July 28, 1964 K. G. EDBERG 3,142,192

FRICTION FACED PULLEY

Filed March 19, 1962

FIG. 1

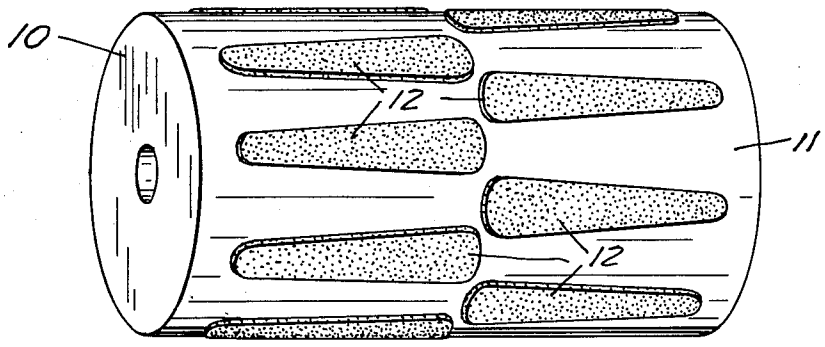


FIG. 2

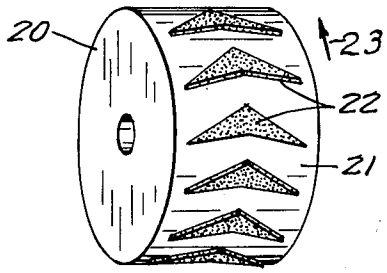


FIG. 3

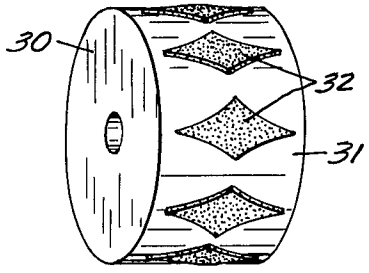
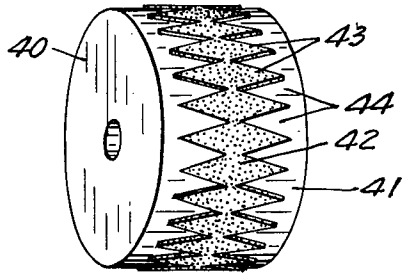


FIG. 4



INVENTOR
KENNETH G. EDBERG
BY
Carpenter, Abbott, Coulter & Kinney
ATTORNEYS

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FRICTION FACED PULLEY

Kenneth G. Edberg, White Bear Lake, Minn., assignor to Minnesota Mining and Manufacturing Company, St. Paul, Minn., a corporation of Delaware

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This invention relates to rotatable cylinders, such as pulleys or rollers. A preferred embodiment of the invention relates to a novel means for providing the external face of such cylinders with an effectively greater crown.

Whenever a flat belt is entrained over a flat surfaced pulley, tracking problems arise, and the belt is likely to wander from side to side and/or slip on the pulley. These difficulties are particularly annoying in the food industry, where the necessity for cleanliness dictates the use of extremely smooth belts made, e.g., of polyester film, to convey peanuts, powdered milk, and similar commodities. Belt tracking is also of concern where heavy belts are used to convey ore, gravel, or coal or where coated abrasive belts are mounted on abrading machines. The problem of wandering is commonly minimized by providing the pulley with a crown, i.e., making the center of its working face higher than the edges, while the problem of slipping is reduced by applying strips of a frictional lagging material to the working face of the pulley. It is both difficult and expensive to use lagging to crown a pulley.

The present invention provides a pulley having a simple and unique crowned effect. It also provides a convenient means for imparting a crowned effect to the surface of an otherwise uncrowned flat pulley. In preferred embodiments the degree of effective crown can readily be varied to suit the needs of the user. The method of crowning is easy and does not require either special equipment or highly skilled workmen.

In accordance with the present invention a pulley is provided which has an embossed or intaglio working face in which all radially outermost points are at least substantially coplanar. These radially outermost points define tapering "fingers" which extend laterally in both directions from the approximate middle of the working face. A normally smooth flat pulley may be modified in accordance with this invention and given in effect a greater crown by affixing to its working surface sheet material of substantially constant thickness in a configuration such that a greater fractional area of the working face is covered with sheet material at the middle than at either lateral edge, and hence the effective circumference of the pulley is maximum at the middle, gradually decreasing to minimum at the edges.

The invention will be better understood upon reference to the attached drawings in which:

FIGURE 1 is a view in perspective of a pulley having a crowned effect and made in accordance with the present invention, and

FIGURES 2, 3, and 4 are views in perspective of other types of pulley made in accordance with the present invention.

In FIGURE 1, pulley **10** has working face **11** from which project protuberances **12**, of substantially constant thickness and shaped like teardrops or the upper part of an exclamation mark. The wider ends of protuberances **12** are located approximately on the midline of the working face of pulley **10**, and the narrower ends are along the lateral edges of pulley **10**. The circumference of pulley **10** is thus greatest along the middle of the working face and gradually decreases as one moves toward either edge of the face. Many variations in the nature of the working face of pulley **10** can be made by adjusting the

form or configuration of protuberances **12**. For example, if a greater crowned effect is desired, protuberances **12** may be spaced closer together or shaped so that the degree of taper from end to end is increased.

