United States Patent

Brooks

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[54] **TRAVERSE CAM DECLUTCHING DEVICE FOR YARN TAKE-UP APPARATUS**

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[52] **U.S. Cl.** .....**242/43,** 242/18 DD, 242/35.5 R, 242/158.5

[51] **Int. Cl.** **B65h 54/28**

[58] **Field of Search**.....242/43, 18 DD, 35.5, 158.5; 74/57; 192/14, 18, 89 A

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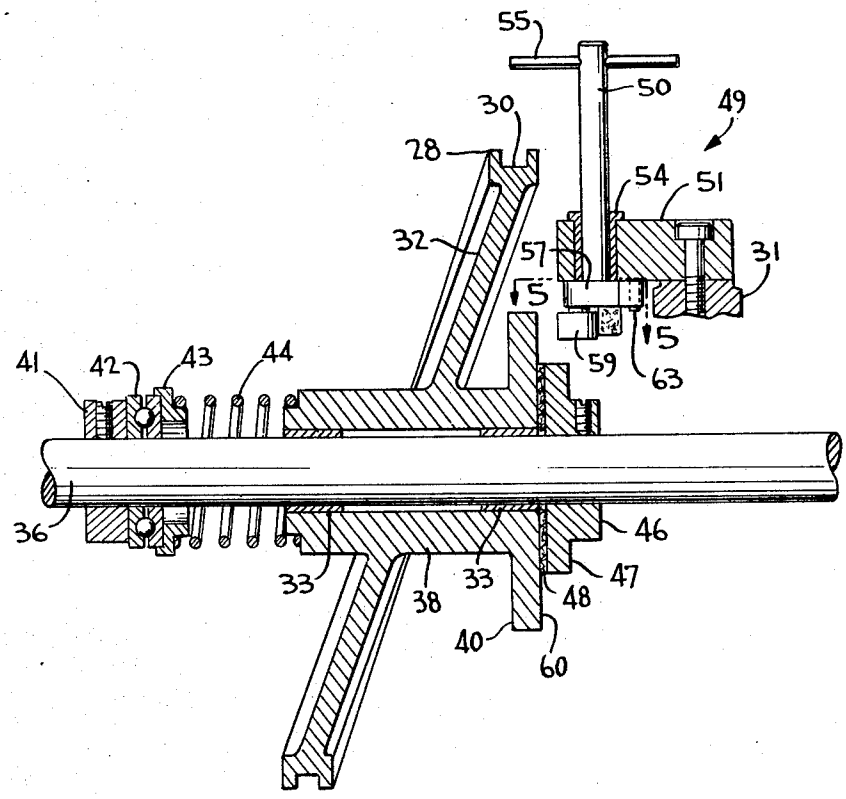
[57] **ABSTRACT**

A traverse cam declutching and braking device for use in a yarn take-up machine. The yarn is conducted by a traverse guide onto the surface of a print roll. The reciprocating motion of the traverse guide is controlled by a barrel cam which is freely mounted for rotation on a cam shaft. A friction faced clutch plate is fixedly secured to the cam shaft in juxtaposed relation to a corresponding flange on the barrel cam. The clutch includes a lever on the frame of the machine. The lever is mounted for rotation about an axis perpendicular to the cam shaft and has a head adjacent to a radial flange on the cam. A roller and a friction pad are mounted on the head at a fixed distance from the lever axis so that rotation of the lever causes the roller and friction pad sequentially to engage the cam flange, thereby displacing the cam axially out of engagement with the clutch plate, while allowing the cam shaft to continue to rotate. The friction pad acts as a brake for the disengaged cam.

