O. F. BRUMAN.

TURBINE WHEEL.

APPLICATION FILED MAR. 20, 1911.

1,074,691. Patented Oct. 7, 1913.

Fig. 1

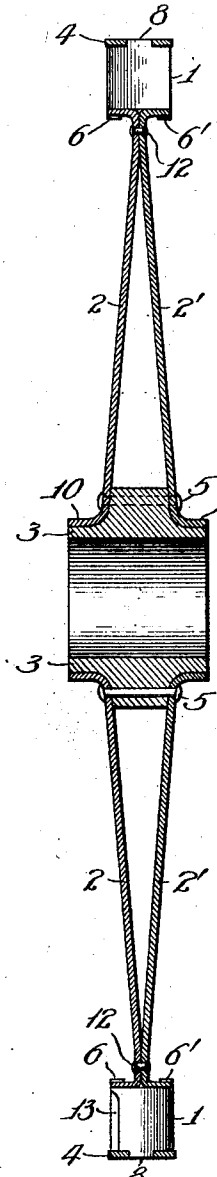


Fig. 2

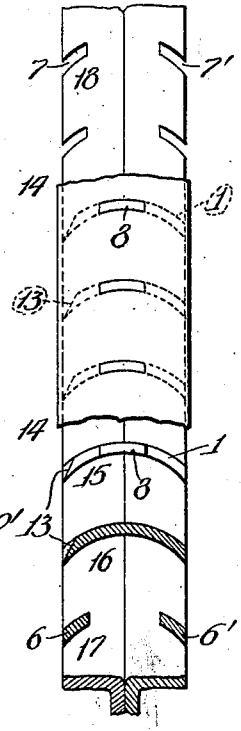


Fig. 3

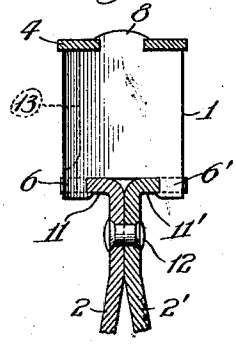
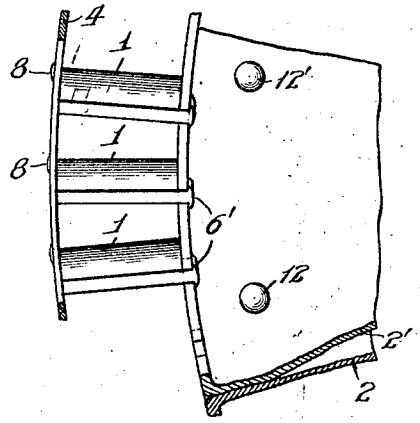


Fig. 4



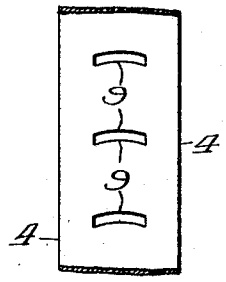


Fig. 5

Witnesses

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UNITED STATES PATENT OFFICE.

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TURBINE-WHEEL.

1,074,691. Specification of Letters Patent. Patented Oct. 7, 1913.

Application filed March 20, 1911. Serial No. 615,540.

To all whom it may concern:

Be it known that I, OTTO F. BRUMAN, citizen of the Republic of Switzerland, residing at Berlin, Germany, have invented a certain new and useful Improvement in Turbine-Wheels, of which the following is a full, clear, concise, and exact description.

My invention relates to rotary turbine wheels, and more particularly to the structure of the wheel disks and the blades or vanes, and to the manner in which said blades are attached to the turbine disks.

The object of my invention is to simplify and render more economical the manufacture of the turbine wheels and blades, and to provide a wheel and blade structure which shall be both light and strong.

The wheel of my invention comprises two disks of pressed steel fastened together. The disks are preferably made slightly dished in shape with flanges formed both on the outer periphery and on the central aperture through which the shaft of the turbine passes.

Another feature of my invention consists in making the flanges on the peripheries of the disks turn outward, thereby forming a felly or rim which may be notched to afford a method of securing the roots of the blades.

