

No. 746,162.

PATENTED DEC. 8, 1903.

H. G. REIST.  
DETACHABLE BUCKET FOR TURBINES.

APPLICATION FILED MAR. 24, 1903.

NO MODEL.

Fig. 1.

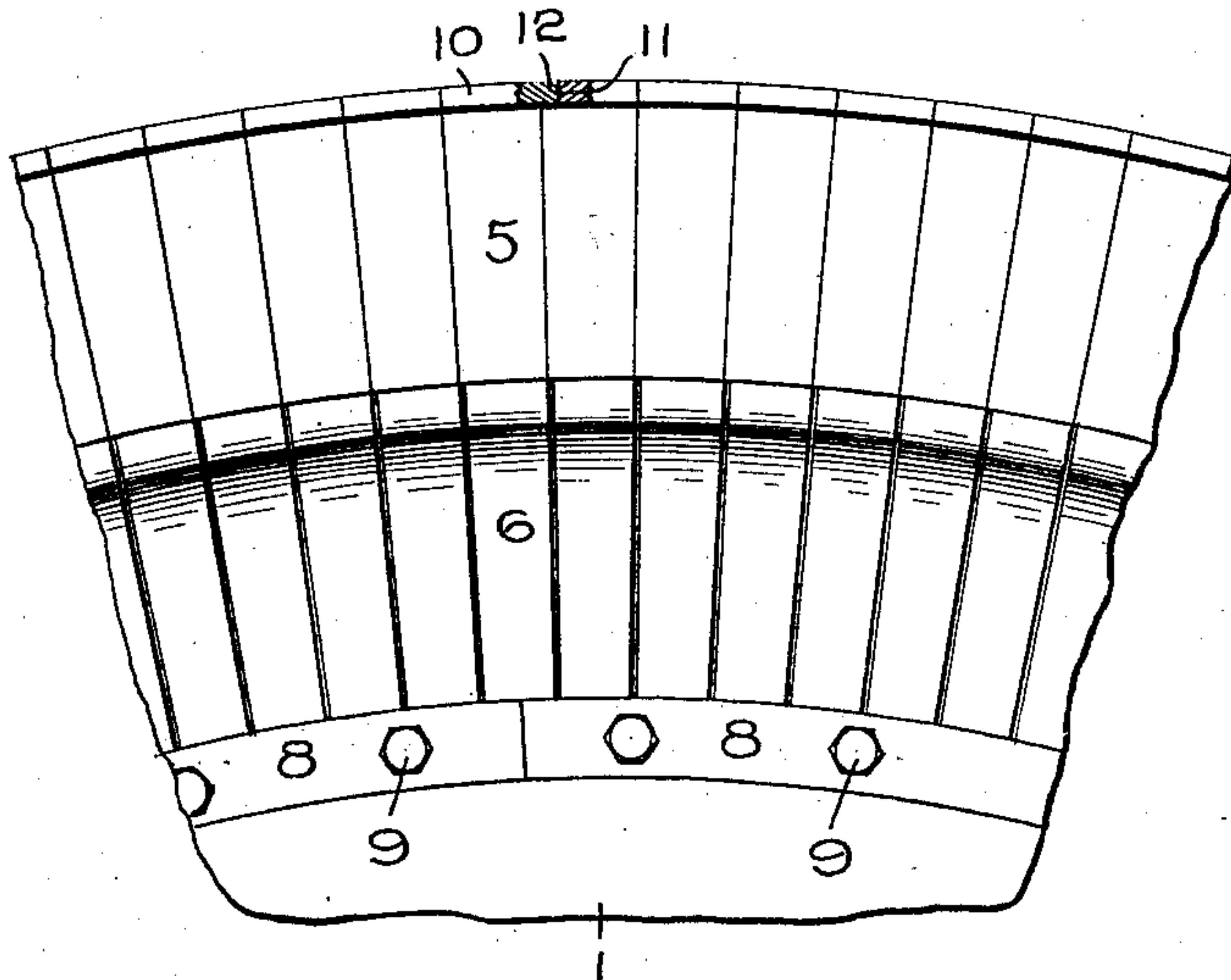
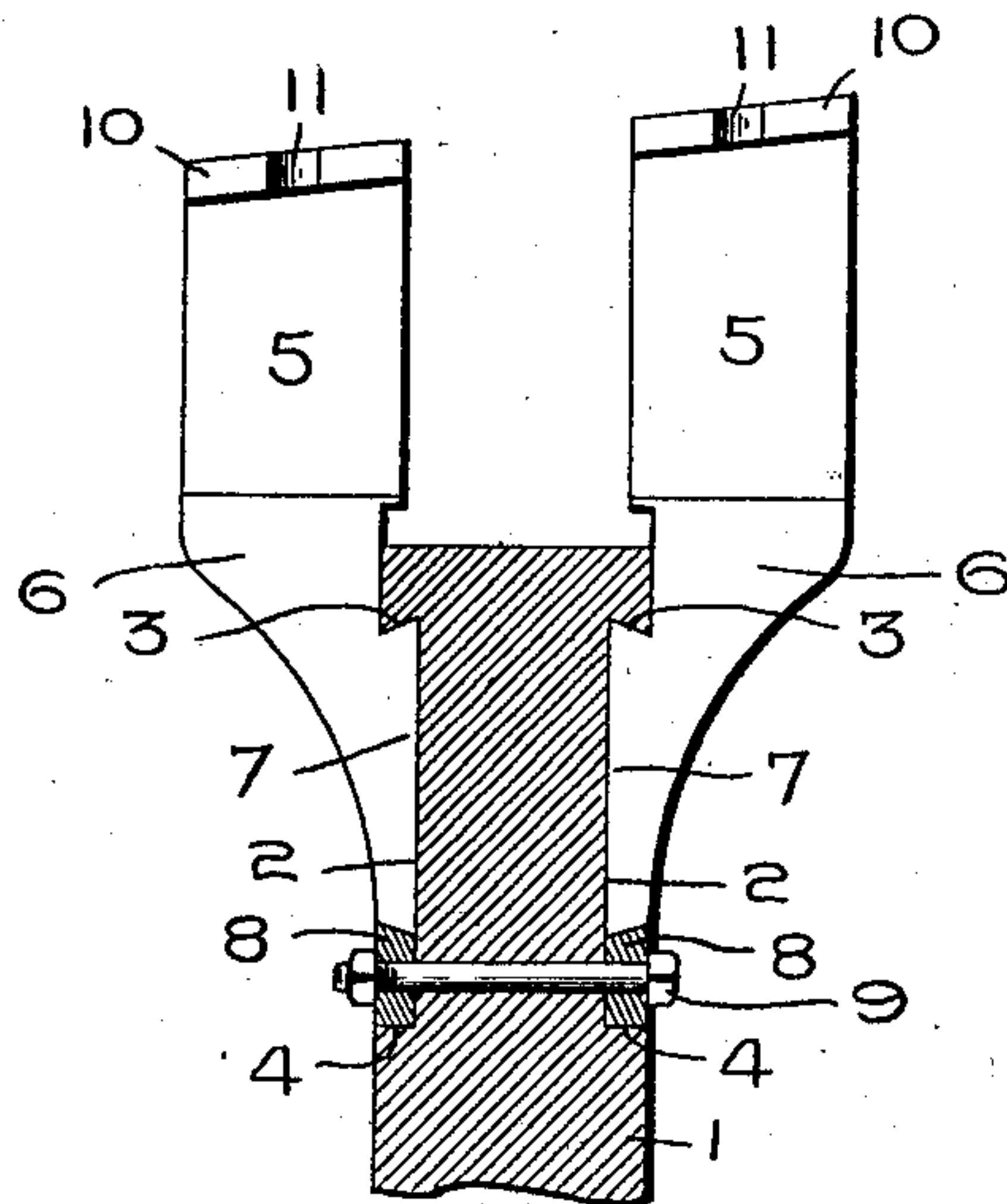


