Oct. 27, 1953 A. L. FREEDLANDER 2,656,582

SLASHER ROLL

Filed June 13, 1949 2 Sheets-Sheet 1

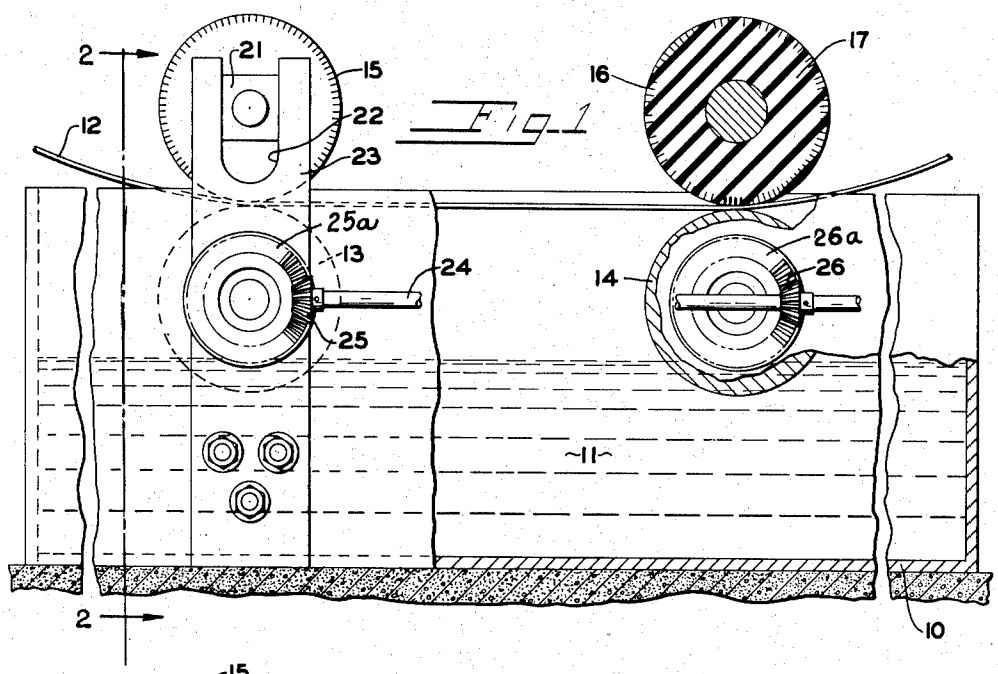


Fig. 1

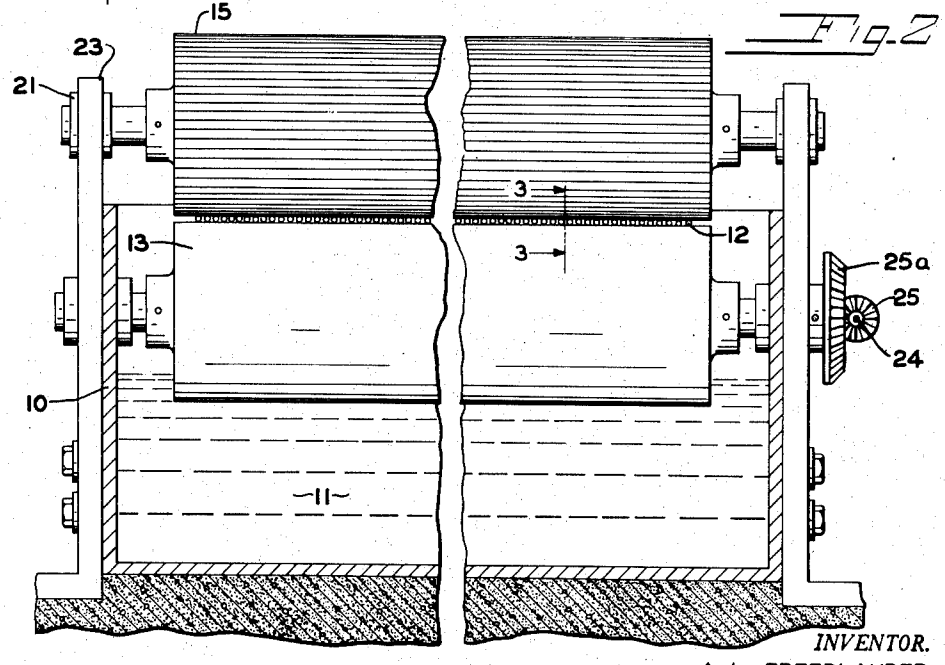


Fig. 2

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Fig. 3

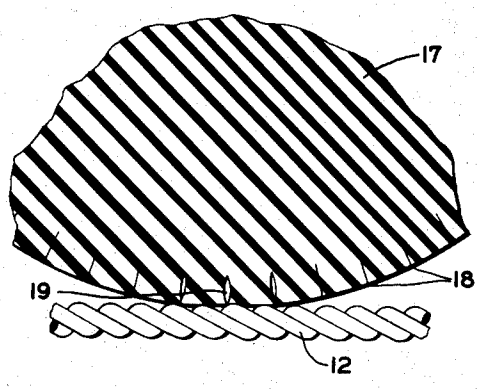


Fig. 4

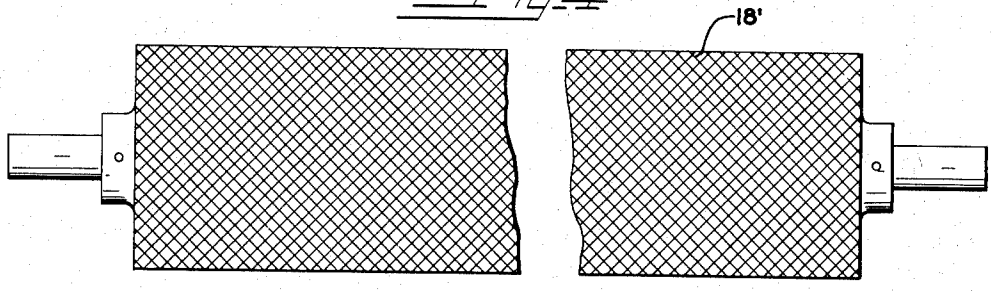
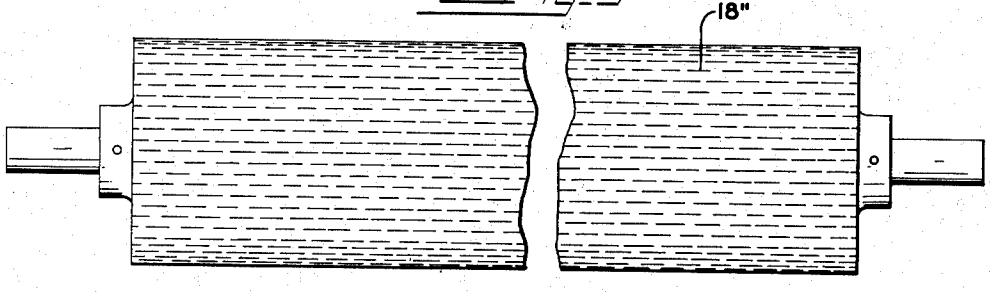


Fig. 5



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Patented Oct. 27, 1953

2,656,582

UNITED STATES PATENT OFFICE

2,656,582

SLASHER ROLL

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Application June 13, 1949, Serial No. 98,849

5 Claims. (Cl. 28—28)

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This invention relates to an apparatus for the impregnation of textile materials, and more particularly to an apparatus for the application of sizing to textile yarns in the operation known as slashing. This invention relates further to a novel type of roll especially adapted for use in the slashing operation and adaptable for use in other applications where coating or impregnation is involved.

Slashing is an operation used in the textile industry in the application of sizing material to textile yarns and in particular to cotton, rayon and artificial silk fibers in general. Various types of sizing materials are used depending on the type of yarn and the various results desired. Starches are generally used in the sizing of cotton yarns, whereas gelatine, soluble starches, and natural gums are most generally used in the sizing of rayon yarns. The sizing material may also include softeners, such as sulphonated oils, and penetrants or wetting out agents. The application of size to the textile yarn makes the yarn smoother and stronger to stand the strain of weaving, eliminates frying and facilitates subsequent handling of the yarn.

