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H. F. BUSCH

COMPRESSED CORK ARTICLE AND METHOD OF MAKING THE SAME

Filed April 28, 1926

Fig. 1.

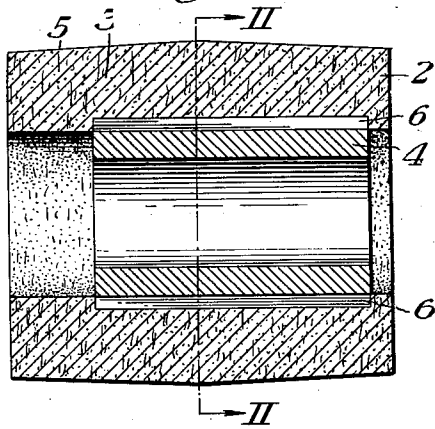


Fig. 2.

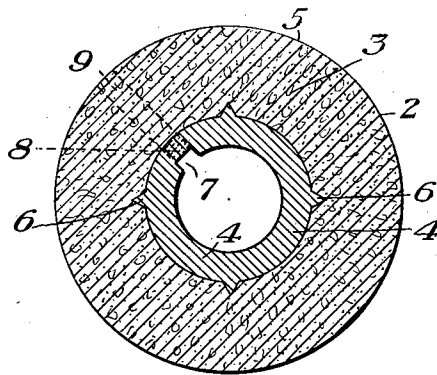


Fig. 3.

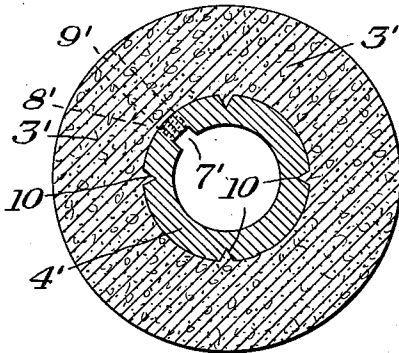
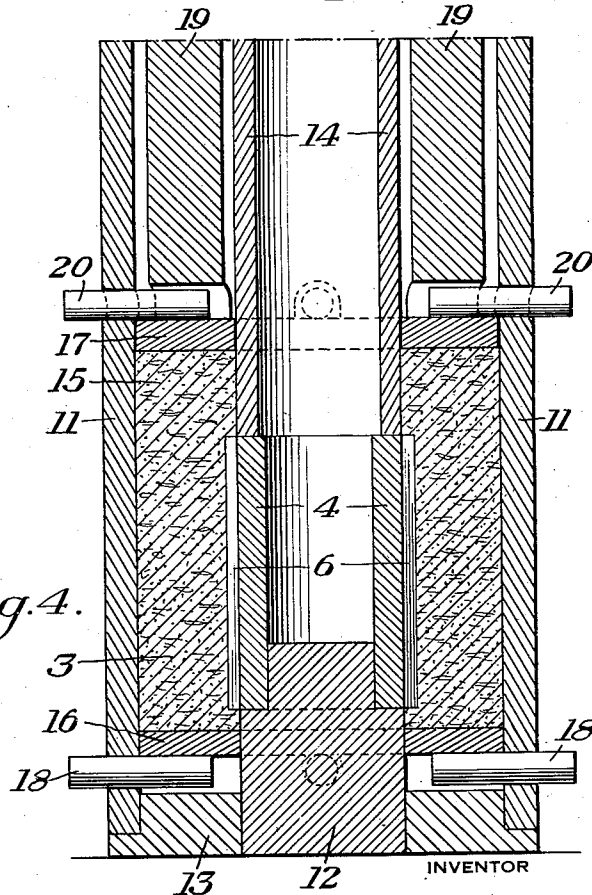


Fig. 4.



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UNITED STATES PATENT OFFICE.

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COMPRESSED-CORK ARTICLE AND METHOD OF MAKING THE SAME.

Application filed April 28, 1926. Serial No. 105,201.

The present invention relates to compressed artificial cork articles and more especially to pulleys having frictional surfaces of compressed artificial cork. The invention will be described with particular reference to its embodiment in power transmitting pulleys, although in some of its aspects and more particularly those of the high compression of the cork, it may be applicable for other things in which a hard wear resisting material is desired, such as for example, facings for clutches.

The compressed artificial cork as herein described, is particularly adapted for pulleys, giving a strong wear resisting body having high frictional qualities. In forming the pulley, the cork is preferably molded around the usual shaft engaging sleeve of the pulley so as to become united therewith during the moulding operation.

