Nov. 18, 1952 D. A. CABOT 2,618,024

TEXTILE DRAFTING MECHANISM

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Fig 1

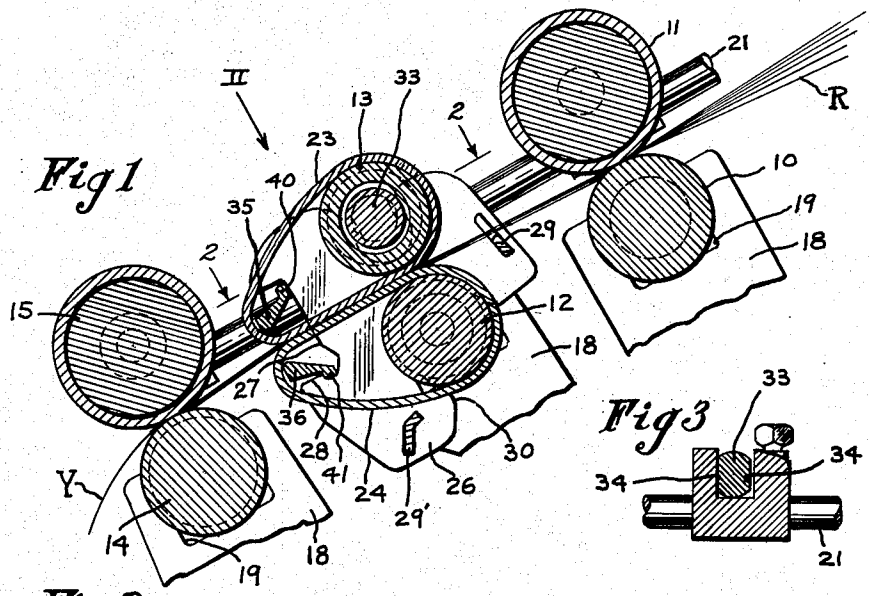


Fig 3

Fig 2

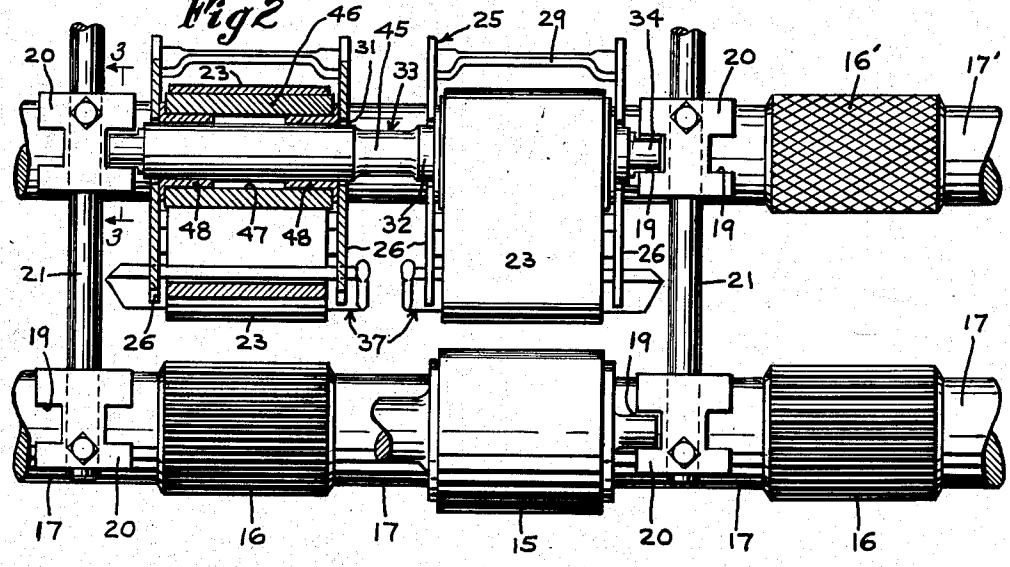
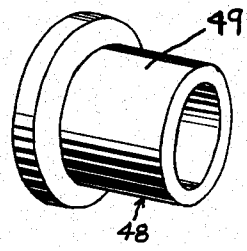


Fig 4



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TEXTILE DRAFTING MECHANISM

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3 Claims. (Cl. 19—131)

1

This invention relates in general to drawing mechanisms of long draft spinning or roving frames, such as the Casablancas system and other like double belt or apron systems and, more particularly, is concerned with an improved manner of mounting the upper belt in such a drafting system.

