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BLADED ROLL FOR WORKING HIDES

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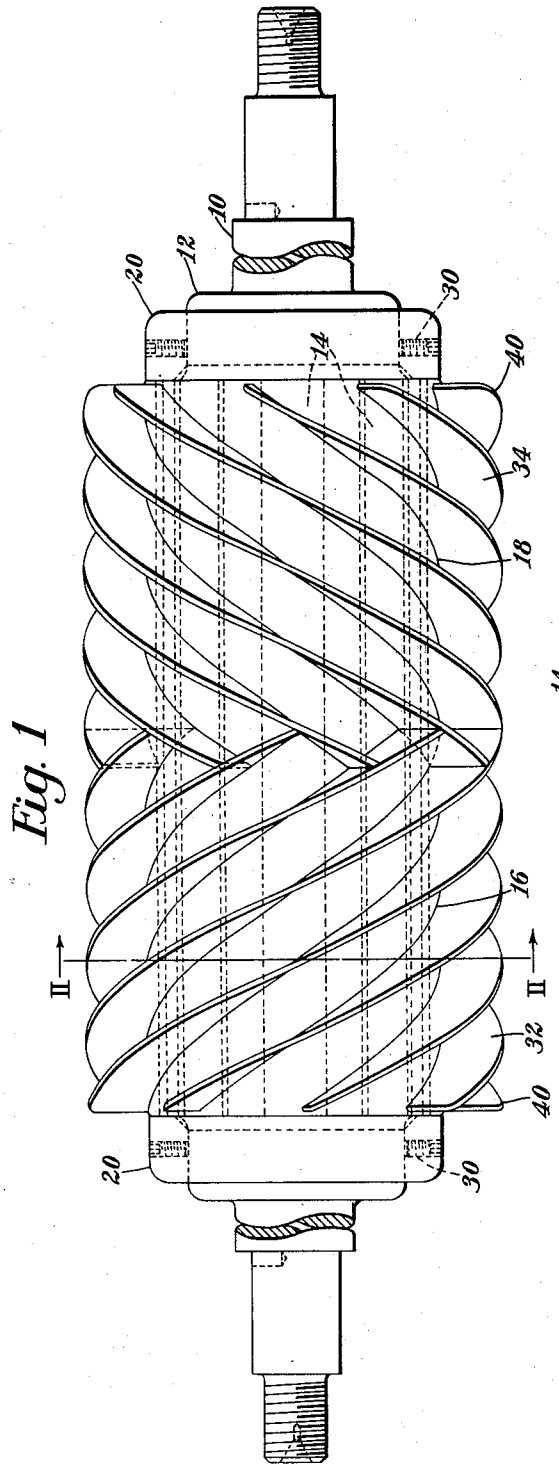


Fig. 1

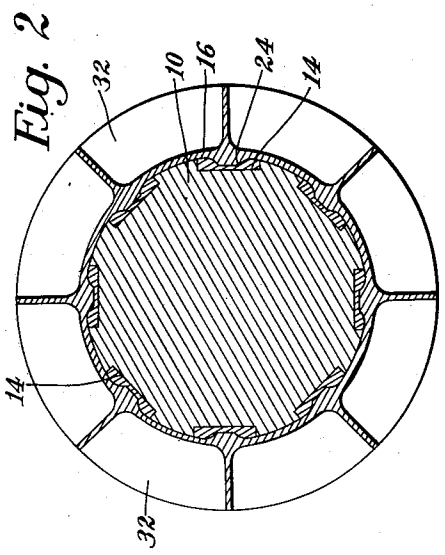


Fig. 2

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BLADED ROLL FOR WORKING HIDES

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7 Claims. (Cl. 69—37)

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This invention relates to rolls provided with cutting blades for use in tanning machinery, and is herein illustrated as embodied in a roll having helical blades for performing a fleshing, shaving or an analogous operation upon hides, skins or leather. It is to be understood, however, that the invention is not limited in use to blades or rolls of the illustrated type.

The present application is a continuation-in-part of application Serial No. 46,658, filed August 28, 1948, now abandoned.

While helically bladed rolls are commonly used in tanning machinery they are difficult to manufacture, at least as heretofore constructed, and frequently they have been found to be or have become defective during use. The blades themselves must be accurately formed and the roll for supporting them preferably should present an integrated structure carefully balanced dynamically if the work on the hides or skins is to be smoothly performed and the blades properly supported so as to withstand the severe strains and stresses imposed upon them during use. Heretofore, steel rolls have been used having carefully and accurately machined helical grooves in which the helical blades are secured and held on the rolls by wedging them in position in the helical grooves. The wedging is customarily done by hammering strips of soft brass or like metal into the grooves on at least one side of each blade. The methods of mounting the blades upon the rolls, the distortion of the blades because of heat treatment to gain hardness, variations in the blade metal composition, and the necessity for frequent regrinding all contribute to unevenness in the work produced and to loss in production time. Special alloys which are resistant to abrasion have been available for some time but they have not heretofore been adopted in making tanning machinery blades. Probably the reason for this is that such alloys are in general very brittle, are known to be difficult to manufacture accurately into complex form, and have met with many complications in the making of other types and simple forms of articles.

