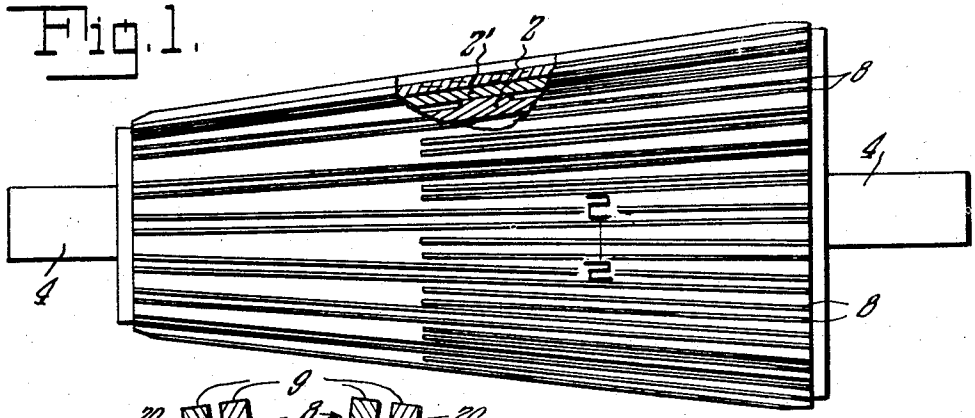
Dec. 2, 1958 D. E. JONES 2,862,424

BLADED BODIES

Filed Aug. 12, 1955

Fig. 1.



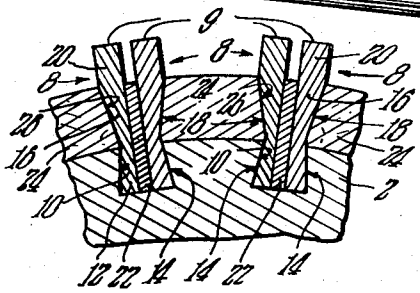


Fig. 2.

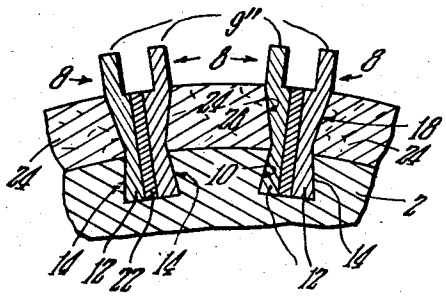


Fig. 3.

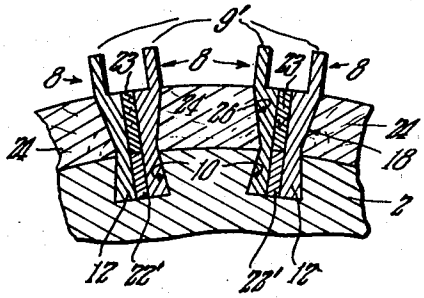


Fig. 4.

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United States Patent Office 2,862,424 Patented Dec. 2, 1958

2,862,424

BLADED BODIES

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Application August 12, 1955, Serial No. 528,014

4 Claims. (Cl. 92—27)

This invention relates to improvements in rotatable longitudinally bladed structures.

The principal objects of the invention are directed to the provision of a rotatable body for a Jordan engine, beater or the like including a novel arrangement of longitudinally extending blades and characterized by novel means for securing the blades in said body.

According to the invention a rotatable body is provided with elongated substantially radial blade grooves in which elongated dual blades are secured thereby making it possible to provide the desired maximum number of blades in a given circumference of body. The blades of the pairs are so formed and secured in the grooves in such a manner that the blades of the pairs are duplicates.

As one novel feature of the invention opposite faces of the grooves and outer faces of the blades of the pairs are complemental and are so formed that when forced into contiguous relationship the blades are held against radial displacement from the grooves.

As another feature of the invention the outer faces of the blades of the pairs and faces of the grooves are held in contiguous relation by keys between adjacent inner faces of the blades. Said keys are relatively thin elongated members having flat parallel side faces which are pressed or driven radially between the blades of the pairs thereof in the grooves. The inner faces of the blades of the pairs are complemental to the faces of keys.

