Nov. 10, 1925. 1,561,084

J. KOENIG

TURBINE ENGINE ROTOR AND METHOD OF MAKING THE SAME

Filed April 14, 1924

Fig. 1

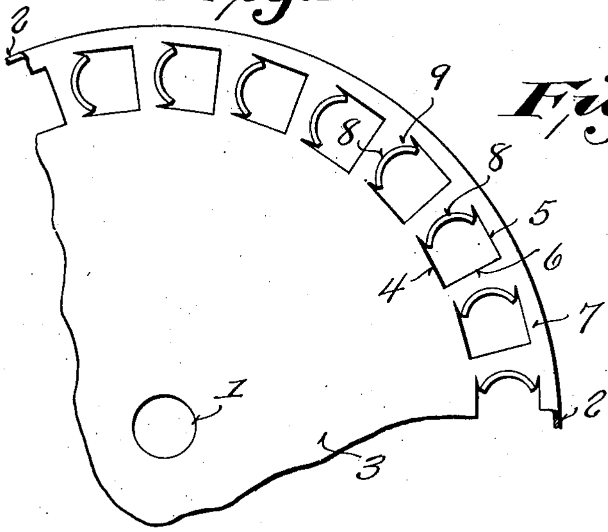


Fig. 2

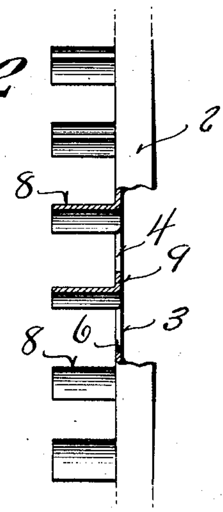


Fig. 3

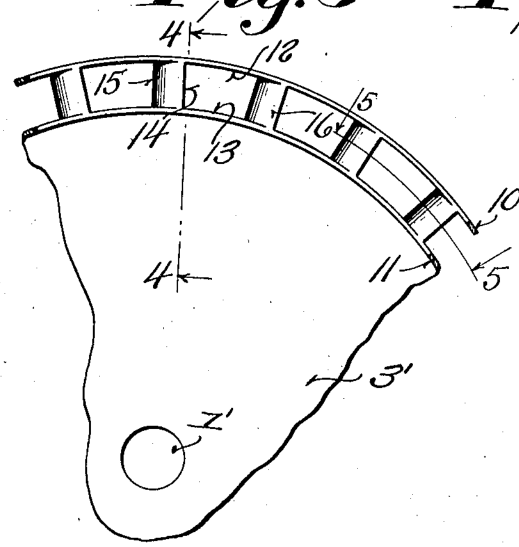


Fig. 4

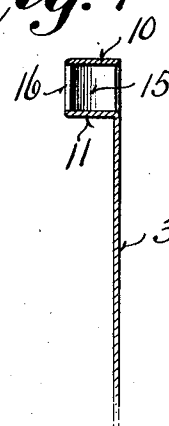
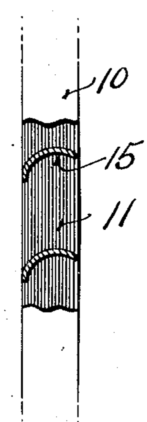


Fig. 5



W. Wood
R. E. Weber

Inventor
Joseph Koenig
By
Attorneys

Patented Nov. 10, 1925. 1,561,084

UNITED STATES PATENT OFFICE.

JOSEPH KOENIG, OF MANITOWOC, WISCONSIN.

TURBINE-ENGINE ROTOR AND METHOD OF MAKING THE SAME.

Application filed April 14, 1924. Serial No. 706,502.

To all whom it may concern:

Be it known that I, JOSEPH KOENIG, a citizen of the United States, and resident of Manitowoc, in the county of Manitowoc and State of Wisconsin, have invented certain new and useful Improvements in Turbine-Engine Rotors and Methods of Making the Same; and I do hereby declare that the following is a full, clear, and exact description thereof.

This invention relates to turbine engine rotors and to the method of making such rotors.

Rotors for small turbines, such as those employed as toys and model turbines have been previously formed from sheet metal, but it has been the customary practice to form the blades of these models by means of radial slits and, thereafter, to twist the blades, adjacent their union, with the main body of the disks. This produced undue stresses in the material adjacent the root of the blades and also resulted in a structure difficult to make and also having the great draw back of almost certain lack of alignment of successive blades.

This invention is designed to overcome the above noted defects, and objects of such invention are to provide a method of making turbine rotors which may be carried out by simple and readily performed operations, which does not produce any twisting stresses in the route of the plates or adjacent portion of the disks, and which provides a plurality of blades accurately aligned and rigidly connected with the body of the disk by substantially untwisted portions of the plate.

