

A. W. CLARKE.
SHROUDING OF TURBINE BLADES.
APPLICATION FILED MAR. 5, 1907.

969,843.

Patented Sept. 13, 1910.

Fig. 1.

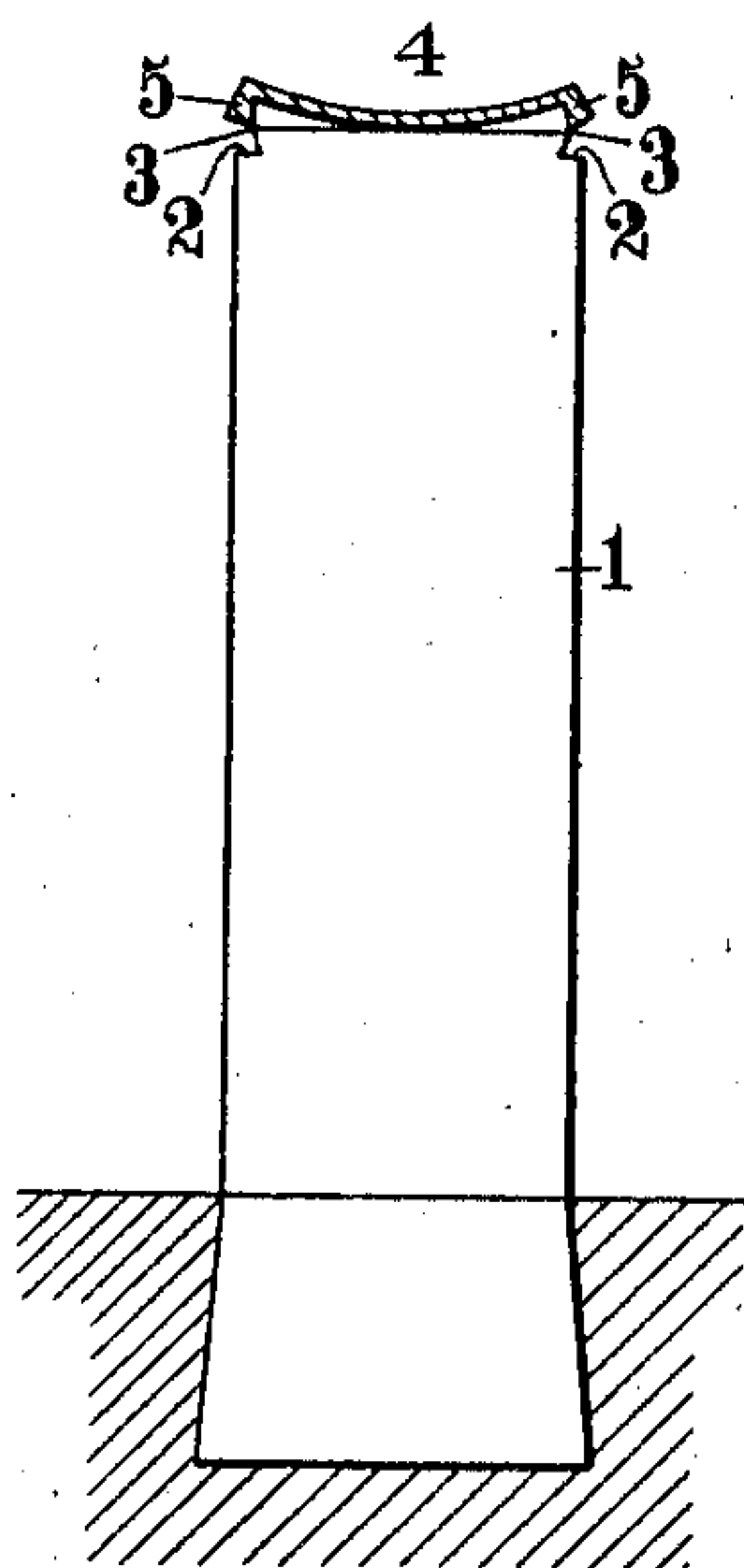


Fig. 2.

