

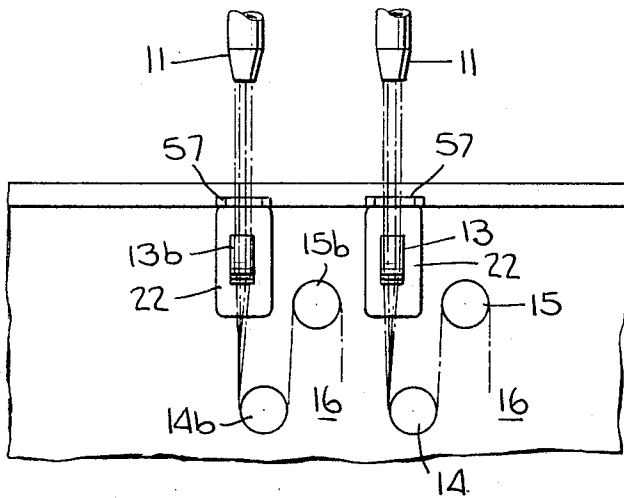
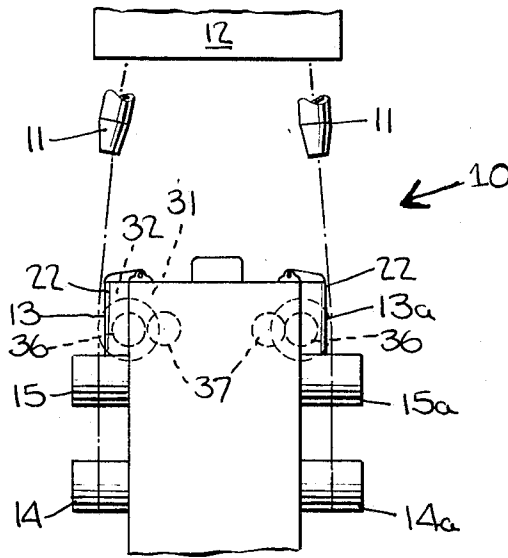
Nov. 29, 1966

P. CONRAD
FINISH ROLL

3,288,107

Filed Oct. 1, 1964

4 Sheets-Sheet 1



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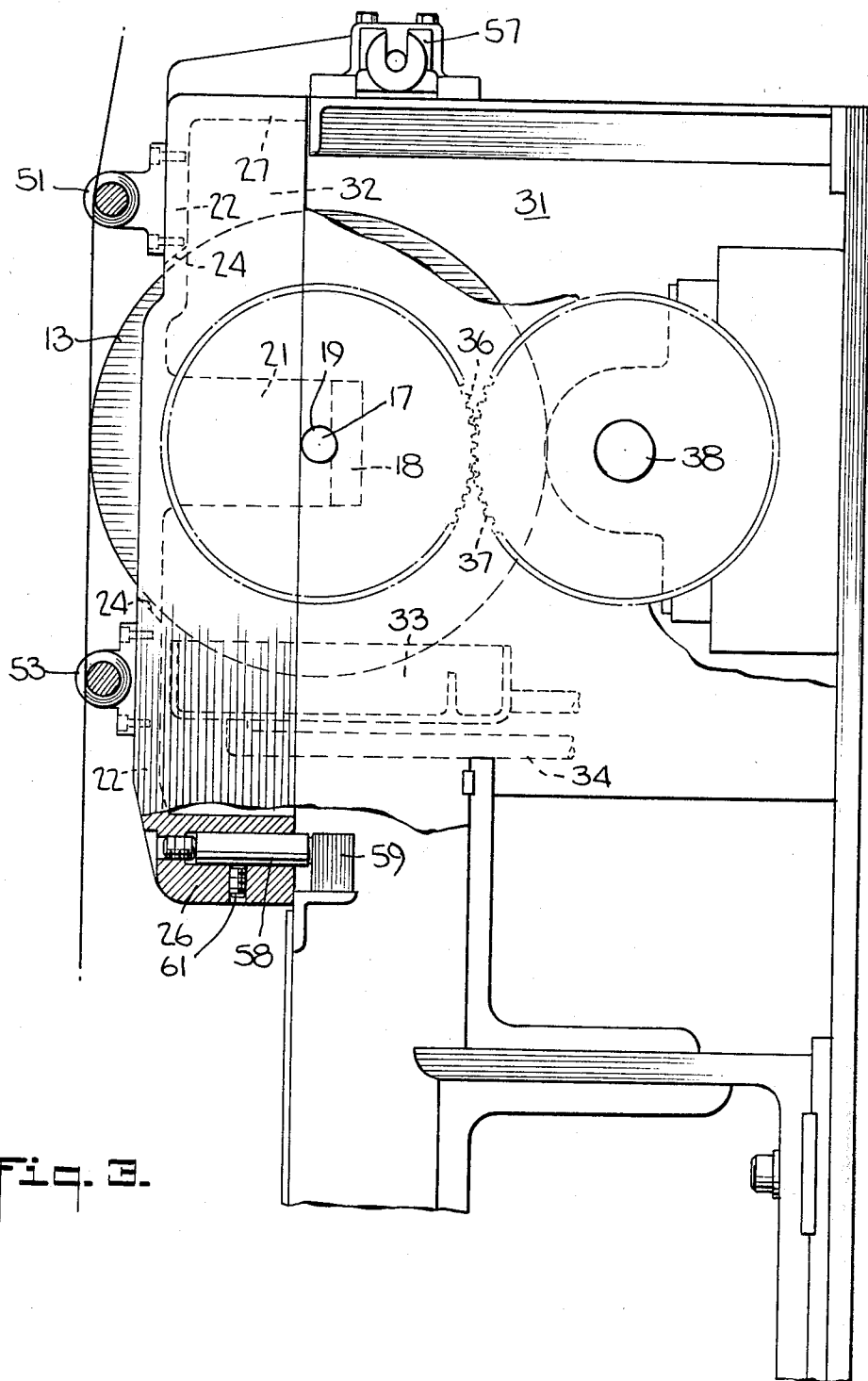