In the arrangement of this class of drafting apparatus now customary the roving or sliver is drafted by passage between two parallel runs of a pair of upper and lower endless traveling belts or aprons which conduct the fibers to a front pair of drawing rolls. As is customary in such systems the belts are guided laterally by the two side walls of a cradle or frame structure which rests on the lower apron driving element while the front loops of the belts encircle and are guided over and supported either by two spaced fingers or by a removable U-shaped member mounted at the forward portion of the cradle. The rear loop of the upper belt is supported by a solid top roll which has two spaced enlarged cylindrical portions over which the rear loop of an individual upper belt runs, the top roll being mounted for free rotation bodily in the side notches of the usual neb members which are carried by the cap bar arms. The lower belt is positively driven by the bottom roll upon which the cradle rests and has its rear loop running over an enlarged cylindrical portion on this roll arranged between the side walls of the cradle and provided with a rough driving surface in engagement with the belt.

The cradles used for guiding these belts or aprons are each made up of two generally parallel sheet metal plates arranged separated one from the other at a distance slightly greater than the width of the bodies of the enlarged cylindrical portions of both apron guiding rolls, viz, the top and bottom drawing rolls operating within the cradle, as well as the width of the belts or aprons confined therein.

In this prior arrangement, the width of the bodies of the enlarged cylindrical portions of both top and bottom apron rolls arranged within the cradle must be very exact and held to close machining tolerances to insure their exact vertical alignment and proper running within the cradle without binding against the side plates of the cradle. In practice, however, manufacturing conditions frequently are such that they result in dimensional deviations or variations in the width and/or the disposition of these enlarged bodies on such drawing rolls whereby, in certain instances, they cannot be superposed within the

2

same cradle while in other cases they lack mutual correspondence in positions on the respective cooperating apron rolls as to result in the top roll member binding endwise against the cradle side walls.

In order to obviate these difficulties, the present invention comprises certain modifications and improvements in the construction of the top roll member which supports, drives and guides the upper belt or apron, and by which is obtained an efficient functioning mechanism capable of long life and requiring a minimum of maintenance, no lubrication, and entirely free from the alignment and rubbing difficulties above mentioned. More specifically, this improved top roll comprises a non-rotating axle and a pair of tubular shell rolls journaled for free rotation thereon by rigid molded nylon sleeve bearing means disposed axially within each shell roll. Nylon is a generic term applied to an entire family of synthetic linear polyamide resins certain of which are used in the manufacture of synthetic textile fibers.

It is accordingly an object of the invention to provide an improved mounting arrangement of the upper belt or apron member in a long draft double belt or apron system.

Another object of the invention is to provide an improved top roll of simple construction that will be self-aligning with respect to the side wall members between which the active working portion of the roll is arranged.

A further object of the invention is to provide a top roll wherein the rotatable roll member for guiding and driving the upper belt or apron is journaled for free rotation on a fixed axle by sleeve bearing means which requires no lubrication.

A preferred form of the invention is shown in the drawing, in which

Fig. 1 is a sectional end elevation of a portion of a long draft double belt or apron system with my improvements applied thereto;

Fig. 2 is a partial plan view, looking in the direction of the arrow II in Fig. 1 and showing a horizontal section on line 2—2 of Fig. 1;

Fig. 3 is a sectional view along the line 3—3 of Fig. 2; and

Fig. 4 is a perspective view of one of the rigid molded plastic sleeve bearings.

