

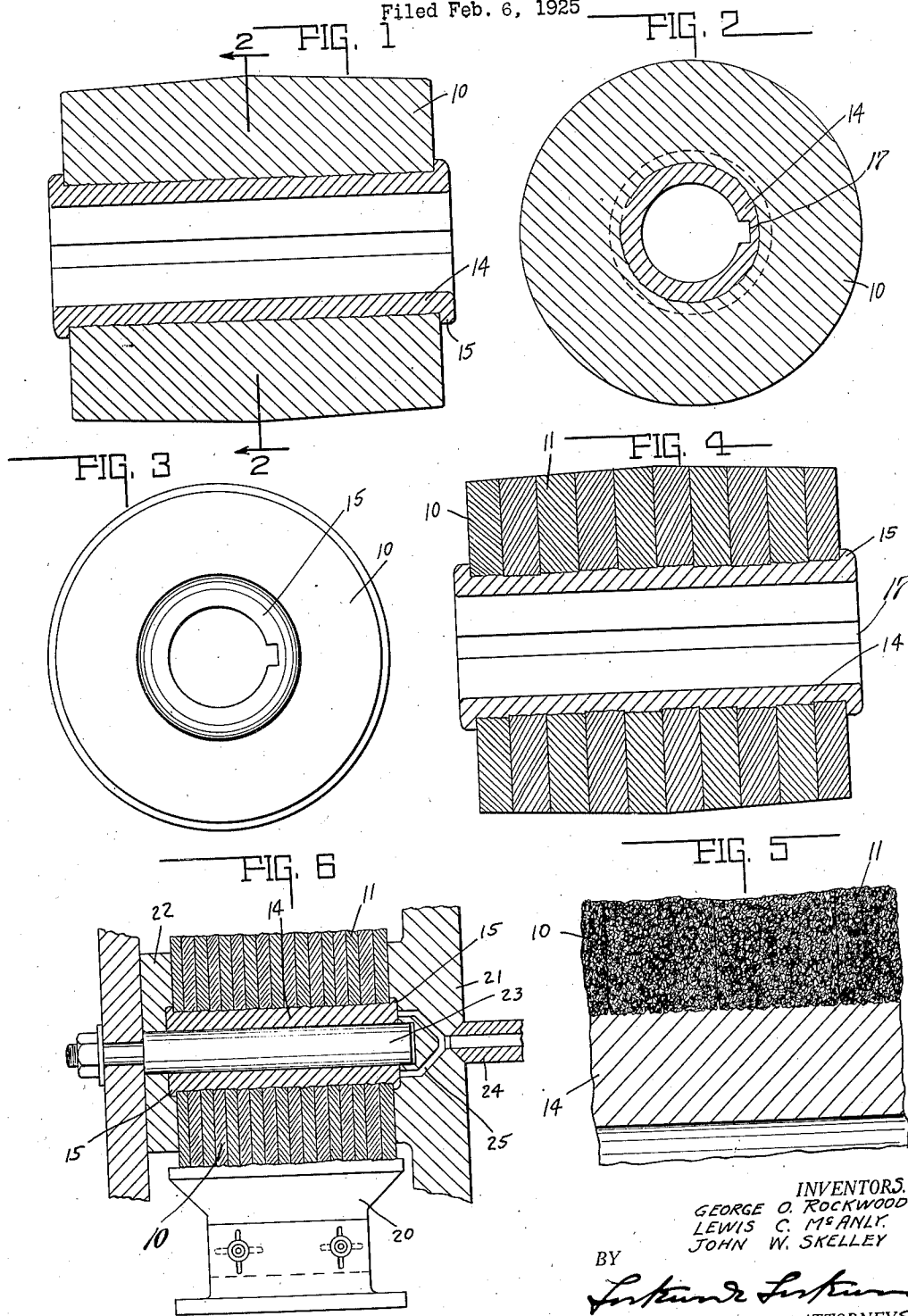
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G. O. ROCKWOOD ET AL

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PULLEY

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UNITED STATES PATENT OFFICE.

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PULLEY.

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To all whom it may concern:

Be it known that we, GEORGE O. ROCKWOOD, LOUIS C. McANLY, and JOHN W. SKELLEY, citizens of the United States, and residents of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Pulley; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings in which like numerals refer to like parts.