Fig. 3.

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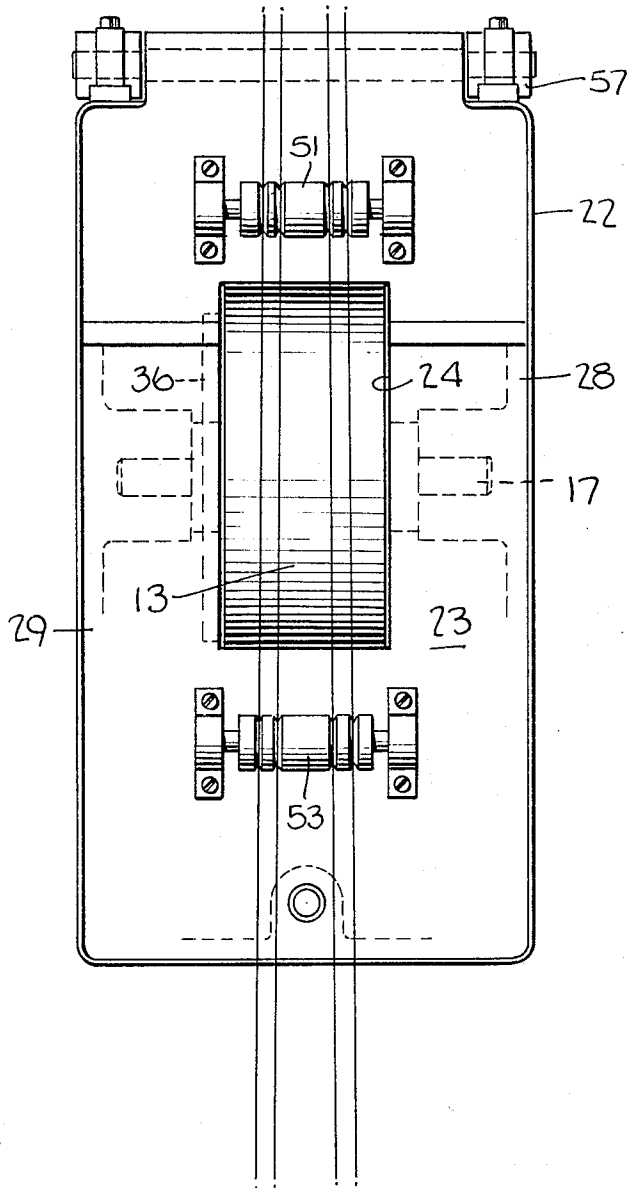


Fig. 4.