Fig. 2.



Witnesses:

*Marcus L. Byng.*  
*Alex. F. Macdonald.*

Inventor:  
Henry G. Reist,

by *Albert H. Bann*  
Att'y.



# UNITED STATES PATENT OFFICE.

HENRY G. REIST, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## DETACHABLE BUCKET FOR TURBINES.

SPECIFICATION forming part of Letters Patent No. 746,162, dated December 8, 1903.

Application filed March 24, 1903. Serial No. 149,246. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY G. REIST, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Detachable Buckets for Tur-

bines, of which the following is a specification. The present invention relates to elastic-fluid turbines, and has for its object to improve their construction and reduce the cost of manufacture by simplifying and improving the means for attaching the buckets to their supports.

For a consideration of what I consider to be novel and my invention attention is called to the description and claims appended thereto.

In the drawings, which represent one embodiment of my invention, Figure 1 is a partial side elevation of a bucket-wheel, and Fig. 2 is an axial section thereof.

1 represents the wheel or other support to which the buckets are secured. It is provided with grooves 2, which extend circumferentially. In the present instance a double row of buckets is shown. Hence a groove is provided on each side of the wheel or support. Where only a single row of buckets is provided, this groove would be omitted on one side. The outer surface of the groove is formed by an inclined wall 3, which is subjected to the centrifugal strain, while the inside edge of the groove is made straight, as is indicated at 4. The inclination of the wall 3 has a tendency to make the bucket hug the wheel closely.

The buckets 5 may be of any suitable form and made from drop-forgings or castings and are provided with tapered shanks 6, which have a dovetail projection 7 formed thereon that enters the groove formed in the wheel or other support. In order to take up the play of the parts and also to hold the buckets in place, locking-pieces 8 are provided which have a beveled side that engages with the shank of the bucket and a straight side that engages with a corresponding side on the groove in the wheel or support 1. These locking-pieces can be made in short sections or they may be arranged to cover a number of the wheel-buckets, as desired. In the present instance the locking-pieces form segments of

a ring and are arranged to cover a number of the buckets. These locking-pieces are secured in place by bolts 9, which extend through the locking-pieces on opposite sides of the wheel and also through the web of the wheel. In this manner a very strong construction is obtained. As the locking-pieces are drawn together it is obvious that the dovetail projections 7 on the buckets will be forced outward in a radial direction, which causes them to engage with the beveled faces 3 of the bucket-receiving grooves in the wheel.

The buckets are provided with a cover 10, which cover may be made up in sections or not, as desired. I have found it advantageous to have the cover made up in sections and have each section formed integral with the bucket. Each section of the cover is provided with a notch 11 and with a projection 12, as indicated in Fig. 1, which enters the notch in the adjacent bucket-cover. This arrangement is useful in alining the buckets and also strengthens them at the ends.

In assembling the buckets they are first mounted in place on the wheel or other support and the projections caused to engage with the inclined surface 3 of the groove at the same time the projections 12 are arranged to enter the notches 11 in the bucket-covers. After the buckets are in place the segmental locking rings or devices 8 are mounted in place and secured by the bolts 9. If it becomes necessary for any reason to take out one of the buckets without disturbing the others, the section or sections of the locking-ring 8 adjacent to the bucket are removed and the bucket moved inward toward the center of the wheel or other support until the projection 12 on the bucket-cover clears the notch in the adjacent bucket-cover, after which the bucket as a whole can be removed. The same movement which causes the projection 12 to be disengaged from the notch 11 will cause the projection 7 to clear the overhanging wall 3 of the support. The small space between the tapered bucket-shanks permits of this radial movement under the conditions specified.

I am aware that wheels having a single row of buckets have been constructed with a dovetail groove in the periphery in which the



buckets are seated; but this construction is only suitable for light buckets traveling at relatively low speeds, because it lacks strength. By placing or forming the gripping-surfaces on the side walls or faces of the wheel or support the shanks can be made of substantial size and provided with large strong hooks or projections amply able to resist any strain to which the buckets may be subjected. I am also enabled to save a large amount of metal in the wheel, and thereby reduce centrifugal strains.

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 in other ways.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. In a turbine, the combination of a support, a double row of buckets one on each side of the support, a shank for each bucket which extends parallel with the shank of a bucket on the opposite side of the support, a dovetail projection and groove for uniting each row of buckets with the support, and an independent means for taking up the play of the parts.

2. In a turbine, the combination of a support having a smooth periphery and an undercut groove formed in one of its sides, a

bucket mounted on and extending parallel with one side of the support, having a dovetail projection on its inner side which enters the undercut groove, a detachable locking device which engages the support and the projection, and a retaining means for the locking device which extends axially of the support.

3. In a turbine, the combination of a support having an undercut groove, detachable buckets, covers for the buckets, interlocking devices between adjacent sections of the cover, shanks for the buckets, projections on the buckets which enter the undercut groove, and means for taking up the play of the parts and forcing the projections into engagement with the wall of said groove.

4. In a turbine, the combination of a wheel or support, grooves having overhanging walls formed in the wheel or support and on opposite sides thereof, a double row of buckets each provided with projections which enter the grooves and extend parallel with the wheel, segmental locking means engaging two or more buckets for forcing the projections against the overhanging walls of the grooves, and bolts which pass axially through the locking means and the wheel or support.

In witness whereof I have hereunto set my hand this 23d day of March, 1903.

HENRY G. REIST.

Witnesses:

BENJAMIN B. HULL,  
HELEN ORFORD.