Oct. 2, 1956 L. M. COTCHETT 2,764,782

TOP ROLL FOR TEXTILE DRAWING MECHANISMS

Filed Feb. 3, 1951

FIG. 1

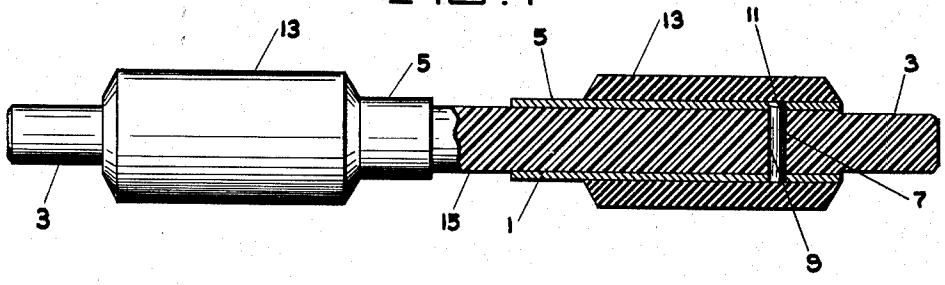


FIG. 2

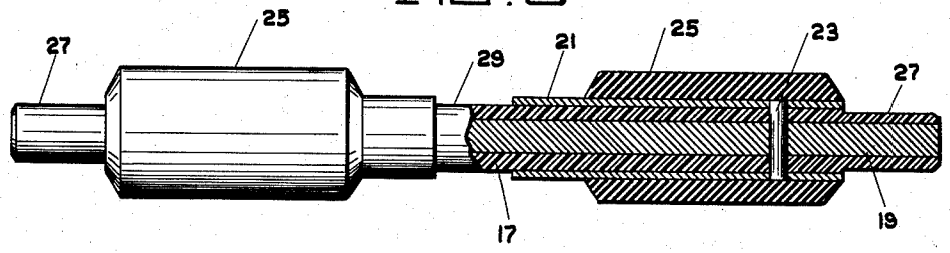


FIG. 3

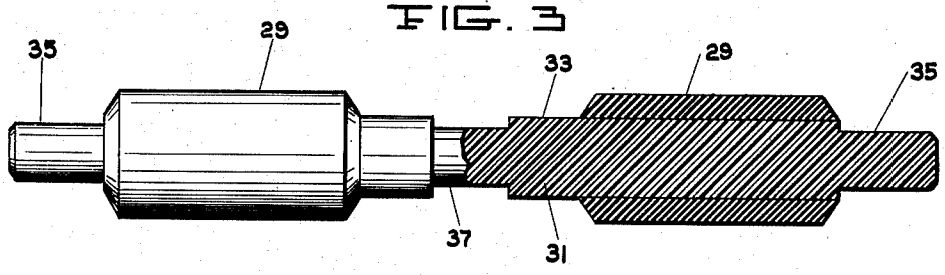
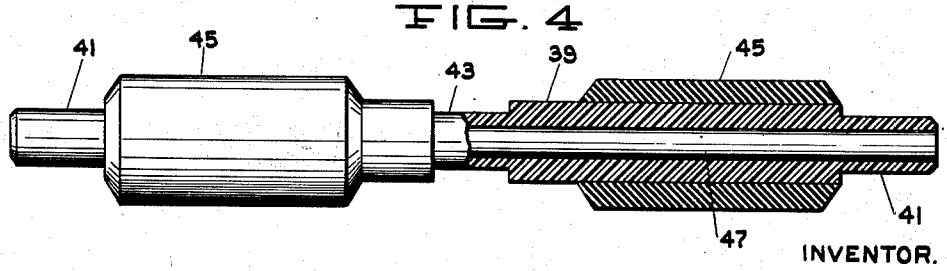


FIG. 4



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TOP ROLL FOR TEXTILE DRAWING MECHANISMS

Louis M. Cotchett, Whitman, Mass.

Application February 3, 1951, Serial No. 209,286

1 Claim. (Cl. 19—142)

The present invention is an improvement in drawing rolls used for the drafting of textile fibers in the production of sliver, roving, and yarn, and relates particularly to top rolls of the so-called solid type in which the entire roll rotates as a unit, and which conventionally comprises a cast iron or steel body having two integral enlargements or bosses connected by a reduced or neck portion and also having an integral reduced portion projecting from the outer end of each boss forming a pintle or journal, the bosses being covered with cots of leather or synthetic or other non-metallic cushioning material having a moderate amount of resilience, which cots ride on the fluted lower rolls which are driven and impart rotation to the top rolls. To grip and thus draw the strands of sliver or roving between the top and bottom rolls, the top rolls are pulled down against the bottom rolls by weighting means applying its pressure to the top rolls through a saddle which bears on the neck of each top roll between the two bosses. To hold the top roll against shifting its position forward or backward, the protruding journals at the ends of each roll are held in slots formed in cap bars located at opposite sides of each roll thus constituting bearings maintaining the top roll in its proper working position.