The object of the present invention is to provide, for a rotary tool tanning machine, an improved helical bladed roll which may be accurately made and which will operate with a minimum of wear.

To these ends, and in accordance with an important feature of the invention, a shaft is provided upon which a cylinder is concentrically mounted and rigidly affixed, the cylinder having spiral blades integral therewith. An advantageous feature of the invention is the interlocking of the parts, including the shaft, to give a rigid, strong and reliable unit. Another feature of the invention is the substantially non-ferrous cobalt base abrasion-resistant alloy as preferably utilized for the blade and cylinder material.

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These and other important features of the invention and novel combinations of parts will now be described in detail in the specification and then pointed out more particularly in the appended claims.

In the drawing,

Fig. 1 is a view of the bladed roll of the present invention; and

Fig. 2 is a sectional view along the line II—II of Fig. 1.

As seen in Fig. 1, the bladed roll comprises a shaft 10 which is machined at each end for journaling in the frame of a tanning machine. The central portion or longitudinal section 12 of the shaft 10 is fluted and in the particular design disclosed, eight longitudinal grooves 14 are shown. Mounted concentrically upon and closely fitting the shaft 10 are two bladed cylindrical sections 16 and 18 and these two sections are retained in position on the shaft by collars 20 and 22 fixed to the section 12 by means of set screws 30. Both sections 16 and 18 have longitudinal internal ridges 24 for a purpose to be described. Cast integral with the cylindrical section 16 are blades 32, each of which ascribes a right-hand helical path and the other cylindrical section 18 is provided with similar blades 34 but which are to the opposite hand. The two sections 16 and 18 are interlocked and in abutting relation and the interlocking or abutting surfaces are in the nature of an annular sawtooth or zig-zag arrangement as can be understood by reference to Fig. 1. The arrangement of the helical blades is such that the inner end of each blade intersects the side of a blade of the other section and also conforms with one of the surfaces in the saw-tooth arrangement referred to—i. e.—the blades as well as the cylinders are in interlocking relation. The outer ends 40 of the blades are rounded to guard against any possible scratching of the surfaces to be worked upon and the outer circumferential edge or cutting side of each blade 32 or 34 is ground to present an outer surface or edge which is exactly concentric with the center of the shaft 10.

In the assembly of the complete roll, the cylindrical bladed sections 16 and 18 are assembled upon the shaft 10 in the positions shown and metal such as molten Wood's alloy is poured into the grooves 14. When the molten metal has

hardened, the ridges 24 of the cylindrical sections 16 and 18 are rigidly locked within the Wood's alloy and the sections are tightly joined to the steel shaft 10 and this construction, together with the sawtooth abutting surfaces and the collars 20, serves to hold the parts in rigid assembly. Static and dynamic balance may easily be imparted to the assembly by drilling away material or otherwise treating section 12 of the shaft 10.

As stated previously, abrasion-resistant alloys have been known heretofore but their use as tanning machinery blades has not been adopted. Such alloys are generally very hard at least at room temperatures and likewise very brittle. The difficulties to be encountered in incorporating such materials for blades is obvious. As a rule, and it appears to be quite an obvious one, harder alloys will wear much less rapidly than softer ones. However, attention should be given to the operating conditions which are to be encountered during use and in this connection any measurement of the hardness of the alloy or its wear resistance is meaningless unless taken at the operative temperature. In other words, the operative hardness and not the room temperature hardness is the true criterion of wear resistance. It is believed, and there is evidence to show, that shaving blades develop a very high temperature at extremely localized working areas such as the cutting edges. The high temperature undoubtedly minimizes the lubrication which may be derived from the fluid which may be in the hide or skin and it also gives rise to corrosion of the cutting edge metal. Abrasion occurs as a natural sequence of the corrosion.

Applicants have found that a cobalt base alloy may be used in making a bladed roll and that it retains its hardness at the operative temperatures encountered in the use of helical blades for tanning machinery. Cobalt base alloys are harder as cast and without further heat treatment than any other known alloy except those of the tungsten carbide class. They have a low coefficient of friction, take on a high polish, are highly resistant to chemical corrosion, the coefficient of expansion is the same as that of steel, and heat treatment is not necessary in order to gain the hardness. A group of alloys known as Stellite is made by the Haynes Stellite Company of Kokomo, Indiana. The Stellite alloys comprise a group of hard, abrasion- and corrosion-resistant, substantially non-ferrous alloys containing by weight 40 to 80 per cent cobalt, 20 to 40 per cent chromium and 0 to 25 per cent tungsten. Applicants have preferred an alloy called Stellite No. 12. This particular alloy by weight comprises 47 per cent cobalt, 34 per cent chromium and 10 per cent tungsten, the balance of 9 per cent being impurities. It will be appreciated that the composition of the cobalt base alloy may be varied somewhat but it must be substantially non-ferrous and in addition to the cobalt base the balance of the composition of the alloy should be selected from the chromium group of metals. By the chromium group applicants refer to chromium, tungsten, molybdenum, and uranium.

