Oct. 9, 1928. 1,686,840

W. E. RICHARD

TURBINE ROTOR AND METHOD OF FORMING THE SAME

Filed June 25, 1924

Fig. 2.

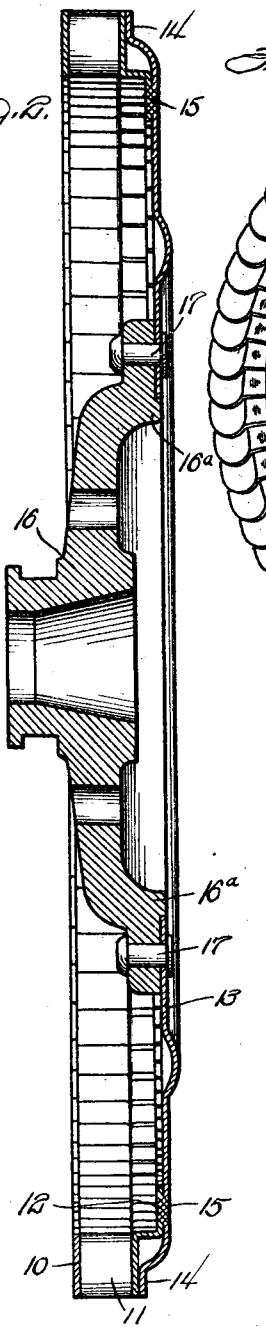


Fig. 1.

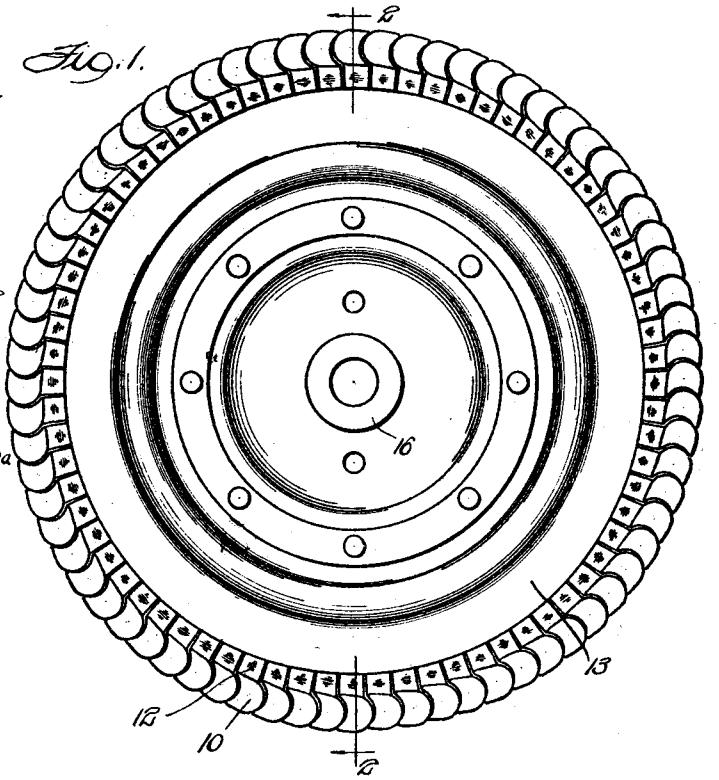
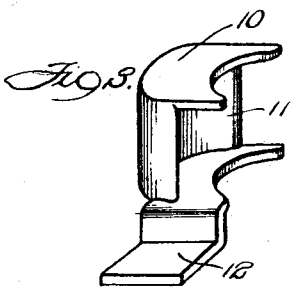


Fig. 3.



Witness:
A. A. Brand

Inventor:
William Edward Richard
By James Addington Ames & Siebold
Attys.

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UNITED STATES PATENT OFFICE.

WILLIAM EDWARD RICHARD, OF EVANSVILLE, INDIANA, ASSIGNOR TO SUNBEAM ELECTRIC MANUFACTURING COMPANY, OF EVANSVILLE, INDIANA, A CORPORATION OF INDIANA.

TURBINE ROTOR AND METHOD OF FORMING THE SAME.

Application filed June 25, 1924. Serial No. 722,222.

My invention relates to turbine wheels and it has particular relation to the provision of a wheel in which the buckets shall be secured to the body portion of the same in such manner as to eventuate an exceedingly strong structure at a minimum cost.

My improvement resides particularly in attaching buckets to a central steel disk member autogenously by welding whereby the disk and the buckets are so secured together that a substantially integrally formed wheel is obtained. Such a wheel is appreciably stronger than one in which the buckets are attached by other methods.