Protuberances of a given dimension are useful over a considerable range of pulley sizes. For example, a pulley face twenty inches wide may be covered from edge to edge by aligning protuberances **12**, having a length of 10 inches, at 90° to the circumferential midline. If however, the pulley face is only ten inches wide, the same protuberances may still be employed by aligning them in herringbone pattern at 60° to the circumferential midline, the rounded edges of the protuberances tending to minimize any danger of tip lifting or snagging. Protuberances **12** are advantageously made of a sheet material having a significant thickness, e.g., on the order of 30 mils, and their attachment is greatly facilitated if a normally tacky and pressure sensitive adhesive is provided on one surface. The other surface, i.e., the ultimate working surface, desirably comprises some frictional material, e.g., cork particles, abrasive grains, rubber particles or the like. A particularly suitable material, in which rubber granules are bonded to a polyester backing by means of a rubber resin matrix coat, is "Scotch-Lag" roll and pulley covering material, which is described in copending Labore and Dupre U.S. patent application Serial No. 797,200, now U.S. Patent No. 3,030,251.

Because of the versatility of application for sheet material of a given size, a predetermined number (e.g., twelve) teardrop-shaped pieces of sheet material may be packaged to provide a kit suitable for crowning pulleys of greatly varying diameter or width.

For the reasons noted, tear-drop-shaped pieces of sheet material are generally preferred, but in many cases—e.g., where a pulley of a specific width is commonly used throughout an installation—various other shapes of protuberances are practical. Thus, for example, the working face **21** of pulley **20** is provided with chevron-shaped protuberances which extend from one lateral face of the pulley to the other, the chevron having its greatest circumferential width at the center and gradually tapering to each side. Pulley **20** is preferably, although not necessarily, rotated in direction **23**. Likewise, the working surface **31** of pulley **30** is provided with modified diamond shaped protuberances **32**, which function in much the same manner, but the direction of rotation being completely noncritical.

Pulley **40** illustrates a modification of the present invention which has interesting advantages. Working face **41** is provided with a continuous strip **42** having laterally extending toothed triangular protuberances **43** separated by edentate portions **44**. Where the width of a pulley can be predicted, or where crowning at the center is sufficient, strip **42** may be sold in roll form, cut to the desired length on the job and affixed in place as shown. The triangular shape of the laterally extending protuberances **43** makes it possible to longitudinally subdivide a strip of sheet material so as to essentially eliminate waste, the teeth of one strip occupying the edentate portions of the laterally adjacent strip. If desired, strip **42** can be severed into either a series of diamond shaped pieces or into a series of triangularly shaped pieces. Similarly, for use in the manner illustrated in FIGURES 1–3, the teeth **43** can be truncated and thus rendered trapezoidal in shape.

Although the preceding description of my invention discloses the particularly preferred method for applying strips of sheet material to the surface of a pulley to impart a crowned effect, I contemplate other means of achieving the same end. To illustrate, an adhesive such as an epoxy resin could be coated on the working face of a smooth pulley in one of the patterns illustrated in the drawings, abrasive granules sprinkled therein, and the

adhesive thereafter hardened to form frictional protuberances. Likewise the pulley itself could originally be formed in the illustrated configuration or modified by etching portions of the surface of a smooth pulley to leave protuberances. Accordingly, since numerous variations of my invention will be apparent to those skilled in the art, I intend to be limited in no way other than by the scope of the appended claims.

What I claim is:

1. For use with a flat belt, a pulley having a normally smooth working face to which frictional material of significant thickness is affixed, the configuration of said frictional material being such that tapering fingers extend laterally in both directions from the middle of said face, the portion of said face covered by said frictional material gradually decreasing from maximum at about the middle of said face to minimum adjacent the edges of said face to provide a crowned effect, whereby a belt entrained over said pulley tends to be tracked on the middle of said pulley.

2. The pulley of claim 1, wherein said frictional material is particulate-coated sheet material.

3. The pulley of claim 1, wherein said frictional material is adhered to said working face.

4. For use with a flat belt, a pulley having a normally smooth working face to which a plurality of similar tapered elongate strips of frictional sheet material are affixed, each of said strips being positioned with its narrow end adjacent an edge of the pulley and with its widest portion approximately at the middle of said face, approximately the same number of said strips extending toward each edge of said pulley.

5. The pulley of claim 4, wherein said sheet material is affixed to said pulley face by a normally tacky and pressure-sensitive adhesive.

6. For use with a flat belt, a pulley having a normally smooth working face to which a plurality of similar tapered elongate strips of frictional sheet material are adhered, said sheet material comprising a backing having rubber particles bonded to its exposed side by a rubber resin matrix and having a normally tacky and pressure-sensitive adhesive bonded to its other side adhering said strips to said working face, each of said strips being positioned with its narrow end adjacent an edge of the pulley and with its wide end approximately at the middle of said periphery, approximately the same number of said strips extending toward each edge of said pulley.

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