Compressed artificial cork is made of cork granules and a suitable binder compressed and set under heat, forming a compact homogeneous mass of cork. Any of the usual formulæ for making artificial cork may be employed, but preferably I use as a basis, granulated cork and glycerine formaldehyde mix described in Busch Patent 1,532,682 of April 7, 1925 and 1,269,682 of June 18, 1918. The size of the cork granules is not particularly important, and granules of any of the usual sizes for making compressed artificial cork may be used.

The mixture of cork granules and binder is compressed to form a hard mass of high structural strength and wear resisting qualities. The mass should be compressed to a volume not over about 1/12 that of the volume of the uncompressed mix and preferably not over 1/16 of the original volume. The most satisfactory results have been obtained with a compression of 20 to 1. The mass is set under heat which sets the binder and holds the cork in its highly compressed condition. The binder also serves to firmly cement the cork mass to the pulley sleeve or mandrel, the moulding of the cork around the sleeve under high pressure combined with the action of the binder forming a very firm union between the metal and the cork.

In the accompanying drawings, which illustrate the preferred embodiment of the invention,—

Figure 1 is a longitudinal sectional view of a pulley made according to my invention;

Figure 2 is a section on the line II—II of Figure 1;

Figure 3 is a view similar to Figure 2, but showing a modified structure; and,

Figure 4 is a vertical sectional view showing the present preferred method of moulding the pulley.

Referring to the illustrated embodiment, the pulley 2 (Figure 1) has a highly compressed artificial cork body 3 which surrounds and is carried by a suitable metal sleeve or mandrel, and upon which is formed a working face 5. The working face 5 is illustrated as being crowned to engage a belt, but obviously the face may be adapted to engage power transmission means other than belts.

The binder used for the work cements it firmly to the sleeve 4. A non-rotative engagement between the cork 3 and the sleeve 4 is further insured by the fins 6.

A modification of this arrangement is illustrated in Figure 3, wherein a sleeve 4' is provided with slots 10 into which the cork comprising the pulley body 3' is pressed thereby forming a tight connection between the body 3' and the sleeve 4'. The sleeve 4' is provided with the usual keyway 7 (Figure 2) and one or more set screws 8, access to each set screw being had through a corresponding hole 9 extending through the body 3.

I preferably form the pulley in a cylindrical mold 11 (Figure 4) in which the sleeve 4 is concentrically supported on a plug 12. The plug 12 is maintained in position by a disk 13 surrounding the plug and engaging the mold 11. The plug 12 also serves as a core, forming an opening, substantially equal to the diameter of the sleeve 4, in the end of the body 3 which projects beyond the sleeve 4. In a similar manner, an opening is maintained in the part of the body 3 which projects beyond the sleeve 4 by a cylindrical core 14 which abuts the end of the sleeve 4 and effectively prevents any cork material being pressed into the interior of the sleeve 4.

In forming the pulley, cork material 15 is compressed in the mold 11 around the sleeve 4 and core 14 and plug 12 by means of rings 16 and 17 which slidably fit within the cavity of the mold 11. The ring 16, closely fitting around the plug 12, is maintained against the pressure applied to the cork ma-

terial by means of pins 18 which project through holes in the wall of the mold 11 and engage the ring 16. Pressure is applied to the cork material 15 by the ring 17 which is forced into the mold by a hollow cylindrical plunger 19 loosely enclosing the core 14. In Figure 4, the ring 17 and plunger 19 are shown in position at the end of the stroke with pins 20, similar to pins 18, inserted through holes in the wall of the mold 11 engaging the ring 17 and preventing expansion of the cork material 15. With the cork material 15 confined as shown in Figure 4, the pulley is heated an amount sufficient to set the binder, which holds the cork in its highly compressed condition and also cements it to the sleeve 4. After the mass is cooled, the pulley is taken from the mold and the working face 5 is shaped in accordance with the work it is to perform.

The compression ratio, as above indicated, is preferably in the neighborhood of 20 to 1. Such compression yields an artificial cork having a hard wear-resisting surface. Such compression results in the density of the material being considerably increased, and results in a strong hard body. The density and strength of the compressed material are considerably greater than those obtainable in ordinary artificial cork, the density of the material compressed in this ratio being about 60 pounds per cubic foot, while ordinary artificial cork has a density of about 30 pounds per cubic foot.

The compression substantially along the axis of the pulley results in the cork granules being compressed into thin flat disks, the planes of compression of which are normal to the axis of the pulley. Flattened granules are therefore disposed edgewise to the working face of the pulley and since each granule is rooted in the body of the cork, the working face has greater wear resisting qualities and there is no tendency for the granules to puff up or scale off as might be the case if the granules lay flat upon the working surface.

