

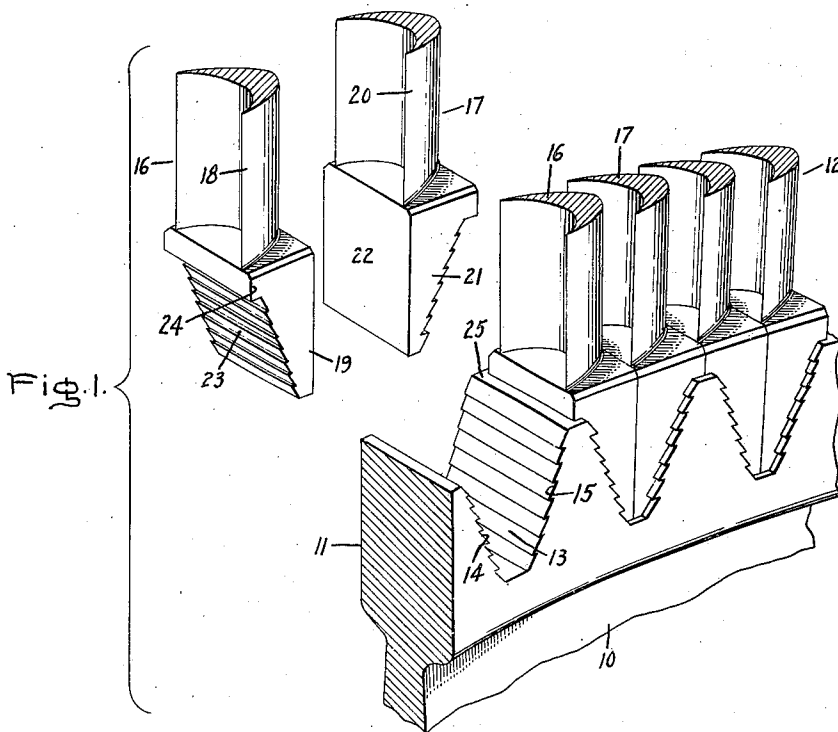
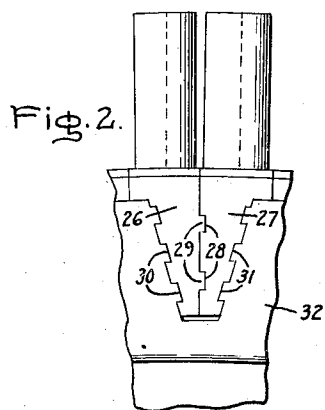
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TURBINE BUCKET WHEEL

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TURBINE BUCKET WHEEL

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5 Claims. (Cl. 253-77)

The present invention relates to turbine bucket wheels and like structures in which a plurality of buckets or like members are secured to the rim of a disk, drum or like rotatable support. More specifically, the invention relates to the type of structure in which the buckets are provided with serrated or dovetailed bases inserted and held in similarly serrated or dovetailed grooves or slots of a disk or support. The slots or grooves of the disks in such structures have to be accurately machined to form a tight connection with the machined bases of the buckets. The machining of bucket wheels with narrow slots or grooves is difficult and expensive when the parts are small and require very accurate machining to get good engagement on both sides of the dovetails.

The object of my invention is to provide an improved bucket wheel or like structure of the type above set forth whereby such structure may be readily produced at reduced manufacturing cost.

This is accomplished in accordance with my invention by the provision of a bucket wheel structure in which pairs of separate buckets are held in serrated or dovetailed grooves. In a preferred embodiment the bases of each pair of buckets constitute mirror images relative to each other. In other words, the base of one bucket of such pair is the same or substantially the same as the image produced by a mirror of the base of the other bucket of such pair.

For a better understanding of what I believe to be novel and my invention, attention is directed to the following description and the claims appended thereto in connection with the accompanying drawing.

In the drawing Fig. 1 is a perspective view partly broken away and partly exploded of an elastic fluid turbine bucket wheel embodying my invention; and Fig. 2 is a modification according to my invention.

The bucket wheel structure in Fig. 1 comprises a disk or like supporting member 10 with an outer rim 11 for supporting a plurality of buckets 12. The rim has a plurality of axial grooves or slots 13 substantially V-shaped in cross section and with a circumferential width increasing in radial direction of the disk 10. Each groove has two serrated surfaces 14 and 15 inclined in opposite direction towards the radial plane through the center of the groove. The buckets are arranged in pairs, each pair comprising a first bucket 16 and a second bucket 17. Each bucket 16 has a blade 18 and a base 19

Similarly each bucket 17 has a blade 20 and a base 21. The blades 18 and 20 of the buckets 16 and 17 of each pair are identical. The bases 19 and 21 of the buckets in accordance with my invention constitute mirror images to each other, that is, the bases 19 and 21 have the same shape but each base constitutes the image produced by a mirror of the other. Each base has a side 22 which in the assembly is located in a radial plane and a serrated or dovetailed side 23 in intermeshing relationship with one of the serrated sides 14, 15 of a groove. During assembly the pairs of buckets with their plane surfaces 22 engaging each other are inserted axially into the slots 13. An upper portion of each base near the thin edges of the blades forms a projection 24 in engagement with the outer surface 25 of the rim intermediate adjacent slots 13 and with a similar projection of an adjacent bucket.