In carrying out the slashing operation, a number of strands of the work yarn are positioned in parallel between one or more pairs of horizontal rollers arranged with a bottom roll immersed in the sizing liquid and a top roll resting upon the bottom roll and driven by the rotation thereof. The yarn may pass between the rolls without immersion in the bath, being impregnated by the sizing liquid carried into contact with it by the bottom roller, or in some cases, may pass beneath the bottom roller for immersion in the sizing liquid prior to passing between the two rollers. The bottom rollers are generally made of copper and are gear driven. The top rollers, commonly known as the slasher rolls, are generally constructed of cast iron and usually weigh approximately 500 lb. each and are normally covered with resilient wool blankets. The function of the wool blanket, by the nature of its resilience and absorptive properties, is to remove excess size from the yarn as it emerges from the bite of the rollers. These blankets possess the necessary resilience and absorptive properties to properly dress the yarn to a predetermined proportion of sizing. In the case of cotton yarns with starch size, this usually runs to about 16% to 18% based on the weight of the yarn. In general, the slasher roll must have the property of uniformly distributing the size and controlling the proportion which

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is permitted to remain in the yarn and must minimize the waste of excess sizing material. Furthermore, the roll surface must be resistant to hot size solutions, such as boiling starch, and must also be resistant to oils and chemicals which may be incorporated with the sizing material. In addition, the roll must eliminate flattening of the yarn and leave no roll marks, and must uniformly retain its resilience over its period of use.

