March 9, 1948. J. ROCKOFF 2,437,362

TOP SPINNING ROLLER

Filed July 24, 1942

FIG. 1

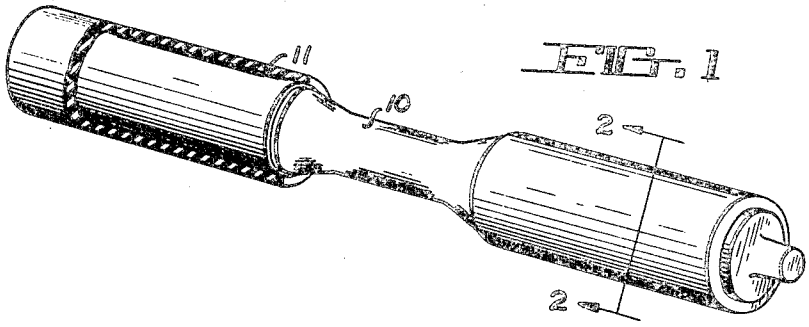


FIG. 3

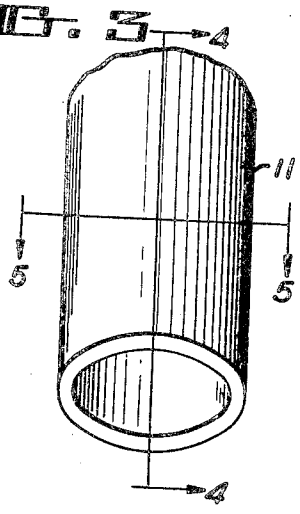


FIG. 2

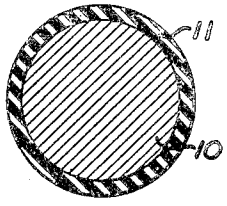


FIG. 4

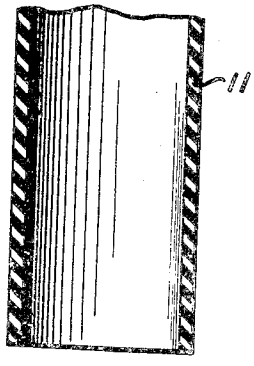
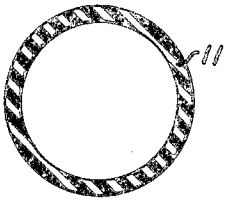


FIG. 5



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TOP SPINNING ROLLER

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6 Claims. (Cl. 19—143)

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This invention relates to textile machinery.

More particularly, it deals with cots for spinning and card room rolls, and while it will be described in connection with the making of spinning roll cots, it will be understood by those skilled in the art that this invention is also adapted for forming other rolls commonly used in textile working machines, such as temple rolls, loom take-up roll coverings, and the like.

The improved spinning roller or cot which is the subject matter of the present invention possesses good fiber drafting characteristics, exhibits low static charge build-up, is resistant to attack by oil and abrasive substances, and has good aging and wear resisting properties. In addition, it is characterized by a surface which exhibits no tendency to "eyebrowing" and which retains its original finish or condition in spite of normal wear through abrasion.

It has been conventional practice to make spinning and fiber drawing roll cots of leather, cork and similar substances. Cots made of leather and cork are resistant to oil but have very poor abrasion resistance and a tendency to develop grooves or a scored or uneven surface during use, thus necessitating their removal for repair or replacement. Calfskin possesses the essential surface characteristics for working fibers but tends to wear out rapidly due to its low resistance to abrasion.

Many attempts to substitute natural rubber compositions in the manufacture of spinning rollers and cots have been made, but they have proved unsuccessful primarily because natural rubber is readily attacked by oil and tends to develop a gummy or tacky surface when used in fiber working. After extended research and experimental testing of a large number of cots made of various compositions, including large scale commercial tests conducted in textile mills, I discovered that the use of synthetic rubberlike materials comprising butadiene copolymers of acrylic nitriles when compounded with other ingredients and vulcanized produce a cot which can be ground to give a fiber working surface possessing the characteristics of calfskin or the best leather covered cots. Such cots have excellent fiber drafting properties and exhibit substantially no tendency to collect fiber on the surface thereof. They do not exhibit a tendency of grooving, do not collect static charge in substantial amount, are practically unaffected by oils and greases, and possess high resistance to eyebrowing.

More recently, and as a result of further extensive research and practical experimentation, I have invented and developed an improved cot or roller which exhibits still a greater resistance to eyebrowing, and it is this improved cot or roller that is the subject matter of the present invention.

