April 28, 1925. 1,535,134

G. O. ROCKWOOD ET AL.

PROCESS OF UNITING METALLIC AND FIBROUS BODIES

Filed May 15, 1924

FIG. 1

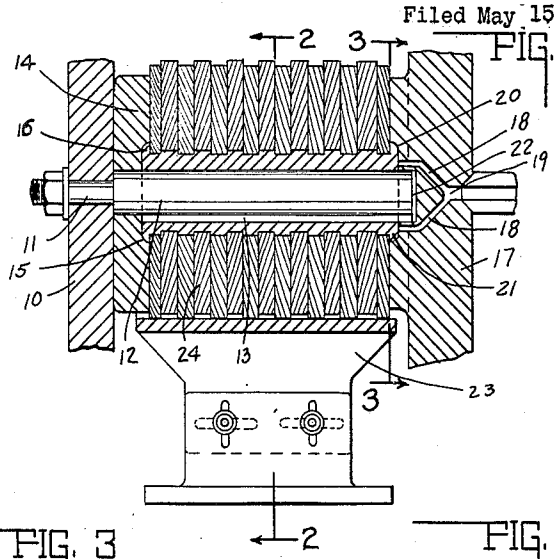


FIG. 2

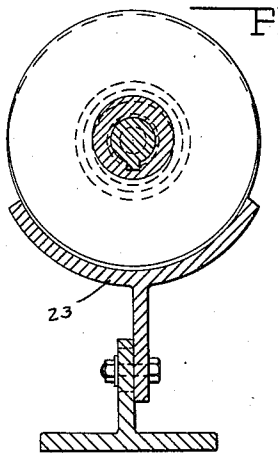


FIG. 3

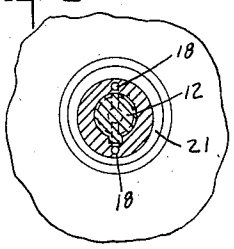


FIG. 4

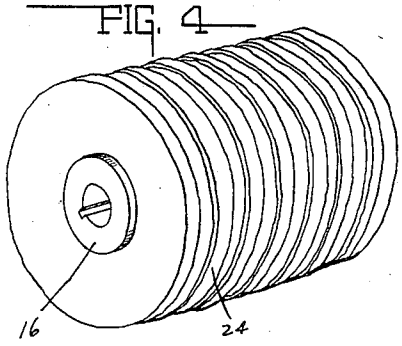


FIG. 5

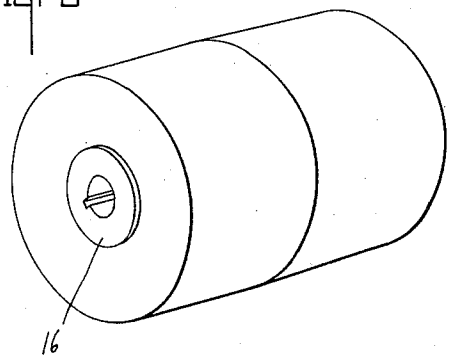
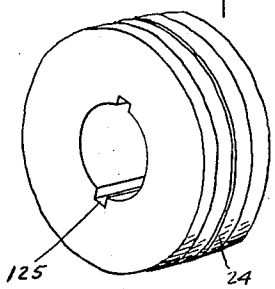


FIG. 6



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UNITED STATES PATENT OFFICE.

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PROCESS OF UNITING METALLIC AND FIBROUS BODIES.

Application filed May 15, 1924. Serial No. 713,463.

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 Process of Uniting Metallic and Fibrous Bodies; 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 a process of uniting metallic and fibrous bodies, such as occasioned by the manufacture of pulleys or similar articles wherein it is desired to provide a metallic hub or bearing for securing the parts together and supporting them about a spindle or shaft.

Whereas heretofore it has been the practice to first form a metallic hub or bearing member and thereafter mount the same in connection with the outer shell to be supported, it is the object of this invention to form the metallic hub or bearing member by die casting the metal in the outer shell, the latter providing the mold therefor.

By this process or method of die casting the hub or bearing member directly in the shell as a mold, many operations of assembling, finishing, and attaching the parts are eliminated, thereby greatly reducing the cost of manufacturing articles of this character.

From the following description of the invention, it will be observed that in die casting the metallic hub or bearing member directly in the outer shell so that the metal is forced into the fibrous surface under sufficient pressure to penetrate into the pores or irregularities therein, the said hub or metallic portion will be securely united or bonded with the shell or fibrous material and may also be formed with flanged ends and a keyway if desired so that upon the casting being removed the product will be finished excepting for the usual buffing, etc.

Another advantage of the invention applies particularly to the manufacture of paper pulleys wherein the pulley shell is formed of a plurality of annular discs or rings which are clamped together. By reason of the die casting process the paper rings forming the outer shell of the pulley will be tightly secured together and held in fixed relation with each other to form a unitary structure, by reason of the metal being forced into and solidifying in the fibrous surfaces of the rings as well as being cast about the ends of the pulley for further maintaining them in clamping position. Furthermore the formation of the metal in the fibrous surfaces of the rings will bind the rings and shell to the hub or bearing member so as to prevent any relative movement therebetween either longitudinally or annularly.

