Nov. 17, 1942. J. A. KENNEDY, JR 2,302,126

DRAWING ROLL AND COT FOR SUCH ROLLS

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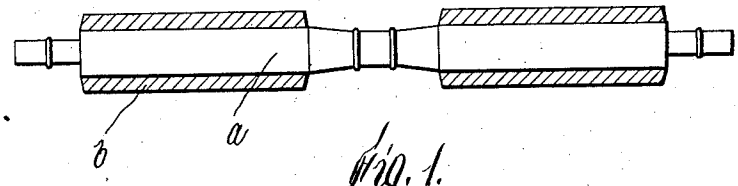


Fig. 1.

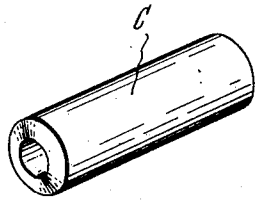


Fig. 2.

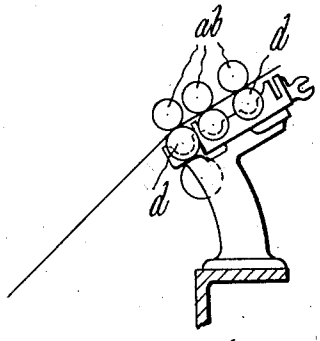


Fig. 3.

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DRAWING ROLL AND COT FOR SUCH ROLLS

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6 Claims. (Cl. 19—143)

This invention relates to drawing rolls of the type used in the textile industry for working fibrous sliver, roving, or partly finished yarns and thread in spinning and twisting machines. Such drawing rolls are arranged in series of two or more pairs, each pair being constituted by a positively driven fluted steel roll and an idle roll having a yieldable frictional surface, which is usually located above and pressed against the fluted roll. The rolls containing the improvement of this invention are designed to be used as the yieldable or top rolls of the drawing frame.

Many attempts have been made in recent years to provide drawing rolls of this character with a surface which is more durable and permanent in its characteristics than the leather coverings previously used. Such efforts have met with varying degrees of success but all, to the best of my knowledge and belief, have left something to be desired. A serious defect of some of these roll surfaces or coverings is that they are affected by low temperature so that they become hard and lose the frictional quality necessary for drawing the fibers and yarns, when chilled to temperatures materially lower than those prevailing in spinning rooms. Thus, for instance in mills which are operated only during the day time and are shut down at night, the night temperature in cold weather usually drops considerably below 60°, that is, to temperatures which cause the rolls of the character last referred to to become hard and fail to work properly. After being thus chilled, they do not become efficient until warmed to nearly the operating temperature of the spinning room after the mill has been started up in the morning. This may require several hours to accomplish, and results in loss of production or the making of inferior yarns, or both, during the warming up period.

The object of this invention is to furnish a drawing roll, and cots or coverings for drawing rolls, which are more durable than leather, have flexibility and a coefficient of friction equal or superior to the best of the rolls and roll coverings heretofore known, and retain these qualities substantially unaffected throughout the ranges of temperature encountered in artificially heated textile mills during the coldest winter weather of the north temperate latitudes.

The invention consists in the combination of a drawing roll core of any usual or desired construction and design and a covering of a vinyl resin compound having the chemical and physical characteristics later described. It further consists of a cot or covering adapted to be applied to drawing roll cores made, wholly or at least as to its outermost parts, of the same compound.

The drawing illustrates conventionally such a drawing roll and cot; and therein—

Fig. 1 is an elevation and partial section of a drawing roll, showing the resin covering in section and the core in elevation;

Fig. 2 is a perspective view of a cot embodying one phase of the invention adapted to be applied to a drawing roll core;

Fig. 3 is a diagrammatic representation of a conventional set of drawing rolls in which the upper rolls contain the present invention.

In Fig. 1, *a* represents a drawing roll core of common design and *b* represents a covering, shell or jacket of vinyl resin thereon. In Fig. 2, *c* is a tube or cot of the same material adapted to be applied to a drawing roll core in the relation of the cover *b* shown in Fig. 1 and to be purveyed as an article of manufacture for application to drawing rolls. In Fig. 3, *d* represents the fluted positively driven rolls of a drawing frame and *ab* represents upper rolls embodying the invention.