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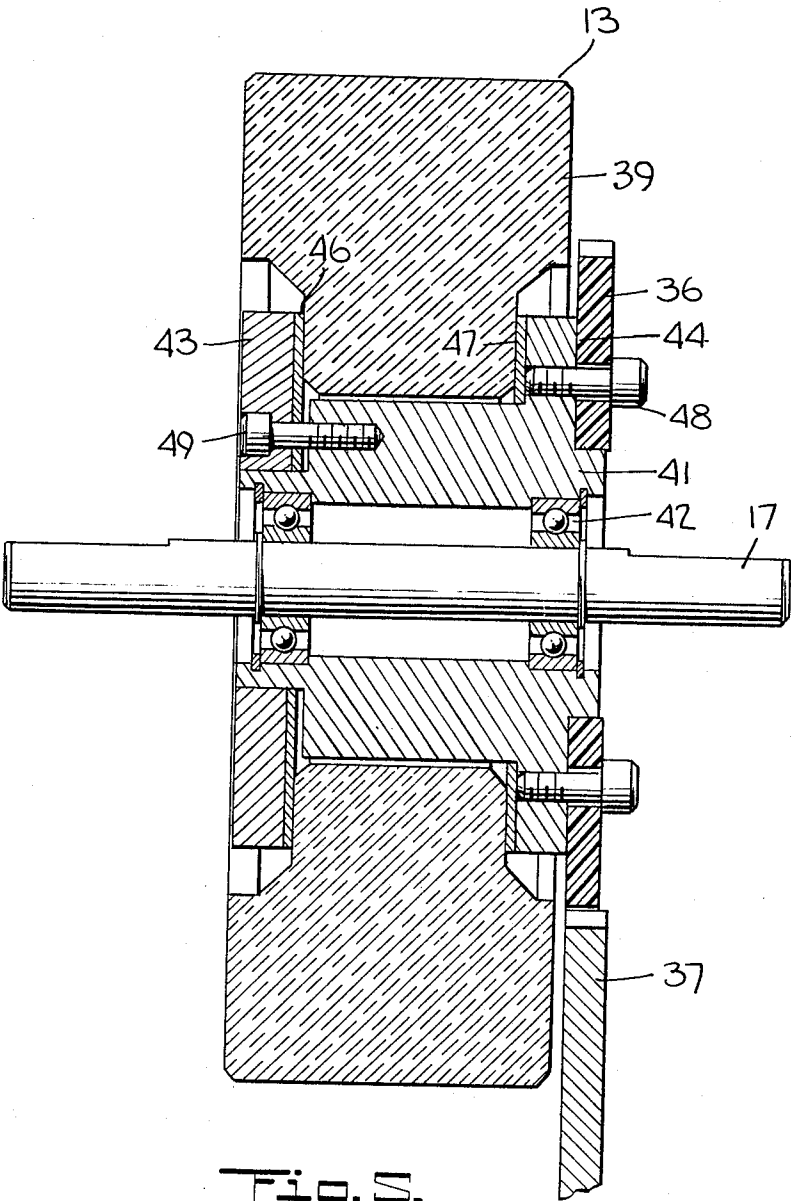


Fig. 5.

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FINISH ROLL

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6 Claims. (Cl. 118—234)

Man-made filamentary materials are customarily produced by extrusion of filament-forming compositions, as by melt-spinning or dry-spinning. In melt-spinning, a molten composition is extruded continuously through the fine orifices of a spinnerette into a cooling atmosphere, while in dry-spinning a solution of filament-forming material is extruded into an evaporative atmosphere. In either case the freshly formed filaments, on emerging as a yarn from the extrusion zone, are treated continuously with a suitable "spin-finish," which may be a lubricating and antistatic composition, usually in aqueous emulsion, and then wound into packages by any suitable takeup mechanism. Typically, the amount of finish on the yarn is in the range of about 0.2–1% of the weight of the yarn.

The spin finish is applied by means of a slowly rotating wheel dipping into a bath of the finish and so arranged that the yarn comes into contact with only a small portion (usually well below 60°) of the periphery of the roll. Generally a large number of spinning units, each comprising an extruding zone, a finishing station and a takeup mechanism, are arranged side by side with a number of finish rolls mounted on, and spaced along, a single shaft or a plurality of coupled aligned shafts. The finish rolls become worn, nicked, broken or otherwise damaged during use; when one wishes to replace a finish roll, or to thoroughly clean the finish-containing pan into which the finish roll dips, it is necessary to stop the shaft or shafts to permit removal of the roll, thus interrupting the spinning operation at all the spinning units serviced by said shaft. Even then it is difficult and troublesome to clean the finish pan thoroughly.