The wool blanket performs its operation satisfactorily, but has the disadvantage of cost and short life in service. In place of wool blankets, rolls having surfaces of synthetic rubber and which are resistant to the various materials involved, have been used and have been found to be generally satisfactory. However, such rolls possess certain disadvantages particularly due to the fact that they do not permit sufficient variation in their surface structure to control the distribution of sizing over a variable range. It is therefore desirable to construct an apparatus for slashing in which the slashing rolls are so constructed that they will have all of the advantages of resistant synthetic rubber surfaces and at the same time be adaptable to a wide range of conditions and sizing concentrations.

It is therefore an object of the present invention to provide an apparatus for the impregnation of textile materials with size or other materials in which the proportion of size may be readily controlled.

It is a further object of the present invention to provide a slashing roll having a surface structure which is highly resistant to the sizing material and conditions of operation over a long period of time and at the same time will properly dress the yarn to a predetermined concentration of size.

It is an additional object of the present invention to provide a roll adapted for the application of coating materials to other objects.

In accordance with the present invention, it has been found that an apparatus of the type described may be constructed using rolls having rubber surfaces and which will function over a wide range of conditions to produce sized yarns containing predetermined proportions of sizing material. This result is achieved by forming a slashing roll having a desired type of rubber surface and forming in said surface a plurality of slits, cuts, or incisions which run transversely to the direction of motion of the yarn or other material which is to be coated. The operation of forming such incisions is known as "siping,"

In use these cuts have a pronounced squeegee effect or action and perform the same function as the wool blanket. The rolls can be adapted to function properly over a wide range of conditions by regulating the depth, number, and spacing of the cuts as well as their arrangement on the roll surface.

The invention will be more fully understood from the following description taken in conjunction with the accompanying drawings which illustrate a typical arrangement for the sizing of cotton yarns and various slashing rolls adapted for this purpose constructed in accordance with the present invention.

In the drawing:

Fig. 1 is a side elevational view, partly in cross section, of an apparatus incorporating the novel features of the invention.

Fig. 2 is a cross sectional view taken along lines 2—2 of Fig. 1 showing the rolls and mounting brackets therefor in elevation.

Fig. 3 is an enlarged fragmentary cross sectional view taken along line 3—3 of Fig. 2.

Fig. 4 is a view in elevation of a modified form of the slasher roll showing an alternative arrangement of slits.

Fig. 5 is a view in elevation of another modified form of the slasher roll showing still another arrangement of slits therein.

Referring to the drawings in detail, reference numeral 10 as shown in Figures 1 and 2, indicates a container which holds sizing bath 11. Thread or yarn to be sized is designated by reference numeral 12. This material is guided between a front drive roll 13 and a back drive roll 14 both made of steel or copper and mounted near the top of the bath so as to be partially submerged therein. Both of these rolls are driven by shaft 24 through beveled gears 25, 25a, 26 and 26a. Above each of the lower rolls 13 and 14 is mounted a rubber covered slasher roll. These rolls are designated by reference numerals 15 and 16. They frequently weigh between 500 and 700 pounds and run freely driven by the friction of their weight resting on the rotating bottom rolls. The slasher rolls are mounted in bearing blocks 21 which are vertically slidable in U-shaped slots 22 which are formed in end bearing brackets 23. These slots are open at the top to facilitate removal of the rolls for cleaning, and permit the full weight of rolls 15 and 16 to bear upon the thread 12. Although Figures 1–3 show the yarn or thread as keeping the top and bottom rolls apart slightly, this is for the purpose of illustration only and in actual practice the surfaces of the two rolls are in rolling contact with the thread between.

Each slasher roll 15 and 16 is composed of rubber or one of the synthetic rubberlike materials. The choice between natural and the various synthetic rubbers depends primarily upon the exact use intended for the slasher rolls and the type of sizing bath in which they are to be used. Each slasher roll comprises a layer of the desired rubber 17 around a metal core, preferably of iron. In order to provide for proper control of slashing by controlling the rate and degree of impregnation of sizing material, each slasher roll is formed with a number of slits or incisions cut into the surface of the roll. As shown in Figures 1 to 3, these slits are formed by incising or siping the surface of the roll longitudinally thereof in spaced parallel incisions. These cuts may be made in a machine using sharpened knife blades and the depth and spacing thereof will depend upon the nature of the sizing action which is desired to be obtained. In a typical operation these cuts are $\frac{3}{16}$'' apart and $\frac{1}{8}$'' deep. In general, the slits may range from $\frac{1}{32}$'' to $\frac{1}{2}$'' in depth and may be spaced from $\frac{1}{32}$'' to 1'' apart. These slits are formed in the rubber by cutting without the removal of any material, so that the walls of the slits are either in direct contact or are held apart very slightly by the internal tension of the material; this procedure is commonly known in the rubber industry as "siping."