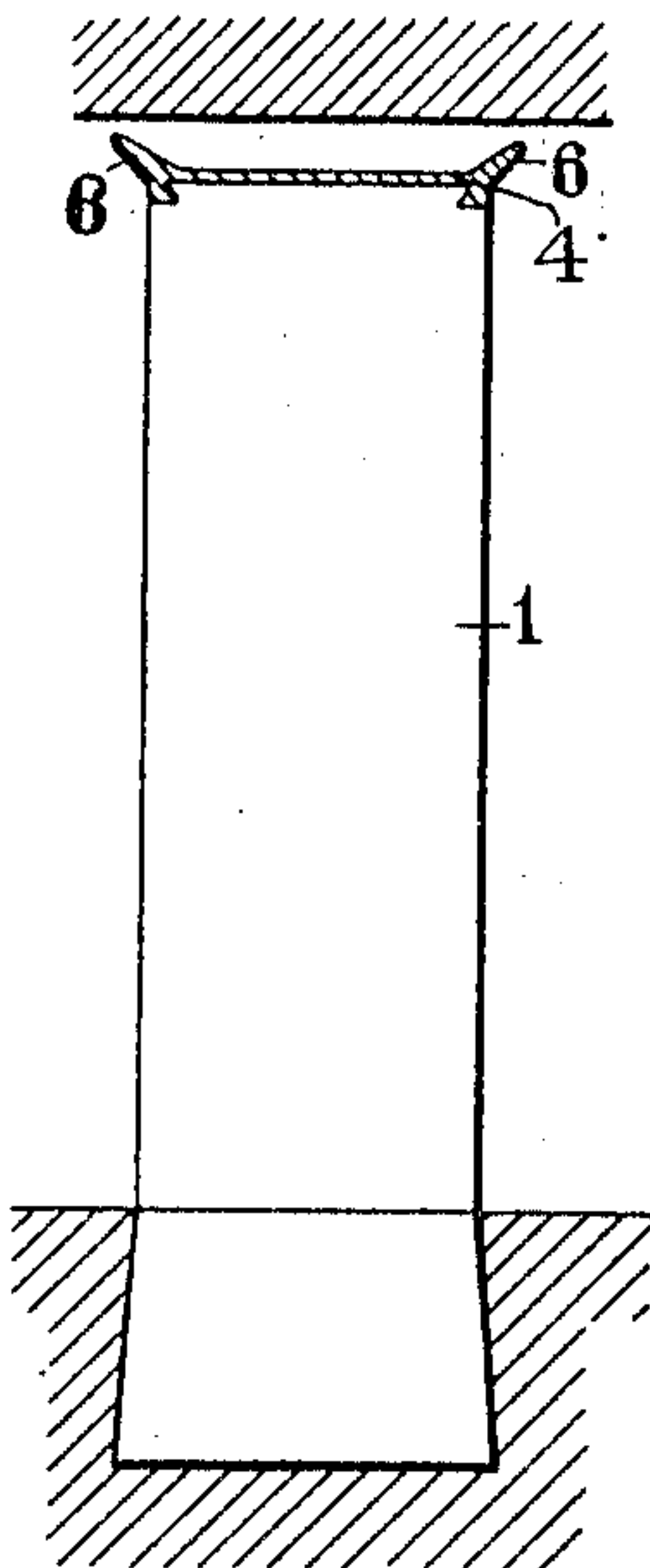


Fig. 3.