It is an object of this invention to provide a novel construction and support for the finish roll to permit ready replacement of one roll without affecting the spinning operation at adjacent spinning units.

It is another object of this invention to provide a novel construction which enables accurate replacement of the finish roll and easy cleaning of the finish pan of a melt-spinning machine without interruption of spinning at adjacent spinning units.

Other objects of this invention will be apparent from the following detailed description and claims.

In accordance with one aspect of this invention, the finish roll at each finishing station is mounted on an individual movable support, said support being mounted for movement into and out of an operative position in which the roll carried by said support dips into said liquid in one of said pans. Each support carries yarn guides for defining precisely the paths of the yarn over the roll carried by said support and the guides and rolls are maintained in fixed relationship on the support. As in the conventional construction there is a single shaft, or series of coupled aligned shafts, for operation the rolls at a series of the finishing stations. When the roll support of any given finishing station is in the operative position its roll is driven by the shaft. When this support is moved to an inoperative position its roll is operatively disconnected from the shaft and no longer dips into the finish pan. The complete assembly can then be removed and replaced, and the finish pan can be cleaned or removed, all without affecting the operation of the other spinning machines serviced by the same shaft. In addition, by using the construction of this invention, the

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cleaning, removal or replacement can be carried out without in any way disturbing the important alignment of the yarn guides and the periphery of the finish roll. This construction also makes it possible to align these elements on the bench in a suitable shop and to mount the prealigned system without disturbing the alignment, and thus eliminates the need for properly aligning the finish roll and the guides on the spinning machine itself.

The invention will be described more fully in connection with the accompanying drawing, which illustrates a preferred form of this invention. In the drawings:

FIGURE 1 is an end view of a spinning machine;

FIGURE 2 is a side view of the machine of FIG. 1;

FIGURE 3 is an end view, with parts cut away of the finish roll mechanism;

FIGURE 4 is a side view of the mechanism shown in FIG. 3; and

FIGURE 5 is a detailed view, in cross-section, of a finish roll and associated gear and supporting shaft.

Turning now to FIG. 1 of the drawing, reference numeral 10 designate generally a spinning machine in which a number of ends of yarn are fed through cooling or conditioning tubes 11 from a melt-spinning zone 12. Each yarn passes over a finish roll 13 (or 13a or 13b, FIG. 2) under a lower godet roll 14 (or 14a or 14b), over an upper godet roll 15 (or 15a or 15b) and then to a winding zone, indicated generally by reference numeral 16.

The melt-spinning zone is so designed, in a manner well known to the art, that a number, e.g. sixteen, ends of yarn are produced in a single zone (preferably from a single spinnerette); each end may be a multifilament yarn or a mono-filament yarn. As shown in the drawing, four such ends are fed to each of four tubes 11; after passing over the finish and godet rolls, these ends are taken up individually.

The godet rolls are all positively driven, their surface speeds being greater than the speed at which the polymer melt is extruded from the spinnerette in the melt-spinning zone 12, as is well known in the art. The peripheral speed of the driven finish roll is much less than the speed of the yarns passing over it, as is common practice in the art.

The finish roll 13 is mounted, by means of suitable bearings, for rotation on a stationary shaft 17 (FIGS. 3 and 4) secured, by means of two removable caps 18, in grooves 19 at the ends of two inwardly projecting ears 21 of a cover member 22, whose generally rectangular face 23 has a slot 24 through which a portion of the finish roll 13 projects. The cover member 22, which is dished, has sides 26, 27, 28 and 29, which are generally perpendicular to the face; it thus forms, with a corresponding hollow 31 in the main body of the takeup machine, an enclosed compartment 32 for the finish roll and for a finish pan 33 into which the bottom of the finish roll dips and to which there is supplied, as through pipe 34, the finish to be applied to the yarn by the finish roll. The edges of the slot 24 are situated close to the finish roll (e.g. 1/16" to 1/4" from said roll) to minimize the entry of foreign bodies into that compartment 32. The finish roll 13 is driven by the engagement of a narrow gear 36, of nylon or other plastic, secured to the side of the finish roll, with a narrow stainless gear 37 carried by a driven shaft 38 which is mounted for rotation on the fixed frame of the winding machine and which extends the length of said machine.

