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THICK AND THIN YARN PRODUCING APPARATUS

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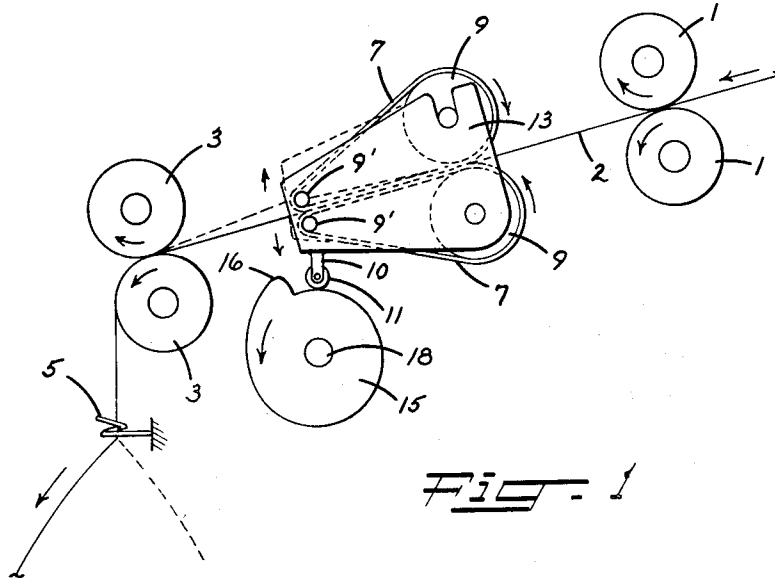


Fig. 1

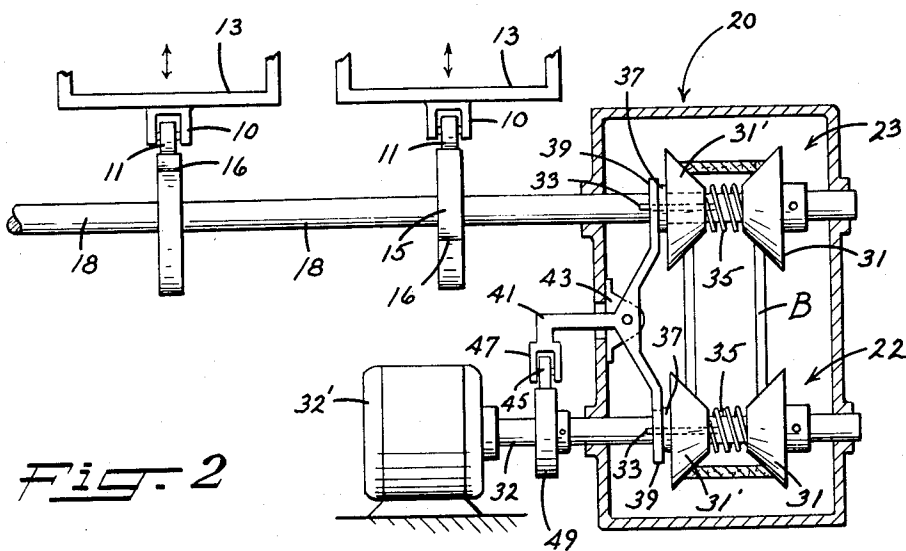


Fig. 2

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THICK AND THIN YARN PRODUCING APPARATUS

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The present invention relates to an apparatus for producing a thick and thin spun yarn having a prearranged thick-thin pattern. In particular, the invention relates to mechanism combined with the well-known Casablanca-type drafting or spinning assembly for producing thick-thin spun yarn.

By thick-thin yarns, I mean that type of yarn which has alternating thick and thin portions occurring axially of the yarn. These yarns are used principally to produce decorative and novel type fabrics.

It is one object of my invention to provide a thick and thin yarn-producing mechanism which may be easily installed to cooperate with the apron cradle of a Casablanca-type spinning frame wherein the mechanism does not interfere in any way with the operator while attending the frame.

A further object of my invention is to provide an improved and novel apparatus for producing a thick and thin spun yarn wherein the thick and thin pattern may be altered as desired and which pattern may be prearranged or set up prior to the spinning operation.

Still another object of my invention is to provide a novel and improved mechanism for producing thick and thin yarn of the spun type wherein the entire mechanism is supported on a spinning frame beneath the apron cradle of the usual Casablanca-type spinning apparatus whereby it does not interfere with the attending operator.