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Among the essential or desirable properties of a spinning cot are those of being substantially static free and resistant to oils and greases. Synthetic rubbers, such as neoprene and other similar butadiene polymers of which methyl rubber is typical, possess these essential or desirable properties, but when these materials are employed in the manufacture of cots or rollers, they are found unsatisfactory because they exhibit excessive eyebrowing and have a tendency to "lap up" the fiber being worked. Thiokol, another synthetic rubber, has extremely high oil resistance. However, spinning cots and rollers made with this material exhibit the same undesirable lapping and eyebrowing. Koroseal, a polyvinyl chloride synthetic rubber, is also resistant to oil and forms a smooth surface cot, but this material develops the same defects as neoprene and Thiokol. Flexible Glyptal resins exhibit the same tendency to lapping and eyebrowing which is found with synthetic rubbers and which is undesirable in textile working operation.

With such poor results obtained with spinning cots and rollers made of synthetic rubberlike substances, it was unexpected and surprising that spinning cots and rollers made of butadiene-acrylic nitrile copolymers would not develop any of the defects or deficiencies which characterize other synthetic rubberlike substances. I discovered, however, that when butadiene-acrylic nitrile copolymers were compounded and employed in producing cots, that the resulting article possessed all of the desirable characteristics found in other synthetic rubberlike substances, and, in addition, a very great resistance to lapping and eyebrowing, and that while the cots possessed substantially the same spinning qualities of calfskin in industrial or commercial use, they had, in addition, greater durability.

I give the following as a typical example of a spinning cot composition:

Example I

	Parts by weight
Butadiene-acrylic nitrile copolymer	80–125
Dibenzyl ether	10–25
Cumarone resin	6–12
Zinc oxide	4–8
Whiting	40–70
Sulfur	1–2
Benzothiazyl disulphide	0.9–1.5

I have found, however, that if I further compound the composition of Example I in its uncured state with a fine granular material such as fine salt or any stable crystalline material of a fine granular nature having the characteristics of salt, that I am able to produce with such com-

position spinning cots and rollers which are substantially devoid of any tendency to lap up or eye brow. A typical example of such further compounding may be noted as follows:

Example II

	Parts by weight
Composition of Example I	100
Fine salt	30–70

The ingredients of the composition of Example I are compounded in the usual manner using suitable rubber mixing and compounding equipment. The fine salt (or any other stable finely granulated material having the characteristic of salt) may be added during the same operation or in a subsequent mixing or compounding operation. After the materials are thoroughly mixed, they are molded and vulcanized to form a cot of the desired shape.

In Example I, the butadiene-acrylic acid copolymer may be used in different amounts, preferably on the order of from 30 to 55 per cent by weight of the composition. The composition of Example II may be vulcanized as is ordinarily done in the case of natural rubber compositions. The hardness of the cots may be preferably within the range of 50 to 95 as measured on the Shore type "A" durometer. The hardness or toughness of the finished article, and its resiliency may be modified by suitable additions of carbon black, zinc oxide, clays and other materials as is well known to those skilled in the compounding of natural rubber.

A great variety of fillers, accelerators and different resins may be employed with good results, but it is essential to use an acrylic nitrile copolymer of butadiene in order to obtain the highly desirable results to which reference has been made hereinbefore. While the butadiene-acrylic nitrile copolymer has been found to be most satisfactory, I do not limit myself to its use nor preclude the use of other acrylic compounds. For example, the copolymers of butadiene with acrylic acid esters or styrene may be employed satisfactorily.

The nature of the spinning roller or cot of my invention will be better understood by reference to the annexed drawing in which:

Fig. 1 is a perspective of a top spinning roller or cot with the covering partially broken away at one end;

Fig. 2 is a section taken along the line 2—2 of Fig. 1 looking in the direction of the arrows;

Fig. 3 is a perspective of one end of the spinning cot sleeve;

Fig. 4 is a section on the line 4—4 of Fig. 3 looking in the direction of the arrows; and

Fig. 5 is a section on the line 5—5 of Fig. 3 looking in the direction of the arrows.

In the drawing the numeral 10 indicates the body of the spinning roller and the numeral 11 indicates the vulcanized cover of acrylic nitrile and butadiene copolymer having dispersed therein a finely granulated stable material such as fine salt.

As has been noted hereinbefore, large scale industrial or commercial tests run over considerable lengths of time have definitely established that cots made from compositions substantially as set forth in Example II possess a fiber working surface which is fully equal to calfskin in spinning qualities and which is substantially devoid of any tendency to lap up or eyebrow. The cot surface is dry and possesses a smooth velvety feel, and what is more, it retains this smoothness and velvetiness. As the surface is abraded or worn away by contact with the fiber, the minute grains of salt or other such material are exposed and are dissolved out by the moist atmospheric conditions existing in the room in which the cots are used, thus leaving behind a macroscopically pitted or pockmarked surface which nevertheless is substantially smooth and velvetlike to the touch.