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

Fig. 1 shows a plurality of paper pulley forming rings mounted in position to receive the die casting. Fig. 2 is a section taken on the line 2—2 of Fig. 1. Fig. 3 is a section taken on line 3—3 of Fig. 1. Fig. 4 is a perspective view of the pulley after the die casting operation. Fig. 5 is a perspective view of the pulley after being turned down and dressed. Fig. 6 is a modified form showing a perspective view of a plurality of paper pulley forming discs clamped together and grooved on the inner periphery for providing an innerlocking keyway with the metal to be die cast therein.

In the drawing there is shown a portion of a die casting machine for the purpose of illustrating the manner of die casting a metallic hub or bearing member in a pulley shell which acts as a mold therefor. Mounted on the frame of the machine there is a back plate 10 which is held rigidly in adjustable position by suitable means, said plate being provided with a plurality of holes, through which the bolt 11 may extend for securing in position a laterally projecting core 12.

The core 12 is of the diameter desired for the bore of the metallic hub or bearing member and likewise of the desired length thereof. Projecting from the surface of the core 12 and extending longitudinally thereon

there is provided a key 13 of suitable dimensions for forming the key receiving groove in the inner-surface of the hub.. On the end of the core adjacent to the bracket 10 there is a head 14 of substantially greater diameter than the hub or bearing member, the surface of said head adjacent the core 12 being provided with a recess 15 for forming one of the end flanges 16 on the hub.

Opposite the bracket 10 and spaced therefrom there is mounted a movable metal discharge nozzle plate 17 which embodies the metal discharge orifices 18 therein. Said plate is movably mounted on the frame of the machine and actuated in the customary manner which need not be described herein. The orifices 18 are opened and closed by a suitable valve 19 so that the molten metal contained within the plate 17 may be discharged through the orifices 18 when the valve 19 is turned to open position. The plate 17 is provided with an annular recess 20 for forming on the casting a flange 21 adapted to embrace the opposite end of the pulley from the flange 16. The said plate is further provided with a centering recess 22 for receiving the free end of the core 12.

A suitable supporting rack 23 which is adjustably mounted with respect to the core 12, said rack being arranged to receive a plurality of annular paper discs or rings 24 for forming the shell of the pulley. The annular surface of said discs or rings are of appreciably larger diameter than the core 12 and the rack is so arranged as to maintain them in concentric spaced relation to said core. The variation in the inner diameter of the rings or discs 24, or their relative position in respect to each other in mounting the same over the core, gives an uneven interior surface surrounding said core, which as hereinafter explained, will cause them to be more firmly formed together or locked with the hub or bearing member to be formed therein.

After suitable rings or discs 24 have been placed in position over the core 12, the clamping plate 17 is brought into engagement therewith so as to firmly clamp them together and force them against the head 14 and back plate 20 under high pressure. Upon the plate 17 being brought into such clamping position, the valve 19 is opened and suitable die casting metal is forced under high pressure through the orifices 18 into the space between the shell and the core 12. As shown in Fig. 1 it will be observed that the metal will be forced into the recess 15 for forming the end flange 16. It will also be forced into any irregularities or pores in the fibrous surface of the shell so as to penetrate into the fibrous pores as well as to form interlocking recesses and projections therein. The metal surrounds the key 12 so that a suitable keyway will be formed therein and will finally be forced into the recess 20 for forming the flange 21. Upon the discharge of metal being completed and the valve 19 closed, and the metal having been sufficiently cooled to become hard and set, the clamping plate 17 is moved away and the completed structure as shown in Fig. 4 is removed from the core 12. Thereafter the paper pulley shell is dressed down to the desired diameter and shape, and the end flanges 21 are buffed which completes all operations with respect to the pulley as shown in Fig. 5.

In event it is desired to employ a key in addition to the uniting and bonding of the materials, the shell 24 as shown in the modified form illustrated by Fig. 6 may be set up and provided in any suitable manner with the keyway 125, after which it may be placed on the supporting rack as above described, the metal being caused to flow into the keyway 125 for providing the interlocking key between the shell and hub or bearing member.

It will be understood that whereas the above process or method of manufacturing fibre pulleys has been described in detail the same method or principle may be employed with respect to other structures whereby it is desired to unite and bond fibre and metal such as fibre rollers, casters, handles, and the like, without departing from this invention.

The invention claimed is:

1. The process of uniting metallic and fibrous bodies consisting of forcing molten metal into the fibrous body under sufficient pressure to penetrate into the pores of said fibrous body and form a bond therewith.

2. The process of uniting a plurality of fibrous laminations, consisting of holding said laminations together so as to provide a laminated fibrous body, and casting metal under pressure in said body as a form, so that the metal will unite with the fibrous laminations and bond them together therewith.

3. The process of producing an article of manufacture having a hollow body portion of fiber and a metallic inner facing, consisting of die-casting the metal under pressure into the hollow fiber body portion so as to cause the metal to penetrate the fibrous surface thereof and unite and bond therewith.

4. The process of producing an article of manufacture having a hollow body portion of fiber, consisting in securing together a plurality of fiber discs, forming a bore or opening extending therethrough, and die-casting a suitable metal under pressure in said opening so as to unite and bond with said fiber discs.

5. The process of producing an article of manufacture having a hollow body portion of fibrous paper, consisting in securing

a plurality of paper discs together, providing an opening extending therethrough, and die-casting a suitable metal under pressure into said opening so that the engaging surfaces thereof will permeate the fibrous portions of the body surface and unite and bond therewith, whereby the discs and metal portion of the article will be permanently bound together.

In witness whereof, we have hereunto affixed our signatures.

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LOUIS C. McANLY.
JOHN W. SKELLEY.