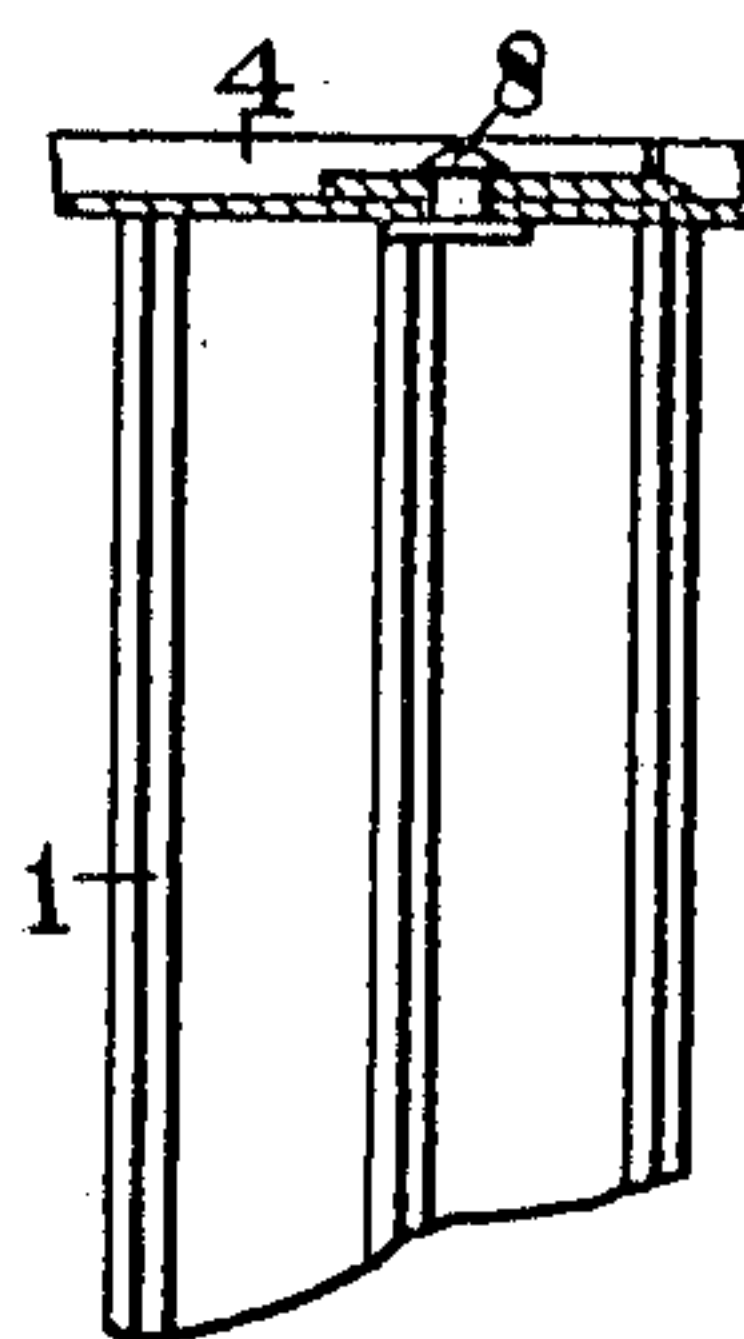


Fig. 4.