The details of the mounting of the finish roll 13 are shown in FIG. 5, from which it will be seen that its gear 36 and main body 39, which is preferably of vitreous material such as glass or ceramic, are supported on a flanged sleeve 41, preferably made of stainless metal, which is mounted on suitable anti-friction (e.g. ball) bearings 42 on the stationary shaft 17. The main body

39 is disposed between an annular metal retaining ring 43 and the flange 44 of sleeve 41 and is cushioned and spaced from said ring and flange by annular resilient cork gaskets 46 and 47. Screws 48 and 49 serve to secure the retaining ring 43 and gear 36 to the sleeve 41, so that the gear 36 may be replaced easily, when necessary, without disturbing the position of the main body 39 and vice versa.

Also supported on the cover member 22 is a stationary grooved upper guide member 51 extending parallel to the axis of the finish roll 13, and a similarly parallel stationary grooved lower guide member 53. The guide members 51 and 53, between which the yarn runs when it is engaged by the finish roll 13, are so positioned that the yarn path between them makes a short wrap, of only a few degrees, on to the surface of the finish roll. The grooves of the guide members 51 and 53 serve to keep separate the several ends of yarn (four such ends being shown in the drawing) as they pass over the finish roll 13. The guide members 53 are suitably made of ceramic material such as Alsimag, while the surface of the finish roll may be suitably of such ceramic material or of glass, although it will be understood that other materials may be employed for these parts.

The cover member 22, which carries the guides, spacer elements and finish roll is removably pivoted by means of hinges 57 to the top of the hollow 31 and is releasably latched in the closed position, covering said hollow, by means of a permanent magnet 58 secured to the lower end of the cover member and adapted to abut against a stop 59, of magnetic material mounted on the fixed frame of the machine. Both the magnet 58 and the stop 59 are adjustably mounted, as by means of suitable set screws 61. When it is necessary to clean the finish roll 13 or the finish pan 33 (which may be done daily) the cover may be easily swung open to permit access to those elements. This disengages one finish roll without in any way affecting the operation of the other finish roll 4b (FIG. 2) which is driven by the same shaft 38, or the operation of finish rolls on adjacent aligned spinning machines, which other rolls may also be driven by said shaft 38 or by shafts directly connected thereto. Any suitable means, such as a hook and eye, or a latch (not shown), may be provided, to support the cover in its open position.

The operative reengagement of the finish roll 13 and shaft 38 is also very simply effected, merely by swinging the cover member 22 to its closed position. The nylon teeth of the gear are sufficiently yieldable to reengage, without any damage, the steel gear 37 which is rotating at a relatively slow speed of, for example, about 5 to 30 r.p.m. Should any foreign body enter between the gears at any time, damage to the parts is also avoided, since the gears are held together, yieldably, merely by the forces resulting from the weight of the cover member and finish roll and the magnetic attraction at the latch 58; thus the cover member will merely pivot slightly in response to the presence of such foreign body. The provision of the resilient gaskets 46 and 47 also protects the relatively brittle main body 39 of the finish roll 4 against damage from shocks or distortions on the gear 36.

As previously stated, the arrangement described above makes it possible to prealign the guides and finish roll in the shop and eliminates the need for such alignment operations on the spinning machine. Also, should a change in alignment become necessary or desirable the whole cover assembly can be removed easily (as by pulling out the pin of the hinges 57) and taken to the shop where the alignment operation can be carried out with great accuracy. Also, when any of the parts in the cover member such as the roll, shaft or bearing becomes worn or damaged, the whole assembly can be removed easily and quickly and a spare, prealigned assembly can be installed without the use of any tools.

If it is desired to apply two different finishes or two applications of the same finish, two finish rolls may be

mounted in the same housing, one above the other. The two rolls may be supported on a single movable cover, or an individual cover may be provided for supporting each roll.

It is to be understood that the foregoing detailed description is given merely by way of illustration, and that variations may be made therein without departing from the spirit of the claimed invention.