The arrangement of Fig. 2 comprises a pair of buckets with bases 26 and 27 corresponding to the bases 19 and 21 of a pair of buckets in Fig. 1. The bases 26, 27 have adjacent surfaces engaging each other. The surface of the base 27 has radially spaced axial grooves or serrations 28 for receiving radially spaced projections 29 formed on the adjacent face of the base 27. Thus the adjacent surfaces of the bases of this pair of buckets are interlocked. The other surfaces of the bases have serrations or grooves 30 and 31 respectively in intermeshing relationship with corresponding serrations or grooves formed on a disk 32. The buckets may be prevented from axial movement by suitable known means such as peening-over portions of the rim of the disk.

Thus, with my invention I have accomplished an improved construction of turbine bucket wheels and like structures. Briefly, a bucket wheel structure according to my invention comprises a supporting member or disk with a row of separate buckets secured thereto. Each bucket has a base with dovetailed, grooved or serrated portions in intermeshing relationship with correspondingly dovetailed, grooved or serrated portions of the disk. In the arrangement illustrated the base of each bucket has a width increasing outwardly in radial direction, that is, in the direction towards the blade. In addition, the means for securely connecting the buckets to the disk may also include serrated or grooved portions of adjacent bucket bases in intermeshing relationship with each other. With this in view, a bucket wheel according to my invention comprises a disk with a group or row of buckets

which have dovetailed, grooved or serrated bases intermeshing with each other and with similar portions of the bucket wheel disk. From another viewpoint, a structure according to my invention comprises a plurality of pairs of blades with pairs of bases attached to the ends of the blades. Opposite surfaces of the bases are inclined in opposite directions with respect to adjacent surfaces thereof. The cross-sectional area of each base increases towards the end of the blade to which it is attached. A grooved supporting member is secured to opposite surfaces of each pair of bases. With this arrangement the center-lines of gravity of the buckets pass substantially through the center portions of the supporting surfaces and with the bucket bases increasing in width towards the blades the latter exert only small bending forces on the bases, thus assuring a rigid construction which may be safely operated at comparatively high load.

Having described the method of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, I desire to have it understood that the apparatus shown is only illustrative and that the invention may 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 bucket wheel comprising a disk having a rim with a plurality of circumferentially spaced substantially V-shaped axial slots, each slot having a circumferential width increasing outwardly in radial direction and side walls with axial serrations, a plurality of pairs of separate buckets secured to the rim, the buckets of each pair having bases with substantially plane surfaces engaging each other and serrated surfaces in intermeshing relationship with the serrations of a slot.

2. In a turbine, a structure comprising a supporting member having V-shaped slots with serrations in both sides thereof, and a plurality

of pairs of buckets having blades and separate V-shaped bases with adjacent surfaces of the bases engaging each other and opposite serrated surfaces meshing with the serrated sides of the slots.

3. In a turbine, a structure comprising a supporting member having V-shaped slots with serrations in both sides thereof, and pairs of separate buckets each having a blade and a base increasing in width towards the blade with adjacent surfaces of the bases of each pair engaging each other, one of the adjacent surfaces having a groove and the other of the adjacent surfaces having a projection filling the groove, the opposite surfaces of the bases of each pair being inclined in opposite directions towards the adjacent surfaces and having serrations intermeshing with the serrations of the slots.

4. A bucket wheel structure comprising a supporting member having a rim with a plurality of axial grooved slots, each slot having a circumferential width increasing outwardly in radial direction, and a group of buckets each having a base with grooved sides, the grooved bases of each group of buckets filling one of the slots and being arranged in intermeshing relationship with each other and with the grooved slot.

5. In a turbine, a structure comprising a plurality of pairs of blades, pairs of separate bases attached to the ends of the pairs of blades, adjacent surfaces of the bases of each pair engaging each other and opposite surfaces of each pair of bases being inclined in opposite direction with respect to adjacent surfaces thereof, each pair of bases having a cross-sectional area increasing towards the ends of the blades to which they are attached, a support having a plurality of grooved portions, both bases of each pair of bases being disposed in and substantially filling the groove of a grooved portion, and means locking opposite surfaces of each pair of bases to opposite surfaces of such groove.

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