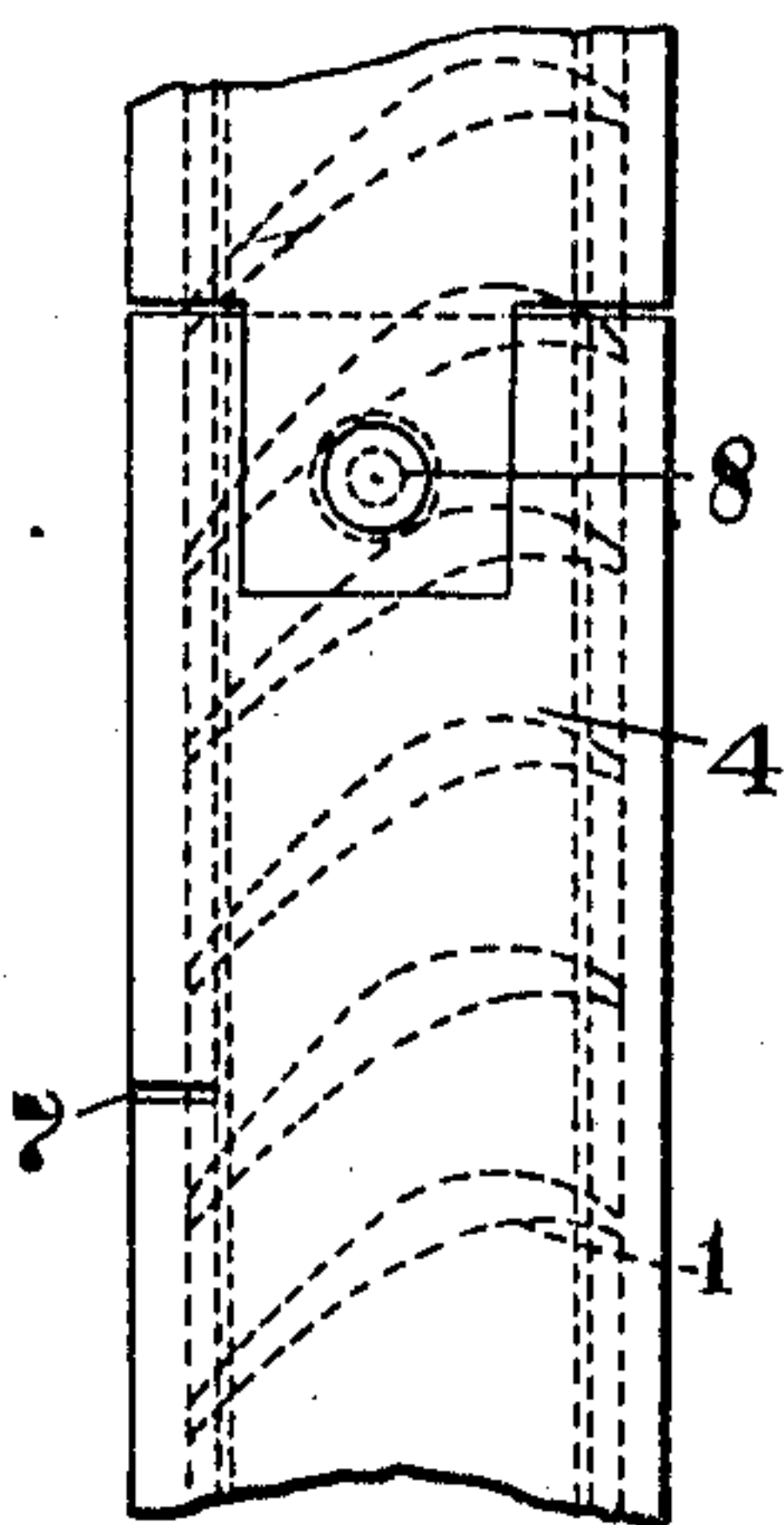


Fig. 5.