What is claimed is:

1. In an apparatus in which a plurality of yarns are treated with liquid by passing said yarns, in parallel, continuously into limited contact with the outside surfaces of a plurality of parallel applicator rolls driven from a common shaft, said applicator rolls dipping into the liquid in individual containers and picking up said liquid and carrying a film of said liquid, by the rotation of said rolls, to said yarns, the improvement which comprises the combination of an individual movable support for each of said rolls, said support being mounted for movement into and out of an operative position in which the roll carried by said support dips into said liquid in one of said pans, means for retaining said supports in their operative positions, yarn guide means carried by each of said supports for defining precisely the paths of the yarn over the roll carried by said support, said support maintaining its roll and guide means in fixed relationship, individual drive-transmitting means on said shaft for each of said applicator rolls, and means, on each of said applicator rolls, for driving its applicator roll by cooperation with the corresponding drive-transmitting means on said shaft when said support is in said operative position, the construction and arrangement being such that said cooperating driving means is operatively disengaged from said drive-transmitting means when said support is moved away from said operative position.

2. A yarn-producing apparatus comprising a filament extrusion zone, a plurality of aligned yarn finishing stations for applying finish liquid to the several yarns produced in said extrusion zone, and a plurality of takeups for drawing the yarns from said extrusion zone through said finishing zone and for winding said yarns carrying said finish, each of said finishing zones comprising a container for said finish liquid, a finish applicator roll dipping into said container when said roll is in operative position, a cover for protecting the container from atmospheric contamination, said pan being mounted in a recess protected by said cover, said cover carrying said guide means and also having mountings for said applicator roll, a gear on said applicator roll and coaxial with said roll, a section of shaft carrying a drive gear adapted to mesh with the applicator roll gear when said applicator roll is in operative position, the sections of shaft of said finishing stations being mutually aligned and driven by a common drive, said cover being mounted for movement, with said roll and guide means carried by said cover, to an inoperative position in which said roll is out of contact with the finish in said pan and the applicator roll gear is out of contact with said drive gear of said section of shaft, said pan being freely accessible for cleaning when said cover is in said inoperative position.

3. Apparatus as set forth in claim 2, in which the cover is mounted for swinging upward movement, about a horizontal pivot, to said inoperative position, said cover having a slot through which a sector of the roll mounted therein projects, out of said recess, for engagement with the yarn passing in contact with said guide means.

4. Apparatus as set forth in claim 2 in which one of said gears has yieldable plastic teeth, and the axis of said roll is parallel to the axis of said shaft section.

5. A yarn-producing apparatus comprising a filament extrusion zone, a plurality of aligned yarn finishing stations for applying finish liquid to the several yarns

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produced in said extrusion zone, and a plurality of take-ups for drawing the yarns from said extrusion zone through said finishing zone, and for winding said yarns carrying said finish, each of said finishing zones comprising a container for said finish liquid, a finish applicator roll dipping into said container when said roll is in operative position, a cover for protecting the container from atmospheric contamination, said pan being mounted in a recess protected by said cover, said cover having mountings for said applicator roll, a gear on said applicator roll and coaxial with said roll, a section of shaft carrying a drive gear adapted to mesh with the applicator roll gear when said applicator roll is in operative position, the sections of shaft of said finishing stations being mutually aligned and driven by a common drive, said cover being mounted for movement, with said roll mounted thereon, to an inoperative position in which said roll is out of contact with the finish in said pans, and the applicator roll is out of contact with said drive gear of said section of shaft, and means for driving said aligned shaft sections at a rate such that when said roll is in operative position the peripheral speed of said roll is substantially less than the speed of the yarn being drawn over said roll by the action of said takeup.

6. In an apparatus in which a plurality of yarns are treated with liquid by passing said yarns, in parallel, continuously into limited contact with the outside surfaces of a plurality of parallel applicator rolls driven from a common shaft, said applicator rolls dipping into

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the liquid in individual containers and picking up said liquid and carrying a film of said liquid, by the rotation of said rolls, to said yarns, the improvement which comprises the combination of an individual movable support for each of said rolls, said support being mounted for movement into and out of an operative position in which the roll carried by said support dips into said liquid in one of said pans, means for retaining said supports in their operative positions, a gear wheel fixed to, and coaxial with, each of said rolls, individual gears on said shaft each adapted to cooperate with and drive one of said gear wheels when the support for the roll of that gear wheel is in its operative position and being disengaged from that gear wheel when that support is moved to an inoperative position, said rolls being of brittle vitreous material, each of said gear wheels being resiliently fixed to its roll and having resilient plastic teeth.

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