Referring to Figs. 1 and 2, I have indicated parts of a drafting mechanism of a long draft spinning frame which are here shown for the purposes of illustration only as comprising three sets or pairs of bottom and top drawing rolls,

viz, back drawing rolls 10 and 11, intermediate drawing rolls 12 and 13, and front drawing rolls 14 and 15 respectively. The bottom rolls 10 and 14 are of usual construction, each having numerous longitudinally fluted bosses 16 and reduced cylindrical neck portions 17 spaced alternately along its length (see Fig. 2) on driven shafts which are suitably journaled in the usual roll stands 18 and extend continuously for substantially the entire length of the spinning frame. The top rolls 11 and 15 also are of usual construction, each having its ends loosely accommodated within the notches 19 of the usual cap bar nebs 20 which, in turn, are individually adjustable on the spaced cap bar arms 21. The top rolls 11, 13 and 15 are forced downward into their cooperative pressure relationship with their companion bottom rolls by appropriate weighting devices (not shown), as is a customary practice. It will be understood that the successive pairs of rolls from back to front are driven at successively higher surface velocities, as is usual practice. The roving R is fed into the nip of the back rolls 10 and 11 and the yarn Y is delivered from the front rolls 14 and 15 to appropriate twisting and packaging mechanism which, in this instance, will be a ring and a traveler but, when the application of the present invention is made to a roving frame, will be a roving flyer.

The top and bottom intermediate rolls 13 and 12 are provided with multiple sets or pairs of coacting upper and lower endless traveling belts or aprons 23 and 24 respectively in each set for conducting roving or sliver passing between them to the front drawing rolls 14 and 15, the rear loops of these belts encircling and being guided over their associated drawing rolls 12 and 13. The drawing rolls 12 and 13 are here shown as being arranged substantially at right angles to the cap bar arms 21.

The lower belt or apron 24 is positively driven by the bottom roll 12 the construction of which is similar to the bottom rolls 10 and 14 in that it also is formed with a series of alternately disposed enlargements or bosses 16' and reduced cylindrical neck portions 17' on a driven shaft, but differs from the rolls 10 and 14 by having the peripheries of the bosses or enlargements provided with a roughened surface, such as that formed by knurling, instead of their being longitudinally fluted whereby a positive driving engagement of the roll with the underside of the belt or apron 24 will be maintained without injury to the inner driving surface of the apron or belt.

Associated with each set of belts or aprons is a guiding cradle or frame 25 which is supported by the intermediate rolls 12 and 13 and comprises two sheet metal side plates 26 one at each side of said belts to prevent lateral slipping thereof, each side plate being formed at its front edge with a recess 27 and a projection 28. These side plates are of identical design and are connected by a pair of transverse bar members 29 and 29' which maintain them in a generally parallel relation and separated at a distance corresponding substantially to the width of both belts or aprons which are guided therebetween. The lower margins of both side plates 26 are recessed or notched as at 30 to straddle the bosses 16' and fit over or rest upon the cylindrical neck portions 17' of the bottom intermediate roll 12. The upper marginal edge portions of the side plates 26 also are recessed or notched as at 31 to accommodate insertion therethrough of my improved idler top roll 13 and to receive the corresponding cylindrical enlargements or bosses 32 of the non-rotatable arbor or axle 33 thereof. The axle 33 of this improved top roll 13 extends between a pair of adjoining cap bar arms 21 and is positively held thereby against rotation by having the ends of the arbor or axle 33 provided with flat portions 34 which are set in the notches 19 in the cap bar nebs 20 carried by said adjoining arms 21. The novel construction of the top roll 13 will be described in greater detail as the specification proceeds.

The front loops of the belts or aprons 23 and 24 encircle and are internally guided over the front edge of the arm members 35 and 36 respectively of a U-shaped tensor member 37 the arms of which extend crosswise of the front of the cradle 25 through their respective belts, the tensor being removably mounted in the recess 27 formed in the front edge portion of each of the side plates 26 of the cradle frame.