As illustrated in Fig. 3, the slits have a squeegee action and appear to function by exerting a sucking or absorbing effect through the compression of the slits and their opening as shown at 19. By this action, a certain amount of the sizing material may be removed from the yarn and therefore the number and depth of these slits will serve to exert a controlling effect on the concentration of size in the yarn.

Fig. 4 illustrates a modified form of roll in which slits 18' are formed diagonally in two directions providing a crisscross effect.

In Fig. 5 another form of roll is shown in which slits 18'' are formed longitudinally but are not continuous and the slits in each roll are staggered, so that all of the threads being sized will be intersected by at least some of the slits.

A typical compound used in making rolls of the present invention is as follows:

	Parts by weight
Butadiene-acrylic nitrile copolymer	100
Whiting	20
Clay	20
Zinc oxide	5
Sulfur	3
Accelerator	1
Softeners	20

A pair of slasher rolls were made with the above compound. The rolls were 8⅝'' outside diameter and 58'' in length. The roll surfaces were slit or "siped" longitudinally in parallel cuts ⅛'' deep and ⅛'' apart. These rolls have run in a conventional slashing operation for nearly a year without appreciable wear or deterioration. A conventional wool covered roll would run for a period of only four to six weeks before the cover would require replacement.

The rolls of the present invention may be made of or covered with various types of rubber or rubber-like material. Natural as well as synthetic rubbers may be used as well as mixtures thereof. These materials are compounded with vulcanizing agents, fillers, plasticizers, modifiers and the like in the manner known to those skilled in the art and are vulcanized in the usual way. The exact types of rubber and compounding materials used will depend upon the degree of resilience required, the amount of resistance to the sizing bath, and other pertinent factors. Among the synthetic rubbers which are satisfactory for the purpose are the chloroprene polymers ("neoprene"), butadiene copolymers, such as butadiene-acrylonitrile ("Buna-N") or butadiene-styrene ("Buna-S"), and the polysulfide rubbers ("Thiokol").

While the rolls of the present invention are particularly designed and adapted for use in the sizing of textile fibers, they may also be used for the coating of sheets of other materials in view of the control which may be effected upon the distribution of coating materials by means of the slit structure described.

It will also be understood that while certain specific embodiments of the invention have been

described herein, it is not intended to limit the invention thereby in view of the fact that this invention is susceptible of various modifications and changes which come within the scope of the disclosure herein and the appended claims.

I claim:

1. Apparatus for the sizing of textile yarns and threads comprising a liquid sizing bath, a guide roll at least partially submerged in said bath, a rubber-covered roll positioned above said guide roll exteriorly of the bath and resting upon said guide roll whereby rotation thereof is effected on rotation of said guide roll, means for conveying textile yarns and threads between said rubber-covered roll and said guide roll during the rotation of said rolls, said rubber-covered roll having formed in the surface thereof a plurality of spaced incisions extending at an angle to the direction of movement of the textile yarns and threads, said incisions being in the form of slits formed without removal of material, whereby control of the amount of sizing liquid left in the yarns and threads after passage between the rolls is effected.

2. An apparatus according to claim 1 wherein the rubber-covered roll is formed with a series of parallel diagonal incisions spaced around the periphery thereof, said incisions being criss-crossed by another series of parallel diagonal incisions extending around the periphery of the roll in a different direction.

3. An apparatus according to claim 1 wherein the incisions are formed in a plurality of rows each incision being formed longitudinally of the roll surface intermittently in each row with the incisions in each row being staggered with respect to the incisions in the adjacent row.

4. An apparatus according to claim 1 wherein the incisions are parallel to the longitudinal axis of the roll and extend at right angles to the direction of movement of the yarns or threads.

5. In an apparatus for the sizing of yarns and threads wherein said yarns and threads are impregnated with sizing fluid and conveyed between a guide roll and a superimposed slasher roll, said slasher roll being formed with a rubber cover having a plurality of spaced incisions formed over the surface thereof, said incisions being in the form of slits formed without removal of material, and said incisions extending at an angle to the direction of movement of the yarns and threads, the depth and spacing of said incisions controlling the quantity of sizing liquid incorporated in said yarns and threads.

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