Other objects and advantages of my invention will become more apparent from the study of the following description and drawings wherein:

Figure 1 is a somewhat diagrammatic side view of my thick and thin yarn-producing assembly; and

Figure 2 is an enlarged detail of a portion of the assembly shown in Figure 1.

As seen in the drawing, my thick and thin attachment or mechanism is used in cooperation with a Casablanca-type spinning frame or assembly. The Casablanca-type spinning frame is well known to anyone skilled in the art. Generally, it includes a pair of feed rolls 1, 1 through which a fiber sliver 2 is fed to the assembly, and a pair of delivery rolls 3, 3 which are rotated at a faster rate of rotation than the feed rolls and from which the drafted sliver is delivered to and through a guide, such as the pigtail guide 5 shown in the drawing, to a twisting apparatus (not shown) by which the sliver is twisted to impart strength to the yarn. With this arrangement, the individual short fibers of the sliver 2 are pulled apart or drafted axially of the sliver between the feed and delivery rolls before twisting to provide a fiber bundle of small cross section.

As the sliver 2 passes between the feed and the delivery rolls, it is threaded through an apron-type cradle which consists of a pair of driven belts 7, 7 positioned one above the other to provide a nip area through which the sliver travels. As seen in the drawing, the belts 7, 7 are supported on drive rollers 9, 9 of larger diameter at one end of the cradle and rollers 9', 9' of smaller diameter at the opposite end. These units are supported in a

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frame 13, the exit end of which is capable of slight vertical reciprocation. The mounting for the frame 13 is not shown in the drawing.

One purpose of the apron-type cradle is to maintain the fibers in alignment as the sliver is being drafted.

As seen in Figure 1 and more specifically in Figure 2 of the drawing, a cam follower 11, preferably in the form of a small roller, is journaled to a frame 10 affixed to the bottom of each frame 13 supporting the apron assembly. The followers 11 are positioned at the exit ends of the frames.

Positioned immediately below each of the followers 11, 11 is a rotatable eccentric cam 15 which has a high point 16 which terminates abruptly to permit the cam follower 11 and frame 13 to drop to the low point or dwell point of the cam 15 with a sudden drop motion. The cams 15, 15 (see Figure 2) are driven by a drive shaft 18. As further seen in Figure 2, the high spots 16, 16 of the cams are out of alignment or staggered with respect to one another whereby the frames 13 are raised and lowered in nonuniform or alternating pattern for a purpose to be hereinafter explained.

The speed of the drive shaft 18 varies during the drafting or spinning operation and is driven by a variable speed driven mechanism such as the one shown in Figure 2 and generally identified by reference numeral 20. Variable drive speed mechanisms, other than the one shown, may be satisfactorily used. Essentially, the variable drive unit 20 consists of a pair of variable pulley assemblies 22, 23. Each pulley assembly 22, 23 consists of two tapering flanged members 31, 31'. The flanged members 31, 31' of the upper pulley assembly 23 are supported on the drive shaft 18 for the cams 15, 15 while the flanged members of the lower pulley assembly 22 are supported on a drive shaft 32 extending from a drive motor 32'. A drive belt B connects the lower pulley assembly 22 with the upper pulley assembly 23. To transmit the drive power from the motor shaft 32 and from the lower pulley assembly 22 to the upper pulley assembly 23 through the belt B, the lower flange member 31 is anchored or fixed to the motor drive shaft 32, and the upper flanged member 31 is anchored or fixed to the drive shaft 18.

The upper and lower flanged members 31', 31' are, on the other hand, slidably supported upon the shafts 18 and 32 and are held in nonrotative relationship with the shafts by splines 33 extending from each shaft. An expansion spring 35 is supported upon each shaft to lie between each pair of flanged members 31, 31' to urge the members away or apart from one another.

A slip ring 37 is also supported over each shaft 18 and 32, and lies between the slidable flanged member 31' on each shaft and an arm 39 of a bifurcated lever 41 which is pivotally mounted at its point of bifurcation to a support 43. A cam follower 45, preferably in the form of a roller, is journaled in a bracket support 47 at the free end of the lever 41. Cooperating with the cam follower 45 is an eccentric cam 49 which is secured to the motor drive shaft 32.

In operation, the motor 32' drives the shaft 32 to rotate the eccentric cam 49. The cam follower 45 rises and falls in accordance with the eccentric pattern of the track of the cam 49 to rock or reciprocally pivot the lever 41 which moves each arm 39 of the lever alternately toward and away from the flanged members 31', 31' of the upper and lower pulley assemblies.