The tensor member 37 conforms in general to construction disclosed in the Casablancas Patent No. 2,075,571 granted March 30, 1937, and is formed as a single U-shaped member having arms 35 and 36 positioned one above the other in vertically spaced relation and connected at one end with the other end of each bar free. The arms 35 and 36 of the tensor member 37 are here shown as being parallel longitudinally, of flat shape, and convergent in cross-section. The rear edges of the arms 35 and 36 have beaded portions 40 and 41 respectively which are so formed that in conjunction with the side plates 26 the bead of the lower of said arms is supported adjacent both its front and rear edges by the projection 28 and the inner lower corner of the recess 27, and the beaded portion of the upper arm is engaged in the inner upper corner of the recess 27 when the pressure of the belts or aprons 23 and 24 holds the tensor member 37 in its normal operating position with respect to the cradle 25 to prevent both forward and rocking movement of the tensor 37 therein. The cradle 25 thus firmly supports the belts or aprons 23 and 24 in operative position with parallel runs closely adjacent, and the aprons also are restrained from lateral or axial displacement by the side plates 26.

The top roll 13 is an idler roll for guiding a pair of top belts or aprons 23 individually within their associated cradle units 25 and consists of the one-piece non-rotatable axle or arbor 33 extending between and set in the cap bar arms 21 and having the two cylindrical enlargements or bosses 32 spaced apart longitudinally of the arbor by the cylindrical intermediate neck portion 45 of smaller diameter. Encircling each of the cylindrical enlarged body portions or bosses 32 and mounted thereon are the hollow cylindrical or tubular shell rolls 46 which form the guiding rollers for the top aprons 23. The outer periphery of each of these shell rolls 46 is roughened, as by knurling, for gripping the inner side of the top belt 23. The rolls 46 each have their inner peripheries well spaced radially from the bosses 32 by having an axial bore 47 therethrough of larger diameter than that of the bosses, and they are journaled for free rotation thereon by means of two spaced flange-type sleeve bearing members 48, each formed of rigid molded nylon polyamide resin. The sleeve bearings 48 turn with the shell roll 46 and have their respective bores molded or machined to provide a free running fit with the bosses 32.

These sleeves also have their cylindrical body portions 49 situated within the tubular bore 47 of the shell roll 46 adjacent its opposite ends by being forced axially therein after introduction from opposite ends of the bore. The physical properties of rigid type molded nylon plastic bearings 48 are such that they have a low coefficient of friction against polished steel and also have the ability to be used without lubrication for light loads at high speeds or for moderate loads at low speeds. Type FM–10001 nylon thermoplastic molding compound is here mentioned, by way of example, as one particular form of rigid type of commercially available nylon that is adapted to be molded by the injection process into rigid molded bearing shapes or into blanks for machining, and thus is an excellent type of nylon for use in making the tubular sleeve bearings 48. The mechanical and physical properties and characteristics of type FM–10001 nylon (polyamide) resin molding compound are set forth in tabulated form in "Table I—properties of nylon molding compounds," at page 180 of Modern Plastics Encyclopedia, 1948 edition, published by Plastics Catalogue Corporation, 122 East 42nd St., New York, N. Y., and are as follows: specific gravity 1.14; a tensile strength (at —70° F., 77° F., 170° F.) of 15,700 p. s. i., 10,530 p. s. i., and 7,600 p. s. i., respectively; a modulus of elasticity at 77° F. of 325,000 p. s. i.; an Izod impact strength (at —70° F., 77° F., 170° F.) of 0.42 ft.-lb./in., 0.94 ft.-lb./in., and 0.97 ft.-lb./in., respectively; a Rockwell "M" scale of hardness of 90; a water absorption factor of 1.5%; and a linear coefficient of expansion per °F. of 5.7×10^{-5}.

