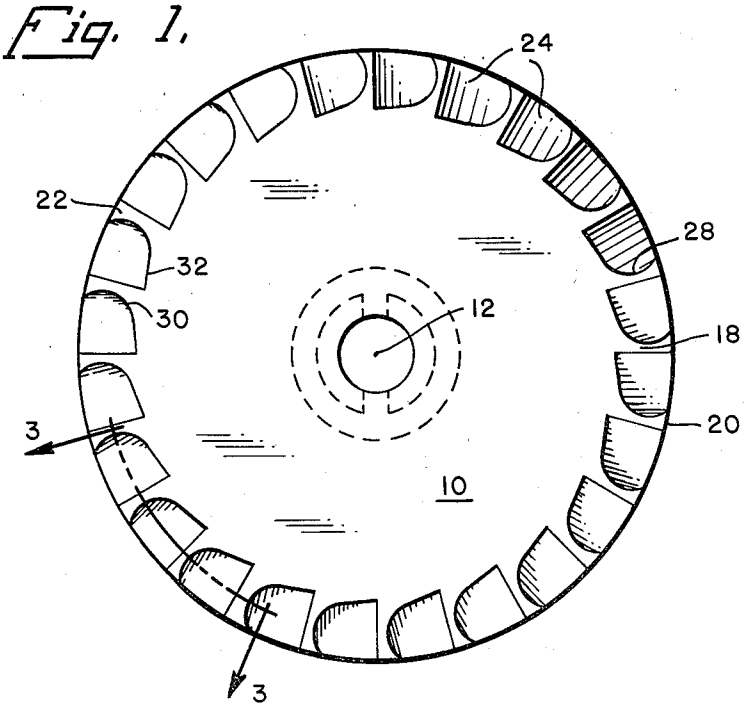
Feb. 4, 1958 W. B. McLEAN 2,822,145

TURBINE ROTOR

Filed April 29, 1954

Fig. 1.



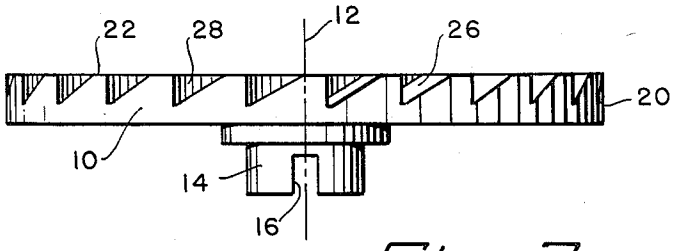


Fig. 2.

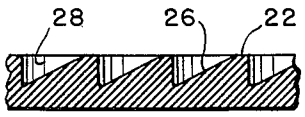


Fig 3.

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TURBINE ROTOR

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Application April 29, 1954, Serial No. 426,609

1 Claim. (Cl. 253—39)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to turbine rotors, and in particular to an improved rotor for a gas driven turbine.

The rotor comprising this invention is primarily intended for use in a gas driven turbine which powers a magnetic alternator such as is disclosed in U. S. patent application Serial No. 392,064, filed November 13, 1953, now Patent No. 2,743,412, by William B. McLean and entitled A. C. Power Supply.

Previously used turbine rotors have been very costly to manufacture because of the large amount of machining required. A high unit cost is acceptable if relatively few rotors are to be made. However, if large numbers of identical rotors are needed, it is essential that the unit cost of each rotor be minimized.

It is, therefore, an object of this invention to provide an efficient turbine rotor that is capable of being manufactured by economical mass production methods.

It is a further object of this invention to provide an efficient turbine rotor that can be mass produced by stamping or die casting.

It is a still further object of this invention to provide an efficient turbine rotor which can be easily manufactured without requiring machining.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same become better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a plan view of the turbine rotor,

Fig. 2 is a side elevation of the rotor, and

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Referring to Fig. 1 the improved rotor comprising this invention has a disc like member **10** which is adapted to be rotated about axis of rotation **12**. Member **10** may be formed from any suitable material, but in a preferred form, it is made of aluminum. Member **10** has an integral hub **14** in which notch **16** is formed. Hub **14** and notch **16** facilitate securing member **10** to a shaft which is not illustrated. Member **10** is a relatively thin cylindrical disk, the outer peripheral surface of which is designated by the reference numeral **20** in the drawing, said disk having flat top and bottom surfaces. The upper and lower surfaces of member **10** lie in planes which are substantially perpendicular to the axis of rotation **12**.

A plurality of equiangularly spaced buckets **24** are formed in the upper surface **22** of member **10**, being positioned in a ring adjacent the outer peripheral edge **20** of the disk in a rim section **18**. The bottom surface **26** of each bucket **24** is angularly disposed with respect to the

upper surface **22** of rim section **18**, as shown, and extends to the upper surface **22**. The side walls **28** of each bucket **24** are substantially parallel to the axis of rotation **12**, or side walls **28** are generated by the movement of a straight line which is substantially parallel to the axis of rotation **12**. The intersection between the side walls **28** of each bucket **24** and the upper surface **22** of rim **18** consists of an arcuate portion **30** having a substantially constant radius of curvature, and a straight portion **32** which is tangent to the arcuate portion **30**. The arcuate portion **30** extends to the outer surface **20** of rim section **18** and reverses the direction of flow of the fluid impinging on each bucket **24**.

The particular arrangement of the buckets **24** on member **10** may be varied; for example, the exhaust gases could escape toward the axis of rotation **12** if desired. Member **10** can be provided with several concentric bands of buckets so as to provide several stages of expansion if this is desired. The thickness of member **10** has been shown as being equal to the thickness of the rim portion **18** although it may be made to have a lesser thickness.

From the foregoing it is clear that the turbine rotor comprising this invention can be easily manufactured without the use of precision machining which permits the rotor to be manufactured with a low unit cost.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

A turbine rotor of the impulse type operable to be rotated about a central axis of rotation comprising a solid body having a cylindrical portion and having a circular end face perpendicular to said cylindrical portion as a right section thereof, a plurality of angularly spaced buckets formed in said end face adjacent the periphery thereof and each of said buckets comprising a substantially planar bottom surface angularly disposed to said end face and extending from a point within the confines of said body to said end face, said buckets having side walls substantially parallel to the axis of rotation of said cylindrical portion the intersection of said substantially planar bottom surface with said end face being defined by a straight radial line, the intersection of said side walls of each bucket with said end face consisting of an arcuate portion having a substantially constant radius of curvature at the area of greatest depth of said bottom surface and a straight portion tangent to said arcuate portion at the radially inward portion of said bucket and extending from said radially inward portion to the point at which said bottom surface meets said end face of said body, said arcuate portion extending to the surface of the cylindrical portion of said solid body and operable to reverse the direction of flow of fluid impinging thereon.

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