A well known drawback in the use of these solid top rolls is the friction arising between the rotating surface of the neck of the solid top roll and the coengaging stationary surface of the saddle which bears down on the neck to weight the roll, as well as that arising between the bearing surfaces of the pintles and the slots in the cap bars which serve as bearings therefor. These bearing surfaces on the customary roll, being of cast iron or steel, have a relatively rapid rate of wear and become worn to such a degree as to impair their usefulness, with the result that the entire roll must be discarded because incapable of being effectively repaired. While accepted as a necessary incident of established manufacturing procedure, this replacement is still a substantial and continually recurring element of expense in the industry.

To prevent intolerably rapid wear of the necks and gudgeons of the rolls, lubrication must be supplied; but the lubricant used must be applied with the utmost restraint and accuracy to the bearing surfaces alone, both because the oil picks up the ever-present lint and fly to collect on the necks and pintles, under the saddle, and in the cap bar slots, and also because any spot or film of oil on the cots or on the fibrous material being drafted interferes with the drawing and damages the material. Thus, frequent cleaning of the rolls and saddles, and cleaning of the cap bars, is compelled by the accumulation of lint and fly when oil is used.

To avoid these alternative drawbacks flowing from wear and lubrication, drawing roll manufacturers have turned to the shell roll type of construction, in which the bearing surfaces are located within cot-bearing shells rotating about an arbor mounted non-rotatably in the drawing frame, and in the best-working types of shell rolls anti-friction bearings have been provided, to reduce to a

minimum the necessity for lubrication in order to get steady rotation. However, the multiplicity of the parts which must be made and fitted to close tolerances and of the handling operations incidental to assembling the rolls has made their cost so high as greatly to restrict their use.

Hence resort has been had to the use of special materials having low co-efficients of friction, obviating the need of lubrication, locally applied to form the bearing surfaces of solid type rolls, in the form of caps, bushings, or sleeves covering or replacing the metal journals or pintles on which the roll turns in its notches in the cap bar, and covering the mid-section or neck of the roll where the pressure of the saddle is applied. An example of such construction is found in patent to Richard K. Butler, covering Top Rolls for Textile Drawing Mechanisms, granted on March 25, 1954, No. 2,678,474. Synthetic plastic materials have been found to be especially advantageous for the formation of those low-friction bearing surfaces and I have found that of these materials the E. I. du Pont de Nemours Co.'s nylon and Teflon, the latter a polytetrafluoroethylene polymer, are peculiarly suitable because of their superior frictional characteristics which obviate or greatly reduce the necessity for the use of any lubricant. In these prior structures, the elements of synthetic material forming the bearing surfaces required to be made by operations separate from the forming of the roll and to be applied thereto as additional component elements, which procedure compels them to be accurately machined and fitted, at an additional cost which through far less than the cost of anti-friction shell type rolls, is still materially greater than that of plain solid rolls.

A leading object of the present invention is to produce a strong and lasting solid type roll possessing all the advantages of the rolls having applied synthetic or other low-friction bearing surfaces requiring little or no lubrication, while capable of being produced at a materially lower cost. To this end, I form the entire roll, or alternatively the major portion thereof, in either case including the bearing surfaces, of synthetic material such as nylon or Teflon, molded in a single operation to its final form and dimensions, or to such close approximation thereto as to require a minimum of machining to such dimensions, applying the cots directly and adhesively to the bosses of the roll, or to metallic shells fixed on and forming permanent parts of the bosses. The synthetic material thus left exposed between and beyond the ends of the cot forms the bearing surfaces. In this way all the advantages of the solid type rolls having applied special low-friction non-lubricated bearing surfaces are attained, but in a materially simpler manner at markedly lessened cost of production.

Other objects of the present invention, and the manner of their attainment are as made plain hereinafter.

Illustrative embodiments of the invention are shown in the accompanying drawings, in which

Fig. 1 is a part-sectional view of a solid roll comprising an arbor of low-friction material having metal sleeves applied to form the bosses.

Fig. 2 is a part-sectional view of a solid roll similar to that of Fig. 1, in which the low friction arbor is reinforced by a metallic core.

Fig. 3 is a corresponding view of the same type of roll in which the arbor and bosses are integral and the entire roll save the cots is made of low-friction material.

Fig. 4 is a part-sectional view of a solid roll similar to that of Fig. 3, with a reinforcing core of metal.