When the arm 39 is moved against the flanged member 31' of the lower pulley assembly 22, the member 31' is, in turn, urged toward the member 31 compressing the spring 35 as it so moves. The upper arm 39 will, at the same time, move away from the flanged member 31' of the upper pulley assembly 23. The compression spring

expands at the same time to urge the flanged member 31' away from the flanged member 31.

This action described above increases the diameter of the lower pulley assembly since it urges the belt outwardly toward the peripheries of the flanged members 31, 31, of the lower pulley assembly. At the same time, the diameter of the upper pulley assembly is decreased since the members 31, 31' have spread apart and the belt has shifted inwardly toward the hubs of the flanged members.

With this above described action the r.p.m. of the shaft 18 is increased, the r.p.m. of the shaft 32 remaining constant.

When the movement is reversed and the upper arm 39 moves against the flanged member 31' of the upper pulley assembly member 23 to urge the flanged members together, the converse result occurs and the r.p.m. of the shaft 18 is lowered.

Cams 15, 15 supported on shaft 18 thereby rotate at varying speed to raise and lower the frames 13, 13 while the fiber sliver 2 passes between the nipping belts 7, 7 rotatably supported by the frames 13, 13.

The thick portions are produced in the sliver as the cam followers 11, 11 journaled to the frames 13, 13 drop from the high spots 16, 16 of the cams 15, 15 to the low or dwell points of the cams 15, 15. The frames 13, 13 drop with a sudden motion. The camming action of the cams 15, 15 serves to gradually raise the frames 13, 13 until the high spots are passed at which time the frames suddenly drop in their downwardly path. As the frames are lowered or dropped, a corresponding release of tension occurs in the sliver traveling through the belts 7, 7 and the fibers tend to bunch-up at this point to provide the thicker portions of the sliver which are carried into the final twisted spun yarn.

The reason for staggering the high spots 16 of the cams 15 is so that the thick portions set up in the plurality of slivers being separately but simultaneously drafted or spun will be staggered with respect to each yarn. The alternating rising and dropping of the frames will prevent excessive vibration from being set up along the entire spinning apparatus.

The variable speed drive 20 will alternately slow down and speed up the shaft 18 to uniformly vary the thick and thin pattern set up axially in each yarn being drafted or spun. This pattern may be altered as desired by changing the pattern or tract of the eccentric cam 49. To accomplish this change, the variable speed drive mechanism 20 is merely slid off the shafts 18 and 32 after which the cam 49 may be replaced with a cam of different eccentricity. When the yarns are incorporated into fabrics, the fabric producer will then be assured that the thick

portions of the yarns will appear in random pattern throughout the fabric rather than in uniform side-by-side alignment which pattern will completely destroy the novel effect desired.

It is to be understood that changes and variations may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

I claim:

1. Apparatus for producing a thick and thin spun type yarn according to a prearranged thick-thin pattern comprising a fiber sliver drafting or spinning assembly of the Casablanca type including sliver nipping belts supported for rotation in a frame the exit end of said frame being capable of slight vertical reciprocation, and a cam assembly which cooperates with the exit end of the frame to vertically reciprocate the exit end of the frame, said cam assembly including a rotating cam having an abruptly terminating high spot which causes the exit end of the frame to drop suddenly on its downward path.

2. Apparatus for producing a thick and thin spun yarn according to a prearranged pattern comprising a fiber sliver drafting or spinning assembly of the Casablanca type including sliver nipping belts supported for rotation in a frame the exit end of said frame being capable of slight vertical reciprocation, a cam follower secured to the underside of the exit end of the frame, a rotatable eccentric cam which cooperates with the cam follower to vertically reciprocate the exit end of the frame, an abruptly terminating high spot on said cam which causes the exit end of the frame to drop suddenly on its downward path.

3. Apparatus for producing a thick and thin spun yarn according to a prearranged pattern comprising a Casablanca-type spinning assembly including sliver nipping belts supported for rotation in a frame the exit end of which is capable of slight vertical reciprocation, a cam follower secured to the bottom of the frame at the exit end thereof, a drive shaft supported for rotation below the cam follower secured to the frame, a rotatable eccentric cam secured to the shaft so that it cooperates with the cam follower of the frame, an abruptly terminating high spot on said cam which causes the exit end of the frame to drop suddenly on its downward path, and variable speed drive means connected with the drive shaft for the cam.

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