The keys having flat parallel opposite side faces are simple in form and adjacent inner sides of the blades being complemental thereto the construction does not involve keys and blades having complicated interfitting portions. Such not only makes for economical construction but facilitates inserting the keys radially which is an advantage over prior constructions where keys or wedges are of a special shape and are driven longitudinally relative to the grooves and blades.

Also according to the invention where desired, plural keys may be inserted radially between the blades of the pairs in end to end relation as distinguished from a single key. In some cases the keys may be of such a height that the upper longitudinal edges thereof are disposed substantially in the plane of the periphery of the body.

The keys having flat parallel sides are relatively thin transversely which enables a greater number of grooves and blades to be employed circumferentially and said keys may be formed from relatively soft metal such as copper or zinc or from such material as vulcanized fiber. Such materials have advantages over wood in that they are not prone to crack, split and otherwise rupture in assembly or in the operation of the bladed body.

Vulcanized fiber has been found to be very desirable for the keys for the reason they may be driven very tightly on assembly of the blades in the grooves. Such keys are adapted to absorb water and therefore swell when wet, so that their function is to increase the wedging action between the blades and they will not become loose in operation of the structure.

Another advantage of the keys of the construction is

that when assembling blades in the grooves of bodies which may have become corroded it is an easy matter to machine the flat parallel side faces of the keys to compensate for increases in heights and transverse widths of grooves. The machining at assembly of keys or wedges which are of special form is difficult and often times impossible in order to obtain the desired fit. In applicant's case any necessary machining is a simple matter.

According to further novel features of the invention it is possible to provide various widths of longitudinal cutting or working faces of the blades without changing the body or width of the grooves. That is the full width of the blades of the pairs may be employed or the outer longitudinal portions may be machined or formed to provide a minimum width or an intermediate width of working face. It may be desirable to obtain a brushing or hydrating action where the blades at their cutting edges are relatively wider than would the case for a cutting action. Thus by forming the working edges to provide different widths it is possible to obtain different functions and different results.

The novel features of the invention will be described in connection with the conical plug for a Jordan engine but it will be understood that the features are adapted as well for use with the roll for a beating engine.

All of the above objects I accomplish by means of such structure and relative arrangements of parts thereof, as will fully appear by a perusal of the description below and by various specific features which will be hereinafter set forth.

To the above cited and other ends and with the foregoing and various other novel features and advantages and other objects of my invention as will become more readily apparent as the description proceeds, my invention consists in certain novel features of construction and in the combination and arrangement of parts as will be hereinafter more particularly pointed out in the claims hereunto annexed and more fully described and referred to in connection with the accompanying drawings wherein:

Fig. 1 is a side elevational view, more or less diagrammatic, of a bladed body or plug for a Jordan engine embodying the novel features of the invention;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1 and;

Figs. 3 and 4 are views similar to Fig. 2 showing modified forms of the invention.

Referring to the drawings in detail the novel features of the invention will be described.

For purposes of disclosure a rotatable bladed structure is shown in Fig. 1 in the form of a conical plug for a Jordan engine. Said structure includes a body 2 of conical form having a shaft 4.

In the drawings there is a sleeve 2' on the body 2 and pairs of blades 8 are secured in the sleeve or they may be secured directly in the body. It will be understood that in describing the construction of the invention that body means the sleeve as well as the body itself as either may be provided with blade grooves.

As shown in the drawings the grooves in the body for the pairs of blades 8 have flat opposite blade side faces 10 which relatively converge radially outwardly from the bottom of the grooves.

Lower portions 12 of the blades of the pairs thereof have outer groove faces 14 which are complemental to the opposite side faces 10 of the grooves, as shown. Upper portions 16 of the blades 8 of the pairs thereof have outer wedge faces 18 which relatively diverge from substantially adjacent the periphery of the body to the uppermost working portions 20 of the blades, as shown. Inner adjacent key faces of the blades of the pairs, thereof are flat and plain and relatively parallel, as shown.

Locking keys 22 have flat uninterrupted outer blade faces which are parallel and complemental to the adjacent key faces of the blades, as shown.

Keys 22 may be formed from relatively soft metal such as copper or zinc although keys formed from vulcanized fiber are very desirable. Such material has the ability to swell when wet and may be readily and easily machined when necessary in the assembly of the components in order to fit tightly between the blades.