Further objects are to provide a turbine rotor which may be easily produced from a single disk of sheet metal, which is provided with a reinforcing annular ring exterior to the plates and integral with the body of the rotor, which is provided with a peripheral integral reinforcing flange, and which has a plurality of curved blades joined to the body of the disk by untwisted sections.

Embodiments of the invention are shown in the accompanying drawings, in which:—

Figure 1 is a fragmentary face view of one form of rotor.

Figure 2 is a side view of the structure shown in Figure 1 with parts broken away.

Figure 3 is a face view of a further form of rotor.

Figure 4 is a sectional view on the line 4—4 of Figure 3.

Figure 5 is a marginal view partly in section, and corresponding approximately to a section on the line 5—5 of Figure 3.

The form of rotor illustrated in Figures 1 and 2 will first be described.

In practicing this invention a circular disk of sheet metal is first formed. Thereafter, a central aperture 1 is punched and a peripheral flange 2 is turned outwardly from the body portion 3 of the disk. An inner and an outer slit 4 and 5, respectively, joined by a transverse slit 6 are cut through the material and adjacent the peripheral portion but spaced therefrom so as to leave an annular ring 7 surrounding the tongues formed by the slits. The tongues 8 defined by the slits 4, 5 and 6 are then bent outwardly from the plane of the disk and preferably towards the opposite side from that occupied by the flange 2. These tongues are curved, as illustrated in Figure 1, to provide the necessary bucket like structure for these rotor blades.

It is to be particularly noted that the portion of the tongue and the adjacent portion of the body of the disk, as indicated at 9 in Figure 1, is untwisted and consequently is not greatly stressed. In other words, the twisting previously found necessary adjacent the roots of the tongues or blades is wholly avoided by this invention.

The invention illustrated in Figures 3 to 5 will now be described. In this form, the body portion 3′ of the disk is correspondingly provided with a central aperture 1′ and is a circular sheet metal disk. An annual channel is struck up adjacent the peripheral portion of the disk and is defined by an outer flange 10, and an inner flange 11 spaced apart a uniform distance throughout. Tongues are then formed in the face of this annualr channel by cutting slits along the lines 12, 13 and 14. The outer and inner slits 12 and 13, it will be seen are joined by a roughly radial slit 14 and resulting tongues 10 and 15 are thus provided which are joined to the edges of the flanges 10 and 11 by means of an untwisted portion 16. Thereafter the tongues are bent inwardly between the flanges and are suitably curved.

It is to be noted that due to the curved shape of the slits 12 and 13 that the upper and lower edges of the tongues 15 snugly

fit between the outer and inner flanges 10 and 11.

It is to be understood that the curves given the blades in either form of the invention may be scientifically determined, and may be accurately formed in a simple and easy manner.

It is to be further noted that the peripheral flange 2 and the annular ring 7 of the first form as well as the flanges 10 and 11 of the second form vastly increase the stiffness and strength of the rotor without materially increasing its weight.

It will thus be seen that a rotor for a turbine engine has been provided which is of extremely simple construction, which is devoid of undesirable stresses and which may be cheaply and readily produced.

Although the invention has been described in considerable detail, it is to be understood that the invention may be variously embodied and is, therefore, to be limited only as claimed.

Further it is to be noted that although the invention has been described with particular reference to model turbine rotors and toy turbine rotors that, obviously, it may be applied to other types of turbine rotors.

I claim:

1. The method of forming turbine rotors comprising forming a circular disk from sheet metal, cutting a plurality of tongues from adjacent the marginal portions of said disk by means of slits defining the three free edges of said tongues, whereby an unbroken marginal ring is left integrally joined to the main body of said disk, bending said tongues out of the plane of such disk, and curving such tongues.

2. The method of forming turbine rotors comprising forming a circular disk from sheet metal, drawing a peripheral flange outwardly from one side of said disk, forming a plurality of regularly spaced tongues adjacent said flange by inner and outer circular slits joined at one end by a transverse slit, bending said tongues outwardly in the same direction, and curving said tongues, whereby said tongues are integrally attached to the main body of said rotor by an untwisted portion and said disk is peripherally reenforced by said flange.

3. A turbine rotor formed from an integral disk of metal having a plurality of tongues spaced inwardly from the marginal edge and joined to the body of said disk by a portion extending laterally of said disk, all of said tongues extending outwardly from the same side of said disk, and an integral continuous peripheral ring surrounding said tongues.

In testimony that I claim the foregoing I have hereunto set my hand at Manitowoc, in the county of Manitowoc and State of Wisconsin.

JOSEPH KOENIG.