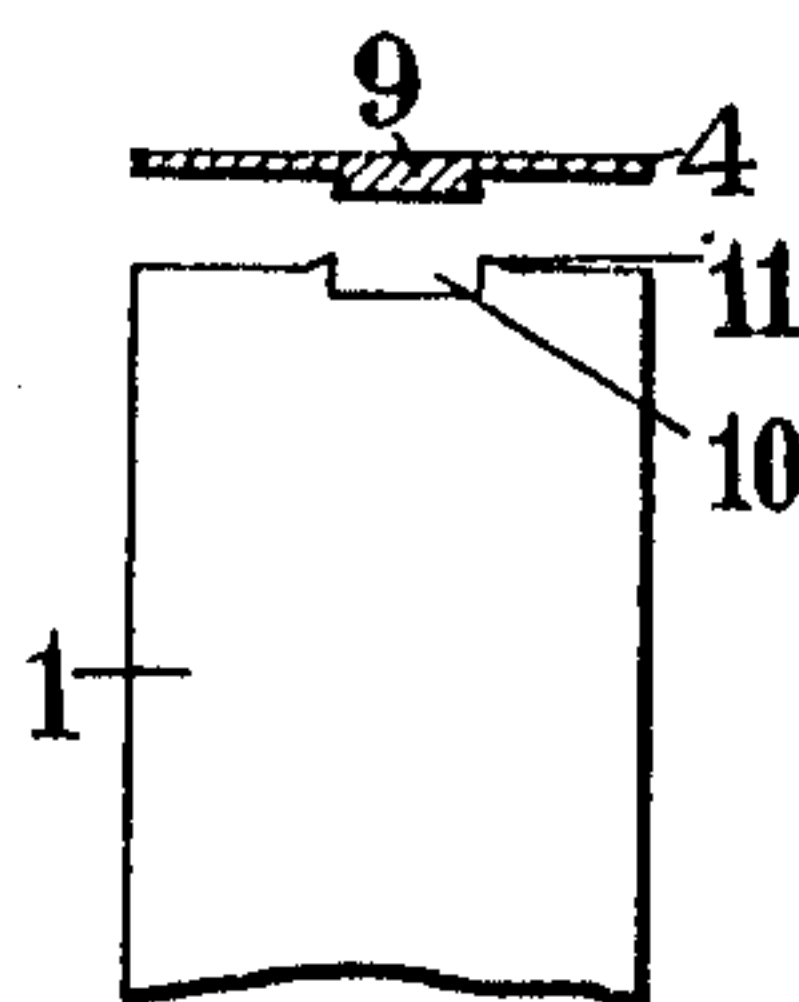
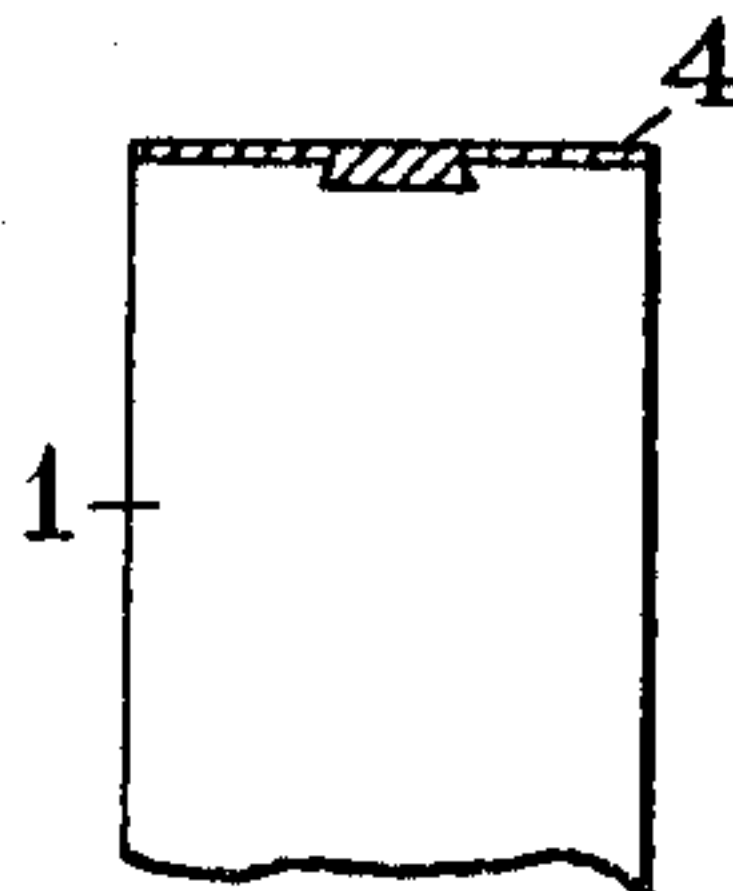


Fig. 6.



Witnesses:

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By *Jno. S. Green*
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fact.

UNITED STATES PATENT OFFICE.

ATHOL WILFRID CLARKE, OF MANCHESTER, ENGLAND, ASSIGNOR TO THE WESTINGHOUSE MACHINE COMPANY, A CORPORATION OF PENNSYLVANIA.

SHROUDING OF TURBINE-BLADES.

969,843.

Specification of Letters Patent. Patented Sept. 13, 1910.

Application filed March 5, 1907. Serial No. 360,775.

To all whom it may concern:

Be it known that I, ATHOL WILFRID CLARKE, a subject of the King of Great Britain, and a resident of Manchester, in the county of Lancaster, England, have made a new and useful Invention in Improvements Relating to the Shrouding of Turbine Blades or Vanes, of which the following is a specification.

10 This invention relates to the shrouding of turbine blades or vanes where such shrouding consists, as has already been proposed, of a thin metal strip attached to the ends of the blades or vanes.

15 The object of the invention is to improve the mode of attaching such a strip to the blades or vanes so that the labor involved is reduced.

20 According to this invention the free end of each of the several blades or vanes and the co-acting face of the shrouding strip are formed with one or more locking recesses and projections which are normally complementary one to the other, or approximately so, and engaged by temporary distortion of the strip or by permanent mechanical displacement of the metal of the blades or strip.