A textile roll having this arrangement of the cork granules to the working surface is disclosed in the Busch Patent 1,532,682 but the material in such patent is different from that herein described in that it is compressed to but about 1/8 of its initial volume so that the cork is highly resilient and presents a yielding surface desired for textile rolls, whereas the material herein described is preferably compressed to form a hard substantial unyielding mass, which, while having the high frictional qualities characteristic of cork, possesses the structural strength and wearing qualities necessary for power transmitting pulleys.

From the drawings it will be seen that the sleeve 4 does not extend completely through the pulley 2. It is not necessary that it should do so, since the body 3 has been com-

pressed to such an extent that it is a strong and relatively hard mass capable of bearing considerable load and torsional stress. Furthermore, the portions of the pulley which extend beyond the sleeve 4 are effective for gripping the ends of the fins 6 and taking any longitudinal thrust which may be placed on the pulley. This latter feature is not required in an ordinary belt pulley, however, because the great pressure to which the cork material in the mold is subjected causes the body 3 to firmly grip the sleeve 4, enclosing any projections thereon or entering any slots or indentations therein, thereby forming a pulley easily capable of withstanding any torsional or longitudinal stresses to which it may be subjected.

Thus I provide a pulley having a hard, substantially unyielding, wear-resisting working face possessed of inherently good frictional qualities. The mass of artificial cork comprising the body portion is hard and strong, firmly gripping the metal sleeve on which the pulley is mounted.

It is understood that the reduction ratio of twenty to one is desirable, but this ratio is not to be construed as a limiting ratio. There is, of course, a limit of compressibility for the artificial cork, which may not be exceeded. On the other hand, a small degree of compression results in a pulley face, similar to ordinary artificial cork, lacking the strength and wear resisting qualities found in my improved pulley.

While I have specifically illustrated and described the preferred embodiment of my invention, it is to be understood that the invention is not limited to the details above set forth, but that the invention may be otherwise embodied within the scope of the following claims.

I claim:

1. A pulley having a working surface of artificial cork compressed to a volume not over about 1/12 that of the uncompressed artificial cork mix.
2. A pulley having a working face of artificial cork compressed to about 1/20 of the initial volume of the uncompressed artificial cork mix.
3. A pulley having a working face of artificial cork compressed to a volume not over 1/12th that of the uncompressed artificial cork mix, the compressed granules being disposed edgewise to the working surface of the pulley.
4. A pulley having a working face of artificial cork compressed to a density substantially greater than 30 pounds per cubic foot.
5. A pulley having a working face of artificial cork compressed to a density of about 60 pounds per cubic foot.
6. A pulley comprising a sleeve and a body of artificial cork moulded about the sleeve and compressed to a volume not over

about 1/12 that of the initial uncompressed artificial cork mix.

7. A pulley comprising a sleeve and a body of compressed artificial cork moulded about the sleeve and compressed to about 1/20 of the normal volume of the initial uncompressed artificial cork mix in such a direction as to cause the granules to be disposed edgewise to the working surface of the pulley.

8. The method of making a pulley comprising a sleeve and a surrounding body of compressed artificial cork which includes positioning the sleeve in a mold, placing the artificial cork mix around and in contact with the sleeve, and compressing the artificial cork in a direction substantially parallel to the axis of the sleeve to materially less than 1/12 of the normal volume of the uncompressed cork mix.

9. The method of making a pulley comprising a sleeve and a surrounding body of compressed artificial cork which includes positioning the sleeve in a mold, placing artificial cork around and in contact with the sleeve, compressing the artificial cork in a direction substantially parallel to the axis of the sleeve, to increase the density of the artificial cork to about 60 pounds per cubic foot, and subjecting the compressed mass to heat to set the binder and cement the cork mass to the sleeve.

10. As a new article of manufacture a body of artificial cork compressed to a vol-

ume not over about 1/12 that of the initial volume of the uncompressed artificial cork mix.

11. As a new article of manufacture a body of compressed artificial cork including a binder and cork granules compressed to a density substantially greater than 30 pounds per cubic foot.

12. As a new article of manufacture a body of compressed artificial cork including a binder and cork granules compressed to a density of substantially 60 pounds per cubic foot.

13. As a new article of manufacture a body of compressed artificial cork including a binder and cork granules compressed to about 1/20 of the initial volume of the uncompressed artificial cork mix.

14. The method of making a pulley comprising a sleeve and a surrounding body of artificial cork having a binder, which includes positioning the sleeve in a mold, placing the artificial cork mix around and in contact with the sleeve, compressing the artificial cork in a direction substantially axial of the sleeve to substantially less than 1/12th of the normal volume of the uncompressed cork mix, and subjecting the compressed mix to heat while under pressure to set the binder and cement the cork body to the sleeve.

In testimony whereof I have hereunto set my hand.

HERMAN F. BUSCH.