In the form of Fig. 1, the roll body 1 is in the form of an arbor made of a single cylindrical piece of nylon, Teflon, or other synthetic material having the desired characteristics of low co-efficient of friction and corresponding relative resistance to wear of its bearing sur-

faces even in the absence of all lubricant, coupled with adequate rigidity, ease of molding, and retention of shape and dimensions. This body 1 is preferably made of the maximum diameter permitted by the size and construction of the frame in which it is to serve, i. e., of the largest diameter permitted by a cot having the outside diameter and wall thickness needed for the work in hand, the extremities of the arbor being reduced in diameter to form pintles 3 of the proper size to fit the notches in the cap-bars (not shown) of the spinning or other frame. Steel sleeves 5 fitting upon the full-diameter portion of the body 1, preferably with a press fit, are installed on the body 1 with their outer ends at the terminus of the full-diameter portion of the body 1 and their inner ends spaced apart a distance in excess of the width of the saddle (not shown) of the weighting system which presses this top roll against its cooperating bottom roll (not shown) when in use, the saddle making its contact solely with the surface 15 of the portion of low-friction material of body 1 thus left exposed at the neck of the roll. Each sleeve 5 is preferably though not necessarily pinned to the body 1 by a pin 7 passing through a hole 9 in body 1 and through aligned diametrically opposed holes 11 in each sleeve, thus fixing the sleeve against relative rotation or axial movement with respect to the body 1.

Sleeves 5 thus form the bosses of the roll, which is completed by applying cots 13 of leather, rubber, or other suitable composition adhesively in usual manner to the outer surface of each sleeve 5, such surfaces being preferably knurled or grooved as in conventional practice to provide a better grip for the cement.

The steel sleeves 5 serve to widen the field of synthetic materials which can be used to form the body or arbor, since a number of otherwise suitable synthetic materials have the characteristic of changing their shape and dimensions under certain circumstances, for reasons not fully understood. Thus the sleeves 5 maintain a truly cylindrical shape throughout the life of the roll in spite of such changes taking place in the material of body 1, as well as aiding through stiffening the roll to prevent its bending under the load of the saddle when in use.

The form of Fig. 2 has its body or arbor formed in nylon, Teflon, or other suitable low-friction synthetic material 17 molded about a steel or other metallic shaft or core 19, preferably of circular section, axially disposed within the plastic 17, the rest of the roll construction being as in Fig. 1, namely with shells 21 of steel or other metal fitted on the arbor and secured by pins 23, with the cots 25 adhesively affixed to the exterior of the shells. As before, the low-friction synthetic material 17 forms the bearing surfaces for the roll at the pintles 27 and the neck 29. The steel shaft or core 19 stiffens the roll against bending under the load of the saddle, as well as preventing deformation and warping of the roll out of true axial alignment through internal changes in the plastic or from other causes; while the steel shells 21 serve as in Fig. 1.

In the form of Fig. 3, the entire roll with the exception of the applied cots 29 is formed of suitable low-friction synthetic plastic material in a single molding operation in its final form and dimensions. The plastic material 31 comprises both the bosses 33 on which the cots 29 are adhesively mounted and the portions of reduced diameter forming the pintles 35 and the neck 37 which serve as the bearing surfaces, the bosses 33 thus being integral with and forming portions of the arbor which no longer has a separate identity. Though lacking the safeguards of the forms of Figs. 1 and 2 against deformation, this roll is adapted for use in many instances such as under light weighting pressures and at slower speeds, as in the case of back rolls. Through its extremely low cost construction with absence of all handling, machining, and assembly operations except the applying and buffing of the cots, it can be economically discarded and replaced when it does become no longer usable.

The form of Fig. 4 is like that of Fig. 3 in that the bosses 39 are integral with the body of the roll and the pintles 41 and neck 43, all being molded in finished form in a single operation, with cots 45 subsequently adhesively applied directly to the surface of the bosses 39. An adidtional feature of this form is the provision of a steel or other metallic shaft or core 47 which as in the case of Fig. 2 stiffens the entire roll to prevent bending under the load of the saddle applied to the neck 43. Through performing this function and also through preventing spontaneous warping or other change of shape of the roll, the addition of the core 47 makes possible the use of synthetic materials otherwise rendered unsuitable through weaknesses in these respects through characterized by other desirable features such as low coefficients of friction, ease of molding, and cheapness. As in the case of Fig. 2, the core 47 is centered in the mold during molding, and the entire roll with the exception of the cots is produced in its lnished form and dimensions at a single operation.

While the named synthetic materials are characterized by molding qualities which render it unecessary to true up and finish their surfaces to size, it is of course contemplated to perform the added steps of grinding or buffing the various diameters of the several rolls to the dimensions and character of surface wanted, in cases where the particular synthetic material chosen makes such additional operation desirable.

While I have illustrated and described certain forms in which the invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art, without departing from the scope of the invention as expressed in the claim. Therefore, I do not wish to be limited to the particular forms shown, or to the details of construction thereof, but what I do claim is:

A top roll for the drawing mechanisms of spinning and roving frames comprising in combination a roll body of synthetic plastic material and having portions of relatively greater diameter forming bosses on the roll, and portions of relatively lesser diameters forming a neck and pintles on the roll, and cots carried by the bosses.

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