

No. 768,597.

PATENTED AUG. 30, 1904.

H. GEISENHÖNER.
TURBINE BUCKET.

APPLICATION FILED AUG. 21, 1902.

NO MODEL.

Fig. 1.

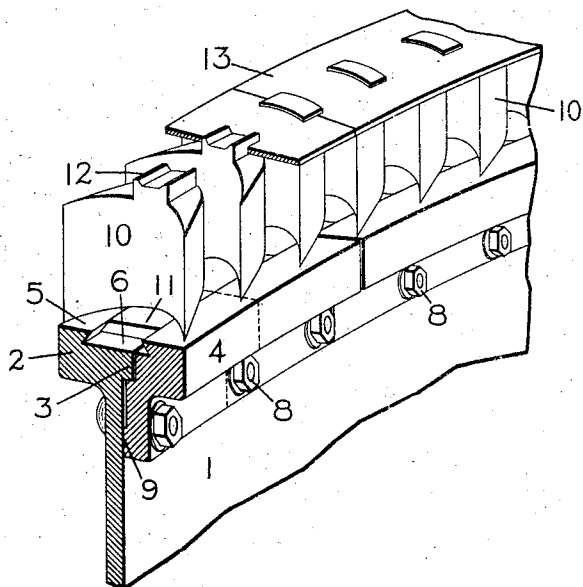


Fig. 2.

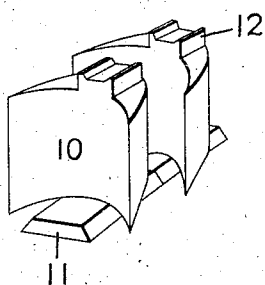
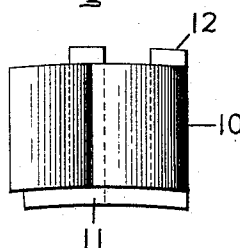


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

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

TURBINE-BUCKET.

SPECIFICATION forming part of Letters Patent No. 768,597, dated August 30, 1904.

Application filed August 21, 1902. Serial No. 120,495. (No model.)

To all whom it may concern:

Be it known that I, HENRY GEISENHÖNER, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Turbine-Buckets, of which the following is a specification.

Turbines driven by fluid under pressure are provided with revolving buckets of special formation. Certain types of turbines are provided in addition with stationary buckets, also of special formation, and this special formation may or may not be similar in both cases. The bucket structures may be divided into two general classes, one class including all buckets which are formed integral with their support, the other class including all buckets which are detachable from their support. The present invention belongs to the latter class, and has for its object to improve and simplify the construction of the buckets and their supports.

For a consideration of what I consider to be novel attention is directed to the specification and to the claims appended thereto.

In the accompanying drawings, which represent an embodiment of my invention, Figure 1 is a perspective view of a portion of a turbine-wheel. Fig. 2 is a perspective view of a pair of buckets detached from the wheel, and Fig. 3 is a side elevation of the same.

1 represents a wheel or other support having a peripheral flange 2 formed integral therewith. The flange extends on one side only of the web of the wheel or support. On the opposite side of the web is a shoulder 3, with which the sectional detachable flanged ring 4 engages. The sectional flanged ring is provided with a shoulder which registers or interlocks with the one formed on the web. The shoulders on the wheel and detachable ring by reason of their interlocking largely relieve the strain on the attaching-bolts due to the centrifugal action. The periphery of the flange is turned true, as at 5, to form a seat for the inner or under surface of the buckets. It is also provided with a grooved portion 6, of reduced size, having an overhanging wall that engages with the base of

the buckets and assists to retain them in place. The sections of the detachable flange or ring are also provided with a portion of reduced size having an overhanging wall, so that when the parts are united a dovetail groove is provided to receive the dovetail projection on the buckets.

The sectional ring 4 is preferably turned out of solid stock, after which it is divided into sections; but it can be made of several separate pieces. This is sometimes advantageous where the diameter of the ring is great. The sections are preferably large enough to retain several buckets, but can be arranged to hold a single bucket, and are secured by bolts 8, which pass through the web. The heads and nuts of the bolts are situated under the flange 2 and the sectional flange on the ring and are protected thereby. The inner edge of the detachable flange or ring 4 is provided with a slight projection at 9, which rests on the wheel-web between the retaining-bolts and the shaft. This causes a slight space to be left between the adjacent side walls or faces of the wheel and the flange, so that the retaining-bolts can firmly clamp the parts together. To put the matter in a different way, the sections of the ring 4 touch at two places, one being on the wheel and the other on the detachable buckets, and the bolts exert their pressure between them.

The buckets 10 are given any suitable shape or conformation. In the present instance each bucket has a curved front and back face which conform to certain requirements that need not be mentioned here. They may be cast, drop-forged, or cut out of solid stock. The two first-mentioned methods of construction are desirable owing to the reduced cost. When the parts are cast, they may be finished by special tools, so that they will be counterparts, and in this manner the cost is reduced to a minimum. Each bucket is provided with a rectangular base 11, having inclined side walls which register with the inclined side wall of the groove formed in the wheel. In other words, each bucket is provided with a dovetail projection, by means of which it is clamped in place. The bases of the buckets are relatively narrow and