The cradle units 25 when in operating position are arranged with their side plates 26 straddling the bodies of two of the roughened enlargements or bosses 16' of the lower drawing roll 12 which is disposed below and within the space defined by the vertical planes of the spaced cap bar arms 21. The side plates of each cradle also embrace the ends of the associated shell roll 46 therein when assembled with said plastic sleeve bearings on said axle whereby said plates tend to automatically align said shell rolls in said cradles by causing them to adjust themselves axially along their respective cylindrical enlargements 32 of the axle 33 into mutual correspondence with the belt driving enlargements or bosses 16 within the cradle of the lower drawing roll 12.

What is claimed is:

1. In a long draft textile machine, a cap bar, a non-rotatable axle held thereby, an idler top roll member on the axle and freely slidable therealong, an endless belt on the top roll member, a lower driven roll having an enlarged belt driving portion, an endless belt on the enlarged portion of said lower driven roll and arranged for cooperating with the upper belt, and a cradle frame unit including a pair of connected spaced side plate members, one at each side of both belts for guiding the moving belts between them, said cradle frame unit having its upper part adapted to removably receive and be held by the non-rotatable axle of the idler top roll member, and having its lower part adapted to receive and rest upon the lower driven roll and contain the enlarged belt driving portion thereof and be held by its ends against sidewise displacement along the lower driven roll, said idler top roll member together with its endless belt being self-aligning within the cradle frame unit by being readily slidable bodily along the idler top roll axle under the influence of the side plate members of said cradle frame unit and consequently assuming at all times positions of mutual correspondence with the belt driving portion of the lower roll and the lower endless belt respectively.

2. In a long draft spinning frame, a cap bar, a non-rotatable axle held thereby, a top roll member sleeved on the axle for sliding axially therealong as well as for free rotation thereon, an endless belt on the top roll member, a lower driven roll having a large roughened belt driving portion and a reduced shaft portion at each end thereof, an endless belt on the said belt driving portion of the lower roll and arranged for cooperating with the upper belt, and a cradle frame unit including a pair of connected spaced side plate members one on each side of the belts for guiding the moving belts between them, said cradle frame unit having the upper edge portion of its side plate members recessed to removably receive the non-rotatable top roll axle and to be held thereby, and having the lower edge portions of its plate members recessed to readily receive and be supported by the shaft portions of the lower roll as well as to straddle the belt driving portion thereof, the ends of said belt driving portion of the lower roll serving to retain said cradle frame unit and the lower belt against sidewise displacement on the lower roll, said top roll member with its endless belt being self-aligning within the cradle frame unit by being readily slidable bodily along the top roll axle under the influence of the side plate members of said cradle frame unit and consequently assuming at all times positions of mutual correspondence with the belt driving portion of the lower roll and the lower endless belt respectively.

3. In a long draft spinning frame, a cap bar, a top roll axle removably and non-rotatably held thereby, said axle having a cylindrical enlargement, an idler roll member on the said cylindrical enlargement, an endless belt having its rear loop guided over the idler roll member, a lower driven roll having an enlarged roughened belt driving portion disposed substantially beneath the cylindrical enlargement of the top roll axle, an endless belt having its rear loop guided over and in driving engagement with the enlarged belt driving portion of the lower roll and arranged for cooperating with the endless belt on the idler top roll, and a cradle frame unit including a pair of connected spaced side plate members one at each side of the belts for guiding the moving belts between them, said cradle frame unit having its upper part adapted to removably receive and be held by the non-rotatable axle of the idler top roll member, and having its lower part adapted to removably receive and rest upon the lower driven roll and be restrained by the contiguous ends of the enlarged belt driving portion of the lower roll against sidewise displacement on the lower driven roll, said idler top roll member together with its endless belt being self-aligning within the cradle frame unit by being readily slidable bodily along the idler top roll axle under the influence of the side plate members of said cradle frame unit and consequently assuming at all times positions of mutual correspondence with the belt driving portion of the lower roll and the lower endless belt respectively.

DEANE A. CABOT.

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