30 In the accompanying drawings, Figure 1 is a sectional elevation showing one mode of engagement by temporary distortion of the strip, the blade or vane being provided with a single projection having two locking faces; Fig. 2 a similar view showing the strip in position and provided with fins or lips; Fig. 3 a sectional elevation at right angles to Fig. 2, showing means for connecting the ends of the strip; Fig. 4 a broken plan of the blade and strip shown in Figs. 2 and 3, showing also means for rendering the fins more pliable; and Figs. 5 and 6 are sectional elevations showing one mode of engagement by permanent mechanical displacement of the metal of the blade, the strip being provided with a single projection having two locking faces.

45 Referring to Fig. 1, the free end of the blade or vane 1 is fashioned to a suitable hold-fast shape, for instance by forming notches 2 at opposite corners, the notches 2 being undercut so as to provide two locking faces 3. The shrouding strip 4 is provided on the face adjacent to the blades or vanes 1 with counterpart projections 5; the notches

2 and projections 5 are engaged with each other by temporarily distorting the shrouding strip 4 in a direction parallel to its length, that is to say by bending the strip 4 transversely, as shown in the figure, in order that the distance between the projections 5 may be increased to permit the latter to enter the notches 2, after which when the strip 4 is released to regain its original configuration, projections 5 spring into their final position, as shown in Fig. 2.

65 For a greater convenience in effecting the distortion of the shrouding strip 4, as well as to provide a shrouding which shall be of a more or less elastic nature, and thus facilitate small running clearances between the shrouding strip and the cylinder or spindle, as the case may be, the shrouding strip 4 may, as shown in Figs. 2, 3 and 4, be provided with fins or lips 6 disposed at an angle to the surface of the strip and extending toward the stator or rotor of the turbine, as the case may be, so that in the event of contact being made therebetween, said fins or lips 6 will yield. The fins or lips 6 can be made more pliable by dividing the same radially at points along the circumference, as for instance by fine saw cuts 7. The ends of the strip 4 or of the several sections of the strip, if made in more than one piece, may be suitably connected together, as for example by overlapping the same, as shown in Figs. 3 and 4, and connecting the ends by means of a rivet 8. Provision may be made for expansive action of the strip if and when required; for instance by elongating the rivet hole in one of the overlapping ends.

75 In some cases, as shown in Figs. 5 and 6, the shrouding strip 4 may be formed with a single undercut or dovetail projection 9 adapted to enter a notch or recess 10 in the respective blade or vane ends. The notches or recesses 10 are not undercut, but are provided at each side with a raised portion or tip 11 adapted to make contact with the co-acting faces of the projection 9. In this way, upon the application of pressure to the shrouding strip 4, the metal of the raised portions or tips 11 can be mechanically displaced so as to engage the undercut portions or locking faces of the projections 9 and hold the strip secure. Obviously in lieu of this last described form, the locking notch

or recess 10 might be formed in the shrouding strip 4, and the undercut projection 9 formed in the ends of the blades or vanes.

•What I claim is:

5 1. In combination with the blades or vanes of an elastic fluid turbine, a shroud for the outer or free ends of said blades or vanes, a longitudinally extending projection formed integrally with said shroud and
10 means secured to each blade or vane, for securing said shroud in place by being distorted to grip said projection.

2. In combination with the blades or vanes of an elastic fluid turbine, a shroud
15 for the outer or free ends of said blades or vanes, a longitudinally extending dove-tail projection on said shroud, a notch in the outer or free end of each blade or vane adapted to receive said projection and
20 means carried by each blade or vane, for securing said shroud in place by being permanently set to grip said projection.

3. In combination with the blades or vanes of an elastic fluid turbine, a shroud
25 for the outer or free ends of said blades or

vanes, a longitudinally extending dove-tail projection on said shroud, a notch in the outer or free end of each blade or vane adapted to receive said projection and tips, adapted to grip said projection and secure
30 said shroud in place by being permanently distorted.

4. In combination with the blades or vanes of an elastic fluid turbine, a shroud
35 for the outer or free ends of said blades or vanes, a longitudinally extending dove-tail projection on said shroud, a notch in the outer or free end of each blade or vane adapted to receive said projection and
40 means, carried by each blade or vane, for securing said shroud in place by being permanently distorted.

In testimony whereof, I have hereunto subscribed my name this 21st day of February 1907.

ATHOL WILFRID CLARKE.

Witnesses:

JAS. STEWART BROADFOOT,
PERCY WM. HOLT.