have considerable length as measured on the circumference of the support. The ends of the dovetail projections are cut on radii extending from the center of the wheel-shaft and act as distance pieces or separators to hold the buckets in place. The bottom of each projection is also curved to conform to the curvature of the wheel or support. The bases should be made large enough to stand the strains to which the buckets are subjected. The sides of the buckets extend beyond the base or projection 11 and the under side thereof is finished so that it will make a good fit with the periphery of the flanges 2 and 4. This arrangement serves to give stability to the buckets and also makes a steam-tight joint. The peripheral portions of the wheel, clamp, and bucket-base form the inner part of the working passages between the buckets. The outer end of each bucket is provided with a tenon 12 of suitable shape and is arranged to receive and hold the sections of the cover 13. After the buckets are assembled the cover-sections are applied and the ends of the tenons riveted over by suitable means. The cover is made in sections, and the sections may or may not break joint with the sections of the flange 4. In any event it is desirable to make the sections of both relatively small, so that the buckets can be removed when desired. When the sections of the cover and the sections of the flange 4 extend over the same angle, it is a simple matter to remove a section comprising one or a number of the buckets and substitute a new bucket or a number of buckets. The joints between the flange-sections may break joint with those between the bases of the buckets, as shown in full lines, or they may coincide, as is indicated in dotted lines. The latter is advantageous, as it permits me to remove the buckets held by a single flange-section without affecting any other flange-section. The cover-sections are provided with slots to receive the tenons, and the ends thereof are notched to receive one-half of a tenon when assembled. The tenons are given such a shape that they may be easily riveted over to hold the cover in place.

The present bucket is for use with turbines of the jet type, and it is desirable to provide covers for the fluid-passages between the buckets; but the retaining means can be applied to those turbines which have no bucket-covers.

The invention has been described in connection with the revolving member of a turbine; but it can be applied equally well to the stationary or intermediate buckets.

It is evident from the foregoing that if one or more buckets are injured it or they may be removed and new ones substituted at a small cost.

Turbine-casings are commonly provided with one or more openings which are covered during operation, and by removing these

covers the wheel may be repaired without disturbing the remainder of the apparatus. It is owing to this fact that I prefer to make the ring 4 of relatively small sections, so that they can be removed through the openings. The bolts are made relatively short for the same reason and are so situated that a socket-wrench can be used.

A single wheel has been shown in the drawings; but it is to be understood that a number may be employed with intermediate buckets situated between them. It is owing to the fact that intermediates are intended to be used with the wheel illustrated that the distance between the end faces of the two flanges is made practically the same as that between the ends of the buckets measured on a line parallel with the wheel-shaft. Such a condition demands that the retaining devices be arranged to occupy a very small space.

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. In a turbine, the combination of a plurality of buckets, each having a dovetail projection forming its base with side portions which extend beyond the base, a support, and a detachable ring for clamping the buckets in place, the support and ring being formed with a dovetail groove, and provided with surfaces which engage the projecting side portions of the buckets for supporting them and forming a part of the working passage between the buckets.

2. In a turbine, the combination of a plurality of buckets, each having a rectangular base having a greater length than width measured circumferentially of the wheel, a support, a sectional detachable flanged ring, the support and sectional ring being provided with means for retaining the bases of the buckets, and transversely-extending bolts for securing the detachable flange or ring to the support.

3. In a turbine, the combination of a plurality of buckets, each having a base which is narrower than the blade, a wheel or support having a portion which engages with the inner end of the bucket and also assists in holding the buckets in place, a detachable segmental ring having a portion which also engages the inner end of the bucket and assists to hold the buckets in place, and a shoulder on the ring which interlocks with a shoulder on the support.

4. In a turbine, the combination of a support, a detachable sectional flange or ring, interlocking shoulders formed on the support

and ring, a dovetail groove formed partly in the support and partly in the ring, bolts for securing the parts together; and buckets, each having a dovetail base which enters the groove and extended side portions which rest on the support and the sectional ring.

5. In a turbine, the combination of a support, detachable buckets mounted thereon, a sectional detachable ring for securing the buckets in place, and a sectional cover, the parts of which are secured to the buckets.

6. As an article of manufacture, a detachable turbine-bucket comprising a curved body portion having a rectangular base which is narrower than the bucket, measured in an axial plane, and longer than it is wide, and a tenon to which the cover is secured.

7. In a turbine, the combination of a plurality of buckets, each having a rectangular base which is narrower than the bucket, measured in an axial plane, and longer than it is wide, the bases of the buckets engaging with each other and acting as separators, a grooved support for the bases, a detachable sectional ring for securing the buckets in place which engages with the under side of the bucket, and bolts which extend parallel with the shaft for holding the sections of the ring in place.

8. In a turbine, the combination of a support, an annular undercut shoulder and an annular flange on said support, a curved retaining element secured to said support and adapted to engage said flange and form with said shoulder an undercut channel, and buckets detachably mounted in said channel.

9. In a turbine, the combination of a support, a peripheral undercut shoulder and an annular side flange disposed around its rim, an annular recessed ring engaging said flange and forming with said shoulder an undercut peripheral channel, and a plurality of buckets secured in said channel.

10. In a turbine, a wheel or support, an undercut annular channel formed by peripheral flanges, one of which is integral with said wheel or support and the other formed by a peripheral ring engaging a shoulder of said wheel or support and detachably secured thereto, and a series of buckets held in place between said flanges.

In witness whereof I have hereunto set my hand this 19th day of August, 1902.

HENRY GEISENHÖNER.

Witnesses:

ALEX. F. MACDONALD,
BENJAMIN B. HULL.