In assembly the keys 22 are driven or pressed radially inwardly and as stated are formed to fit tightly between the blades. As the keys become wet they swell and enhance the wedging force to lock the complemental faces of the blades and grooves so that the blades are held against radial displacement from the grooves.

A key may extend in all cases the length of the blades and grooves. Or there may be plural keys in end to end relation if desired in connection with the assembly of certain blades and keys.

Elongated wedges 24 are provided which have opposite side faces 26 which are complemental to adjacent wedge faces 18 of adjacent blades of the pairs thereof. Said wedges are usually formed from wood and are driven endwise of the blades. Due to the arrangement of the side faces of the wedges with relation to the blades said wedges are held against displacement radially outwardly.

It may be desirable to employ wood keys such as 23 over the keys 22' as shown in Fig. 4 which as with the locking keys are driven or pressed radially between the blades of the pairs.

The longitudinal working edges of the blades 8 may be of any desired transverse width without the necessity of any changes in the general construction.

As an example the width of the working faces 9 of the blades in Fig. 2 are equal to the thickness of the blades for a particular action such as brushing or hydrating action on fibers.

Or as in Fig. 4 the working faces 9' of the blades are narrower than in Fig. 2 with a wider space between the blades so that each blade functions with a cutting action on paper making fibrous material. Or it may be desirable for a different action to provide an intermediate width of working edges as 9'' in Fig. 3.

The working portions of the blades may be machined to provide the desired width of working edges without in any way necessitating changes in the grooves of the body, wedges or otherwise in the blades.

The converging and diverging faces of the blades and complemental faces of the grooves and wedges or filler material are such that when forced into contiguous relation by the flat parallel sided keys, the blades and wedges are locked against displacement. In lieu of the said faces of the grooves, blades and wedges shown, said faces may be otherwise formed to obviate displacement when forced into contiguous relation by the keys. That is while the form of faces shown may be said to provide restrictions against radial displacement of the blades and wedges, restrictions may be formed in other ways.

It will be observed that the blades are similar in form and have inner flat key faces while the keys have flat parallel side faces. In this way specially formed engageable faces of the blades and keys are obviated not only to facilitate easy and ready assembly but when necessary at assembly the keys may be readily and easily machined for fitting purposes.

The keys are readily pressed or driven radially between the blades of the pairs thereof. The keys may be continuous or to facilitate assembly or for other reasons keys in end to end relation may be driven between the blades.

Said keys when formed from vulcanized fiber or other material having the required strength and the ability to swell when wet are fitted tightly for initial assembly and swelling. By becoming wet locking of the bars in the grooves is greatly enhanced.

The invention may be embodied in other specific forms without departing from the essential characteristics thereof: Hence, the present embodiments are therefore to be considered in all respects merely as being illustrative and not as being restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all modifications and variations as fall within the meaning and purview and range of equivalency of the appended claims are therefore intended to be embraced therein.

What it is desired to claim and secure by Letters Patent of the United States is:

1. A bladed structure comprising a body having a series of grooves disposed side by side in spaced relationship, the side walls of each groove diverging toward the bottom of the groove, a pair of blades disposed in each groove with a space therebetween and with their outer portions projecting from the groove, the inner opposing faces of the blades being approximately parallel, key means between the blades of each pair, each key means having approximately uniform thickness and substantially bridging the space between the blades, a portion of each key means being disposed outside the groove, the thickness of said blades increasing both inwardly and outwardly from the region of the mouth of the groove so that the outer faces of the pair of blades diverge from each other inwardly inside the groove and outwardly outside the groove, the divergence inside the groove approximating that of the side walls of the groove and the divergence outside the groove being sufficient to make the outer faces of the projecting portions of succeeding pairs of blades converge outwardly, and a wedge fitting between the converging faces of the projecting portions of succeeding pairs of blades.

2. A bladed structure according to claim 1 further characterized in that said key means are made of liquid absorbent material which swells as it absorbs liquid.

3. A bladed structure according to claim 1 further characterized in that said wedges are made of liquid absorbent material which swells as it absorbs liquid.

4. A bladed structure according to claim 1 further characterized in that said key means comprises two keys, one disposed in the groove and one disposed outside the groove, the outside key being formed of material which swells as it absorbs liquid.

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