The vinyl resin compound of which the cots and jackets of this invention are made is a reaction product of polyvinyl alcohol with one of the aldehydes of the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde and valeraldehyde. Of these compounds the ones resulting from the reaction of formaldehyde (known commercially as Formvar) and butyraldehyde (known commercially as Butvar) are preferred to the others; and Formvar is the preferred one of these two.

These products are made by hydrolyzing polyvinyl acetate, with substitution of hydrogen atoms for acetyl groups of the long-chain acetate molecules, to produce polyvinyl alcohol. The reaction of formaldehyde with the hydroxyl groups of polyvinyl alcohol produces Formvar, with elimination of water. The similar reaction of butyraldehyde results in the production of Butvar; and the other aldehydes in the group above named react in similar fashion with polyvinyl alcohol to form analogous products. These reaction products are thermoplastic. They differ from polyvinyl alcohol in being insoluble in water, but are soluble in a number of organic solvents, including the organic phthalates, aromatic phosphates, etc., which serve as plasticizers.

The cots or sheaths made of the resins herein defined are sufficiently flexible and resilient to coact with the fluted metal rolls of drawing frames in gripping fibers firmly, but without cut-

ting or breaking the fibers. At the same time they are firm and hard enough to grip and draw the fibers without slipping. Their efficiency in these respects is substantially uniform throughout a temperature range of from near zero degrees F. to 150 degrees F. Within that range the resin can be distorted and it returns by its natural resilience to the previous shape after removal of the distorting force. It is wear resisting, and cots made of it resist the abrasion and wear of the threads, rovings and fibers passing successively between pairs of drawing rolls which are driven at different rates of speed.

Such cots do not accumulate static electricity in any degree commensurate with leather or rubber, and so enables fibers to be satisfactorily spun under conditions where spinning is all but impossible with the use of rubber-covered or leather-covered rolls. In the solid state this material can be cut by cutting tools to prescribed forms and dimensions, and buffed by abrasives to exact dimensions and to produce a desired surface texture.

Masses of the resin may be molded directly on the drawing roll cores, or the coverings may be built up by wrapping the resin in sheet form around the core and fusing the wrappings together by heat and pressure. Separate cots may be made in the same way, and also by extrusion, and applied to drawing roll cores, being made fast if desired by cement or otherwise.

The foregoing description of physical characteristics applies to both Formvar and Butvar. The qualities described are valuable and important in drawing roll cots and covers. These desirable qualities exist in greater measure in Formvar than in Butvar, wherefore I prefer this composition to all others. However, I do not limit my protection to that specific compound, but include all others of the aldehyde group of vinyl resins.

The said resins may be combined with any of the water-insoluble plasticizers known to be assimilable with these resins, in any degree to give a desired quality of softness and flexibility.

What I claim and desire to secure by Letters Patent is:

1. A drawing roll having a flexible, resilient covering composed of a vinyl resin, the reaction product of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde.

2. A cot or covering for drawing rolls having its outermost portion at least composed of a vinyl resin, the reaction product of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde.

3. A drawing roll having a flexible, resilient covering composed of a vinyl resin, the reaction product of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde, said covering having flexibility, resilience and gripping capacity in substantially equal measure throughout the temperature range from about 50° F. to about 150° F.

4. A cot or covering for drawing rolls having its outermost portion at least composed of a vinyl resin, the reaction product of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde, said covering having flexibility, resilience and gripping capacity in substantially equal measure throughout the temperature range from about 50° F. to about 150° F.

5. A drawing roll having a flexible, resilient covering composed of a reaction product resulting from hydrolysis of polyvinyl acetate to polyvinyl alcohol, and the reaction of hydroxyl groups of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde.

6. A cot or covering for drawing rolls of which at least the outermost portion is composed of a reaction product resulting from hydrolysis of polyvinyl actate to polyvinyl alcohol, and the reaction of hydroxyl groups of polyvinyl alcohol with one of the substances in the group consisting of formaldehyde, acetaldehyde, propionaldehyde, butyraldehyde, valeraldehyde and hexaldehyde.

JOHN A. KENNEDY, Jr.