This invention relates to an article, such as a paper pulley formed of a plurality of fibre rings or disks, securely bound together and held in compressed position with respect to each other by an internal metal core, hub or bearing member, and is a continuation in part of application Serial No. 713,462 filed May 15, 1924. The invention likewise applies to similar structures of wood, paper, or other fibrous material, and to such articles as handles, casters or any similar device having an annular outer shell, with a core, hub or bearing member extending centrally therethrough.

The principal object of the invention is to provide articles of this character formed of paper, wood, fibre or such a body as having a porous or yielding fibre surface with a metallic core, hub or bearing member, which will unite or bond therewith and form substantially an integral part thereof. Heretofore, it has been customary to form the shell and inner metallic member separately and then assemble them, locking them together by means of rods, bolts, screws or the like, or putting them through a suitable operation for providing end locking flanges by rolling or stamping the same. Such cores or bearing members may also be formed by the usual casting of metal therein under atmospheric pressure, but there would be no uniting or bonding of the metal with the fibre under atmospheric conditions and the two materials would have a separate and defined engaging surface and be capable of readily parting from each other.

By means of this invention, the internal member, which may be a core, hub or bearing member, formed of metal, is die cast under pressure into the shell so as to conform, not only to any irregularities therein, but to be forced under high pressure against the surface so as to bite into the fibre and force

any resilient particles of the surface inwardly so as to weave itself into the fibrous surface and accordingly unite and bond therewith so that no other means is necessary for securing the two parts together. This causes them to be for all practical purposes integral in their nature, so that they cannot thereafter be separated.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings, Figure 1 is a central vertical section through a paper pulley, showing one type of die cast metallic member formed therein. Fig. 2 is a section taken on the line 2—2 of Fig. 1. Fig. 3 is an end elevation of the pulley shown in Fig. 1. Fig. 4 is the same as Fig. 1 showing a modified form having irregularities provided in the inner surface of the shell. Fig. 5 is an enlarged view of a portion of the shell and core illustrating the binding therebetween. Fig. 6 is an illustration of a method for die casting the metal into the core under pressure.

In the drawings there is shown in Figs. 1 and 4 a pulley structure having a shell 10 which may be formed of a solid fibrous material or of a plurality of fibre disks, rings or laminations 11, said laminations being pressed together under heavy pressure so as to form a substantially unitary shell with the outer periphery thereof dressed down to provide a relatively smooth outer surface of the desired dimensions. The inner bore of the shell into which the core is to be cast may either be reamed out or formed by reason of employing rings. The bore may be relatively smooth excepting for the natural roughness of the fibrous surface, such as shown in Figs. 1 and 5, or may be provided with irregularities, as shown in the modified form illustrated by Fig. 4. However, it is preferable that the bore be relatively smooth as first mentioned.

The shell 10 is provided with a die cast metallic core, hub or bearing member 14, which instead of being formed or cast in the usual manner, is die cast under high pressure directly within the shell so that the metal will not only conform to any irregularities in the bore, but will be forced into any crevices or cause any resilient or

yielding surface fibres to give way and permit the entry of the metal therein, in addition to becoming embedded with the fibres. This will cause the metal of the member 14 to be united or bonded with the fibre of the shell so as to be in effect, and for all practical purposes, integral therewith and inseparable.

It will be observed that by reason of this invention, no other means of uniting the parts would be required, although if desired, for purposes of finishing or the like, the outwardly extending flanges 15 may be formed at the same time by providing suitable dies or forms at the end of the shell when the member 14 is cast therein. While the flanges 15 are not essential to holding the member 14 united and bonded within the shell, or the parts of the shell secured together thereby, they may be desirable for other purposes and will also aid in maintaining the parts of the shell in compressed relation. Depending upon the use to which the article is to be put, a keyway 17 may also be formed longitudinally of the inner surface of the member 14 in the die casting operation.

As shown in the modified form illustrated by Fig. 4, the shell may be made up of a plurality of rings or laminations having a defined irregularity of bore occasioned by a variation in the inner diameter of the rings, or their being slightly offset with respect to each other. In this instance, the metal will not only have a uniting and bonding effect with the fibre surface of the respective rings, but will also cause an interlocking to take place. Thus such defined irregularities in the surface coact with the bonding effect.