Wear and regrinding of the cot surface will not destroy the desirable texture thereof, since the composition is homogeneous and new grains of finely granulated salt are brought to the surface and dissolve out when the surface is ground and during use. The surface of the cots remains tough, resilient and resistant to oxidation. The cots possess a very low static charge build-up and high resistance to abrasion and to attack by oil and grease. They are greatly superior to similar cots made with chloroprene and other known oil resisting synthetic rubberlike substances.

It will be understood by those skilled in the art that my improved butadiene-acrylic nitrile copolymer composition containing homogeneously dispersed grains of finely granulated material may be used in making a great variety of fiber-working machine elements for use in the textile industry. For example, various types of rolls, covers, jackets, aprons and the like used in drafting, conveying and fiber-working may be manufactured using my improved compound and used to advantage.

It will be also understood by those skilled in the art that the degree of vulcanization or curing may be so controlled as to produce any specific physical property which may be found desirable in the finished product. Proportionate amounts of different ingredients may be substituted for those enumerated in order to produce a product of any desired degree of hardness, elasticity and frictional characteristics. In each case, the ingredients will be compounded with the butadiene-acrylic nitrile copolymer and the granulated substance, molded to the desired shape or form, and then vulcanized, and if it is so required, the surface may be ground, buffed, abraded, or otherwise machined or processed to give it any desirable surface characteristics.

In addition, it will be understood that while I have set forth certain embodiments of my invention, it is not my intention to have it limited to or circumscribed by the specific details of proportions, procedure and substances herein set forth, in view of the fact that my invention is susceptible to many and varied modifications without departing from the spirit of this disclosure and the scope of the appended claims.

This application is a continuation-in-part of copending application Serial No. 379,867, filed February 20, 1941 (on which Patent No. 2,304,656 was granted December 8, 1942).

I claim:

1. A textile machine unit for processing textile fibers into yarn comprising the combination of a body consisting substantially of acrylic nitrile butadiene copolymer, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said unit with the textile fibers of the yarn, for disseminating static electricity formed during operation and for preventing lapping up of the textile fibers on said unit, said means consisting of a plurality of projections alternating with cavities on the surface of said unit, said cavities being formed by the crystals vacating said unit.

2. A textile machine unit for processing textile

fibers to a yarn comprising the combination of a body consisting substantially of acrylic nitrile butadiene copolymer, a filler, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said unit with the textile fibers of the yarn, for disseminating static electricity formed during operation and for preventing lapping up of the textile fibers on said unit when it is used in substantially dry condition, said means consisting of a plurality of projections alternating with cavities on the surface of said unit, said cavities being formed by the crystals fallen out therefrom.

3. A textile machine unit for processing textile fibers comprising the combination of a body consisting substantially of acrylic nitrile butadiene copolymer, calcium carbonate, coumarone resin, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said unit with the textile fibers when it is used in substantially dry condition, said means consisting of a plurality of projections alternating with cavities on the surface of said unit, said cavities being formed by the crystals fallen out therefrom.

4. A textile machine unit for processing textile fibers comprising the combination of a body consisting substantially of acrylic nitrile butadiene copolymer, filler, resin and sulfur, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said unit with the textile fibers, for disseminating static electricity formed during operation and for preventing lapping up of the textile fibers on said unit when it is used in substantially dry condition, said means consisting of a plurality of projections alternating with cavities on the surface of said unit, said cavities being formed by the crystals fallen out therefrom.

5. A textile machine unit for processing textile fiber to yarn comprising the combination of a vulcanized body consisting substantially of acrylic nitrile butadiene copolymer, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said unit with the textile fibers, for disseminating static electricity formed during operation and for preventing lapping up of the textile fibers on said unit when it is used in substantially dry condition, said means consisting of a plurality of projections alternating with cavities on the surface of said unit, said cavities being formed by the crystals fallen out therefrom.

6. A cot for converting textile fibers into thread comprising the combination of a body consisting substantially of acrylic nitrile butadiene copolymer, granulated, water-soluble salt crystals homogeneously dispersed therein, and means for increasing the gripping action of said cot with the textile fibers, for disseminating static electricity formed during operation and for preventing lapping up of the textile fibers on said cot when it is used in substantially dry condition, said means consisting of a plurality of projections alternating with cavities on the surface of said cot, said cavities being formed by the crystals fallen out therefrom.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
17,754	Smith	July 7, 1857
938,087	Subers	Oct. 26, 1909
1,563,943	Adams et al.	Dec. 1, 1925
2,012,223	Cutler	Aug. 20, 1935
2,248,071	Fisher	July 8, 1941
2,287,780	Carman	June 30, 1942
2,304,656	Rockoff	Dec. 8, 1942
2,332,514	Holtzclaw	Oct. 26, 1943

FOREIGN PATENTS

Number	Country	Date
272,269	Great Britain	June 7, 1927
321,220	Great Britain	Nov. 4, 1929