I am enabled to practice such a method of attaching the turbine buckets to the central member by reason of so forming the associated central disk and buckets that the stresses tending to disrupt the wheel when the same is used in a turbine are overcome. As will be pointed out hereinafter, I form the central disk in such a manner that a peculiarly formed bucket may be attached thereto to eventuate the aforesaid structure.

For a better understanding of my invention reference may be had to the accompanying drawings, in which:

Figure 1 is a plan view of a wheel embodying my invention;

Fig. 2 is an elevational sectional view taken on the line 2—2 of Fig. 1; and,

Fig. 3 is a view of one of the buckets embodied in my improved wheel and illustrating the form of said buckets.

The buckets comprise a body portion 10, having a fluid receiving portion 11. Extending from the body is a foot 12, and this entire bucket is preferably integrally formed.

The dimensions of the aforesaid bucket are such that a predetermined number thereof may be arranged circumferentially upon a steel disk 13, said disk being annular in the embodiment shown therein, although it may of course comprise the entire central portion of the wheel.

The aforesaid disk 13 is provided with a raised peripheral edge 14, whereby the lower portion of the bucket bodies rests thereupon, while the foot portions of the buckets are autogenously secured to the disk, as at 15—15, by being welded thereto.

A central hub member 16, which is preferably of cast metal, is provided with an annular centering shoulder 16ª and secured to the steel disk by rivets 17—17, and thus a desirable turbine wheel is built up. It will be noted that the provisions of a raised peripheral portion on the central disk, which is adapted to receive the body portions of the buckets when the foot portions of the latter are welded to the planar portion of the disk, eventuates a most desirable and strong turbine wheel. Moreover, the provision of the shoulder 16ª is of distinct advantage and contributes materially to the strength of the wheel.

By utilizing my method of forming a turbine wheel, as well as the wheel itself, a desirable structure is obtained in that the wheel is substantially integral because of the autogenous securing of the buckets to the central disk portion of said wheel. A marked increase in strength and resistive capacity is noted in a wheel of this character.

In turbine wheels of this character which are used in small turbo-generator sets it has always been a problem to eventuate a wheel which would not be in danger of exploding or disrupting at the high speeds which are necessarily existent in such an apparatus. It is my experience that wheels formerly used are quite subject to such explosions with the resultant danger, as well as the inevitable delay, since these turbo-generators are frequently used in locomotive headlight sets where any delay operates to tie up transportation.

Without enlarging the wheel in any respect, the employment of my invention so strengthens turbine wheels of the above character that the danger of exploding, even at excessive speeds, is appreciably minimized. This is obtained not only by the welding of the buckets but by reason of the fact that because of such welding a very strong but light central member of steel may be employed, and since steel can be employed, a lighter structure as a whole results.

Other advantages will be apparent to those skilled in the art after a perusal of the description of my invention, as will also

variations therein, and I desire, therefore, that my invention be limited only by the scope of the appended claims and by the prior art.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the U. S. is:

1. A turbine wheel comprising a central disk and individual buckets welded thereto, said buckets being integrally formed and having a weldable foot bent therefrom whereby they are individually secured to the face of said disk.

2. A turbine wheel comprising a central disk and individual buckets welded thereto, each of said buckets comprising a body portion and a foot portion extending therefrom, and said disk having an offset peripheral portion to support the body portions of said buckets when said foot portions are welded to the main planar portion of the disk.

3. A turbine wheel comprising a central disk and individual buckets welded thereto, said disk comprising an annular member having a raised peripheral edge to support the non-welded portions of said buckets, and a cast hub having an annular centering shoulder secured to said disk.

4. A turbine wheel comprising an annular steel disk provided with a peripheral portion raised above the plane thereof, a cast metal hub secured to the central portion of said disk, and individual buckets welded to said steel disk, said buckets comprising a body portion and a foot portion integrally formed therewith, said body portions resting on the peripheral raised portion of the disk and said feet being autogenously secured to the planar portion of said disk to eventuate an integral turbine wheel.

5. A turbine wheel comprising a steel disk, individual buckets secured to said disk by welding, each of said buckets comprising an off-set portion to facilitate said welding, and a cast-iron hub also secured to said disk.

6. A turbine wheel comprising a central disk and individual buckets welded thereto, said buckets being integrally formed and having a welding tang off-set from the body thereof to permit the individual securing of the buckets to the face of the disk.

In witness whereof, I have hereunto subscribed my name.

WILLIAM EDWARD RICHARD.