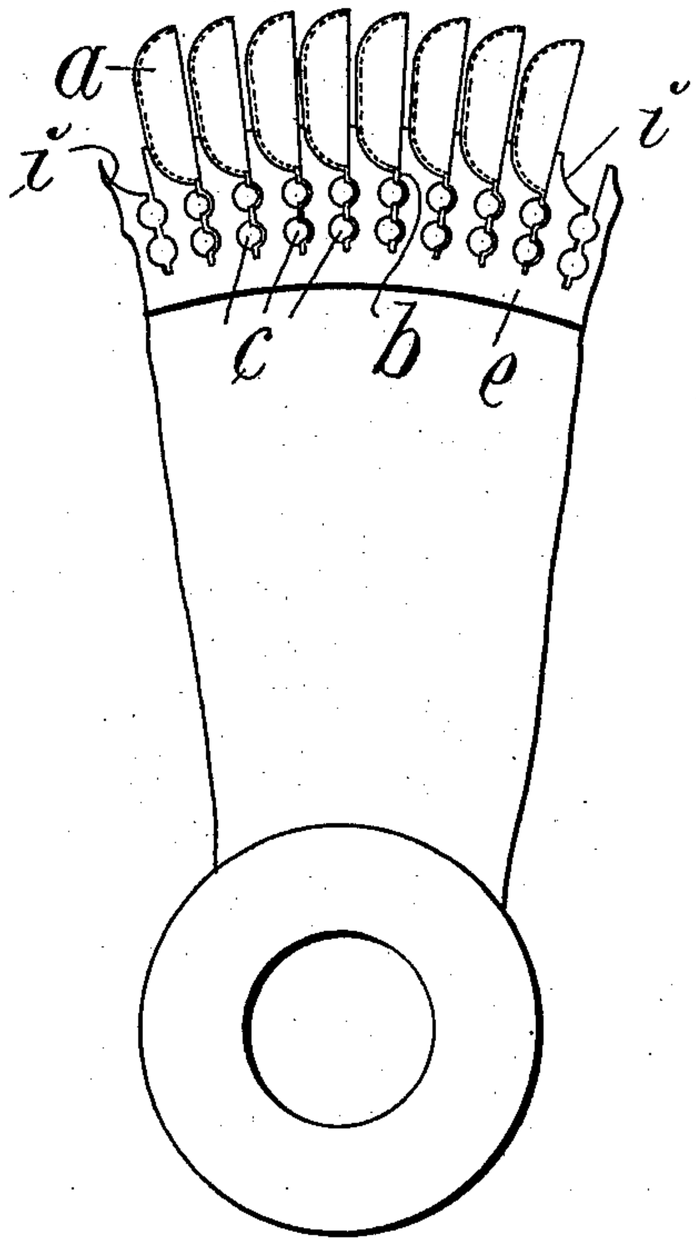
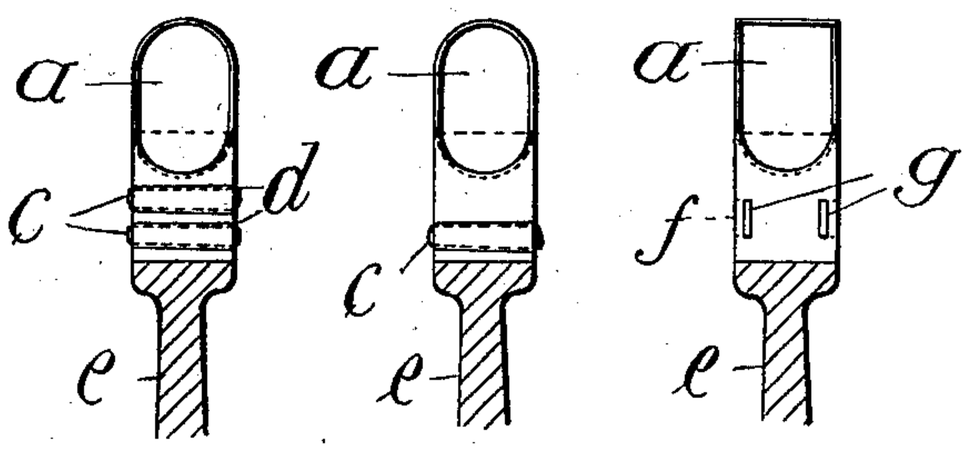


Fig. 2. Fig. 3. Fig. 4.