Another feature of my invention relates to the manner in which the blades are shaped. These blades are made of drawn nickel steel or other suitable material and have tangs or roots punched on them adapted to fit in the notches on the rim of the wheel.

Still another feature of the invention relates to the manner of securing the projections on the blades to the rim of the wheel and to the cover plate which surrounds the ends of the blades. The blades are inserted in place and the slightly projecting ends of the tangs are welded to the rim and to the cover plate by the autogenous method of welding. After the tangs are welded, they are preferably turned off smooth, whereby the friction and eddies, which would otherwise be set up by the projections in the surrounding steam or other fluid, are avoided.

These and other features of my invention may be more readily understood by reference to the accompanying drawings, in which,

Figure 1 is a diametrical sectional view of a portion of the wheel on a reduced scale; Fig. 2 is a fragmentary view of the periphery of the wheel, partly in section and partly broken away; Fig. 3 is a sectional view showing the blades and the method of attaching them to the wheel and the outer band; Fig. 4 is a side elevation of a portion of the wheel, showing three blades in place; and Fig. 5 is a plan view showing a portion of the band which surrounds the outer end of the blades.

The blades 1 are secured on the periphery of the wheel formed by the disks 2, 2′ which are secured to the central hub 3. Around the outer ends of the blades is secured a band 4. The disks are secured to the hub by means of bolts 5 and the blades have tangs or projections 6, 6′ which fit in slots 7, 7′ in the rim of the wheel. The blades also have projections 8 which fit in slots 9 in the outer band 4.

The wheel disks are held together and stiffened by the rivets 5 and 12 and also by the tangs 6, 6′. After the wheel disks are secured together and the blades inserted, the tangs 6, 6′, may be treated by the autogenous welding process so as to weld the tangs securely to the rim of the wheel. After the outer bands 4 are put in place, the tangs 8 may also be welded to the bands by the autogenous welding process.

When the turbine wheel disks rotate in the steam or other fluid, there is a considerable loss caused by the friction and eddies set up by projections, such as would be made, for example, if the tangs 8 were left protruding beyond the outer band. By securely welding tangs 8 and 6, 6′ to the band and rim respectively, these parts may be securely held even if the projecting portions of the tangs are turned off.

As is well known a disk of uniform thickness, rotating at a high speed about a central axis, has stresses set up in it due to the centrifugal force. These stresses are greatest at the center of the disk, and if the disk is perforated by a central hole, the stresses around the edges of this central hole are considerably greater than if the disk were unperforated. It will be noted that I preferably utilize the material of the center portion of the disk to turn out into a flange which forms a hub for the disk. In this way I utilize most efficiently the metal of the disk and avoid the increase in stress which would occur if the disk were perforated

for a large number of rivets or otherwise decreased in section to provide a joint for securing it to a separate hub.

Referring to Figs. 2 and 3, it will be noted that I preferably sharpen the edges of the blades on the entering side, that is, the one on which the fluid jets impinge, as indicated at 13. This sharpening or beveling may be done on the working portion of the blade only, leaving the metal of full section at the tang 6.

It will be understood that various modifications of my invention can be made within the scope of the appended claims.

I claim:

1. In a turbine wheel, the combination with two disks secured together at their peripheries and having flanges forming a rim on said wheel, said rim being provided with notches in the outer edges thereof, of blades having tangs on their outer edges fitting in said notches and secured therein.

2. In a turbine wheel, the combination with two disks secured together at their peripheries and having flanges forming a rim on said wheel, said rim being provided with notches on the outer edges thereof, of blades having tangs on their outer edges fitting in said notches and secured therein, said blades being beveled on the entering side along the working portion of the blade.

3. In a turbine wheel, the combination with two disks secured together at their peripheries and having oppositely extending flanges forming a rim on said wheel, said rim being provided with notches in the outer edges thereof, of blades having tangs on their outer edges fitting in said notches and welded to said rim, a band covering the ends of said blades, said band being provided with notches therein and said blades being provided with tangs fitting in said notches and welded to said band.

In witness whereof, I, hereunto subscribe my name this 19 day of January A. D., 1911.

OTTO F. BRUMAN.

Witnesses:
HENRY HASPER,
WOLDEMAR HAUPT.