While the invention has been above described as pertaining to a pulley it is obvious that it is applicable to other articles such as rollers, casters, handles and the like. Likewise the shell could be formed of a single piece or a plurality of discs or rings, made from fibre, wood or similar material. The same objects are accomplished by the invention in the several forms shown herein, or in other ways not described, wherein the metallic inner-member is die cast into the outer shell under high pressure so that it may conform to any groove, recess, irregularities or resiliency of the surface for uniting or bonding metal and fibre, as well as providing keys, keyways, or flanges formed thereon during the casting operation. This eliminates various parts and devices that have heretofore been used for interlocking the parts, as well as eliminating the necessity and expense of assembling the shell and inner metallic member and afterwards interlocking the same or operating on one or both of them for forming end flanges, keyways and the like. How-

ever, the most important function of the invention lies in the uniting or bonding of fibre, such as paper, with metal by casting under high pressure.

In applying this invention to so-called paper pulleys, its merits and advantages are particularly apparent. In addition to the advantages in construction and bonding, as above set forth, a power pulley must transmit the power from the shell to the metal bearing member or vice versa. In order that one will not turn with respect to the other in power transmission, they must be securely locked together. This is usually accomplished by a keyway, which may be done away with by reason of this invention which has material advantages over such structures. It permits of a comparatively thin layer of fibre surrounding the metal bearing or hub which has not been permitted heretofore by the usual structures. This increases the use to which the paper or fibre pulleys may be put by permitting of a much smaller pulley to be made without reducing the bore of the hub or bearing member. This is true by reason of the fact that the metal and the fibre are for practical purposes integral, and the fibre need be no thicker than sufficient to barely cover the metal, which will hold it firmly in place and prevent its breaking off.

Fig. 6 illustrates one method of die casting the metal into the hub under high pressure for causing it to unite and bond therewith. The shell 10 is mounted on a support 20 and clamped in place thereon between the end plates 21 and 22. Supported by said end plates and extending through the bore of the shell so as to be properly spaced from the inner surface thereof, there is a core 23 about which the metal is adapted to be cast. The metal is forced from a suitable die casting machine through a nozzle 24 and through the orifices 25 into the space between the core and the shell, the pressure under which the metal is so forced into the shell being sufficient to cause the same to bite into the fibrous or yielding portions of the surface thereof for uniting and bonding therewith.

The invention claimed is:

1. An article of the character described, including a fibre body, and a metal hub or bearing member cast therein so that the surface metal of said member will unite and bond with the adjacent surface of the fibre.
2. An article of the character described, including a fibre body portion having an internal bore, and a metal hub or bearing member cast in said bore under pressure, whereby the metal thereof will be forced into and bonded with the fibre.
3. A power transmitting pulley having a fibre body portion, and a metal hub portion, one of said portions being adapted to trans-

mit power to the other portion, said hub portion being cast in said body portion under pressure so as to unite and bond with the fibre thereof, whereby power may be transmitted therebetween.

4. An article of the character described including a fibre pulley formed of a plurality of associated fibre rings having an internal bore extending therethrough, and a bearing member die cast in said bore and in engagement with the inner periphery of each individual ring, whereby said rings and bearing member will be interlocked with each other.

5. An article of the character described, including a shell formed of a plurality of associated rings, the inner surfaces of said rings being arranged to provide a bore extending through said shell having an irregular surface, and a metallic member cast in said bore so as to conform to the irregularities of said surface and lock said rings in position with respect to each other and said member.

6. A pulley including a plurality of fibre rings compressed against each other to form a pulley shell, said rings being so arranged as to provide a bore extending through said pulley shell, and a hub member cast in said bore so as to conform to the surface thereof and interlock said rings with respect to each other and said hub.

7. A fibre pulley including a plurality of fibre rings positioned adjacent each other and compressed together for forming the outer shell of the pulley, said combined

rings having a central bore extending longitudinally of the pulley shell, and a bearing member cast in said bore so that the adjacent surfaces of said bearing member and the inner surfaces of said rings will engage each other so that any irregularities in said bore will cause said rings and bearing member to interlock, said bearing member having a central bore cast therein and extending longitudinally therethrough, and outwardly extending flanges formed on each end of said bearing member for engaging the end surfaces of the shell.

8. A fibre pulley including a plurality of fibre rings positioned adjacent each other and compressed together for forming an outer shell and having a central bore extending longitudinally therethrough provided with an irregular surface, and a hub member cast in said bore so that the adjacent surfaces of said member and shell will engage each other and cause the metal of said member to interlock with the surface of said shell, said hub having a central bore cast therein and extending longitudinally therethrough provided with a keyway and outwardly extending flanges formed on each end of said hub for engaging the end surfaces of said shell substantially as and for the purpose described.

In witness whereof we have hereunto affixed our signatures.

GEORGE O. ROCKWOOD.
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