WITNESSES

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No. 754,984. Patented March 22, 1904.

UNITED STATES PATENT OFFICE.

ERNST ELIS FRIDOLF FAGERSTRÖM, OF SUNDBYBERG, SWEDEN.

DETACHABLE BLADE FOR STEAM-TURBINES.

SPECIFICATION forming part of Letters Patent No. 754,984, dated March 22, 1904.

Application filed April 1, 1903. Serial No. 150,594. (No model.)

To all whom it may concern:

Be it known that I, ERNST ELIS FRIDOLF FAGERSTRÖM, a subject of the King of Sweden and Norway, and a resident of Sundbyberg, in the county of Upland, in the Kingdom of Sweden, have invented certain new and useful Improvements in Detachable Blades for Steam-Turbines, of which the following is a specification.

This invention relates to a peculiar construction of steam or vapor turbines for the purpose of fixing the metal vanes of such vapor-turbines firmly to the wheel, so that they will withstand high rate of revolutions.

In the accompanying drawings a plan view and partial horizontal section of a portion of such a turbine-wheel is illustrated in Fig. 1. Fig. 2 is a cross-section of a portion thereof, and Figs. 3, 4 are cross-sections illustrating modified arrangements of the invention.

The metal-sheet vanes *a*, which may be of varying forms, are inserted by means of their stems into the transversal and radial or approximately radial grooves or slits *b* of the turbine-wheel, said grooves or slits being provided with one or more channels or enlargements *c*, Figs. 1, 2, 3, passing transversely through the wheel *e* at a distance from the ends of the slits. These channels or enlargements may be of any convenient cross-section—for instance, cylindrical, Fig. 2, or tapering, Fig. 3. On inserting the stems of the vanes from one side into the slits alternatively after previously bending them to suit the enlargements of the slits pins or wedges *d* are driven through the said channels or enlargements, the vanes being thereby secured so firmly that they cannot be thrown out when the wheel rotates.

In the modified arrangement shown in Fig. 4 pins or wedges are likewise used for securing the stems inserted in the slits *b*, these, however, not being provided with channels passing transversely through the wheel *e*, but the wheel instead being on each side provided with an annular groove *f* and each vane having two apertures, Figs. 1, 4, made therein at the part thereof adjoining the groove in the wheel-rim on the insertion of the vane. In these apertures short wedges or pins *g* or pieces of metal plate are inserted for securing the vane.

In order to provide good support for the vanes, the turbine-wheel is provided at its circumference with recesses *i*, shaped to suit the curved or tapering part of each vane, the latter bearing on the walls of said recesses and being thus prevented from bending under the influence of the driving fluid.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a steam or water turbine the combination of a wheel with transversal, radial slits or grooves, metal-sheet vanes inserted with their flat sheet-metal stems therein, and pins for securing the said stems in the wheel, said pins engaging the said stems directly.

2. In a steam or water turbine the combination of a wheel with transversal, radial slits or grooves, channels or enlargements in said grooves, metal-sheet vanes inserted with their flat stems therein and pins driven through the said channels or enlargements for clamping the stems against the wheel.

3. In a steam or water turbine the combination of a wheel with transversal, radial slits or grooves, metal-sheet vanes, inserted with their flat stems therein, apertures in the said stems, near their edges, grooves at the outer surfaces of the wheel and pins inserted through the apertures in each stem and with their ends resting in the grooves.

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

ERNST ELIS FRIDOLF FAGERSTRÖM.

Witnesses:

H. TELANDER,

T. RISBERG.