Applicants have found that the cylindrical sections 16 and 18, together with their blades and internal ridges 24, may be cast as units by means of the lost wax process otherwise known as the precision investment castings method. This method is widely used at the present time for the formation of both simple and intricate castings. The method is well described in the June 5, 1948 issue of "Business Week," pages 48 to 56. It is also described in the book entitled, "Precision Investment Castings" written by Cady and published in January, 1948 by the Reinhold Publishing Corporation, New York. For the instant purpose, the method may be described by stating that precision casting begins with a master pattern of the part to be produced. The master pattern is machined of brass or bronze and is used to form or cast the mold into which the melted wax is later injected. This wax is introduced under controlled pressure and temperature and hardens to form a wax replica of the desired part or element of the desired part. Several elements may be waxed together to form the final waxed replica. In making each of the bladed sections 16 and 18, applicants found it advantageous to make eight helical segments in wax with each segment including a blade and a helical strip of the cylinder. Eight of these strips are then joined by means of wax to form a wax bladed replica of a cylindrical section. This wax replica is then given a primary investment coat which may be a mixture of fine silica and sodium silicate that will form the smooth inner surface of the final mold after the wax is melted out. A secondary investment coat is then added and the coated wax replica is placed into a flask and surrounded therein by a plaster-like investment mixture. This mixture is poured into place and when it is hardened the flask is heated to melt out the wax. The flask is then heated to metal pouring temperature and the proper metal alloy is poured into the cavity left by removal of the wax. In order to avoid imperfections, the molten alloy is poured into the flask cavity under pressure induced by rotating the flask or by the use of a static head of alloy or air pressure. An example of an apparatus for driving the molten metal into the mold is disclosed in United States Letters Patent No. 2,125,080, granted on July 26, 1938 in the name of Albert W. Merrick. The investment is then removed from the casting which is generally ready for use except that possible rough spots may require slight grinding.

It will be understood that the substantially non-ferrous cobalt base type of alloy is preferred for the blade composition but the invention is not limited in its application to the use of such a composition. Some aspects of the invention may be practised using case-hardened steel or other suitable wear-resisting metals for the making of the blades and/or the cylinders.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. As an article of manufacture, a tanning machine roll comprising a shaft, multiple cylinders arranged in end-to-end and interlocking relation on said shaft, each of said cylinders having spiral blades formed integral therewith.

2. As an article of manufacture, a tanning machine roll comprising a shaft, a cylinder concentric with said shaft and having helical blades formed integral with the cylinder, and the cylinder being locked in place on the shaft by metal cast between them.

3. As an article of manufacture, a tanning machine roll comprising a shaft with longitudinal grooves, a cylinder concentric with said shaft and having helical blades on its exterior and ridges on its interior, the said ridges being locked in said grooves by metal cast in place, and the cylinder, blades and ridges being integral to form a one-piece construction.

4. As an article of manufacture, a tanning

machine roll comprising a shaft with grooves, a cylinder concentric with said shaft and having helical blades on its exterior and projections on its interior, and the said projections being locked in said grooves by metal cast in place.

5. As an article of manufacture, a tanning machine roll comprising a shaft with longitudinal grooves, multiple cylinders concentric with said shaft and arranged in end-to-end and interlocking relation on said shaft, each of said cylinders being of cast metal with spiral blades on its exterior and projections on its interior, the said projections being locked in said grooves, and the said cylinders, blades and ridges being composed of a substantially non-ferrous, abrasion-resistant cobalt base alloy containing at least one of the metals from the chromium group.

6. As an article of manufacture, a tanning machine roll comprising a shaft with longitudinal grooves, a cylinder concentric with said shaft, said cylinder being of cast metal with helical blades on its exterior and ridges on its interior, the said ridges being locked in said grooves by metal cast in place, and the said cylinder, blades and ridges forming an integral structure of the following composition by weight:

40 to 80 parts cobalt
20 to 40 parts chromium
0 to 25 parts tungsten

7. As an article of manufacture, a tanning machine roll comprising a shaft provided with grooves, a cylinder concentric with said shaft and having formed integral therewith outwardly extending helical blades and inwardly extending ridges opposite to the grooves in said shaft, each of the grooves being substantially wider than each of said ridges, and the cylinder and shaft being secured together by metal cast in said grooves.

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