6 Claims, 6 Drawing Figures



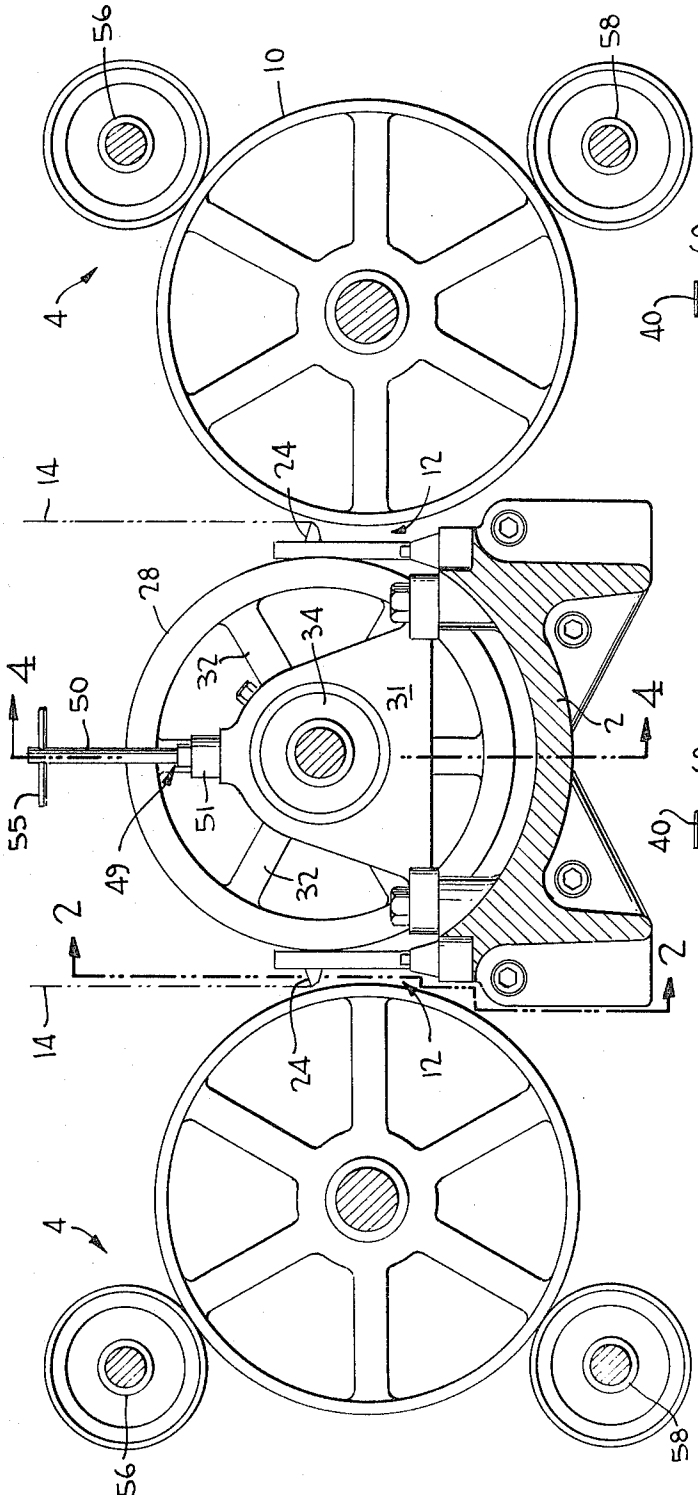


FIG. 1

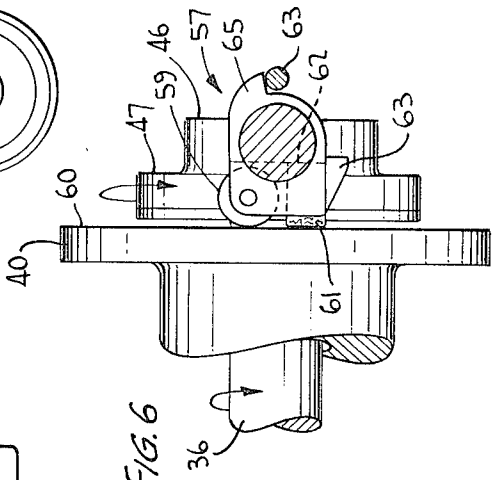


FIG. 6

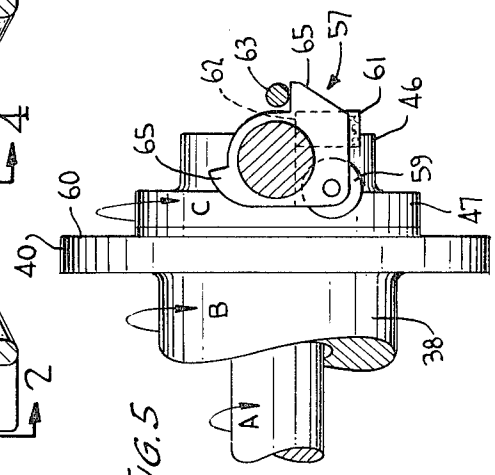


FIG. 5

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FIG. 2

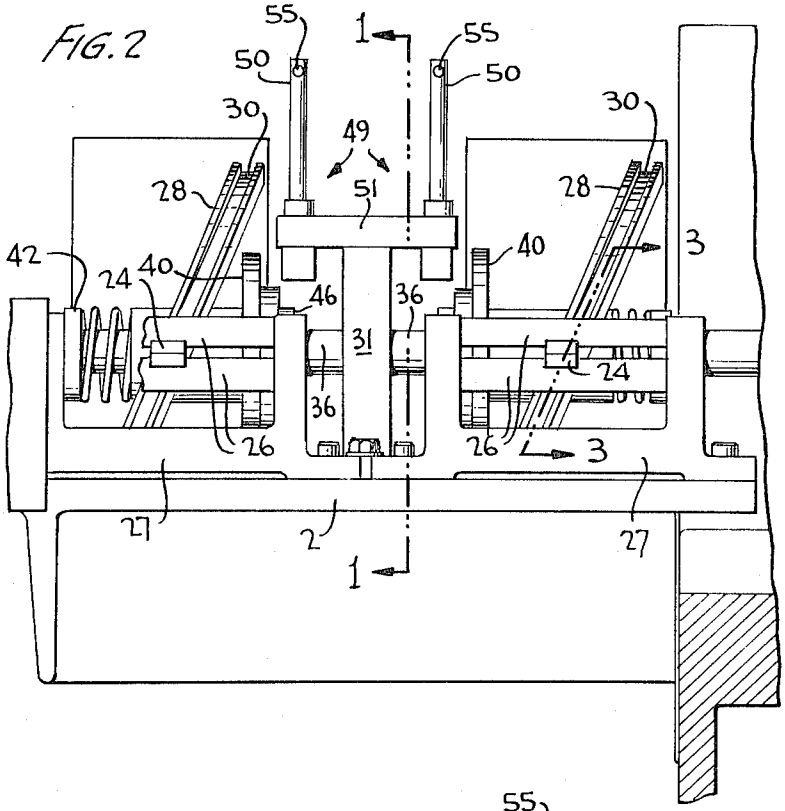


FIG. 3

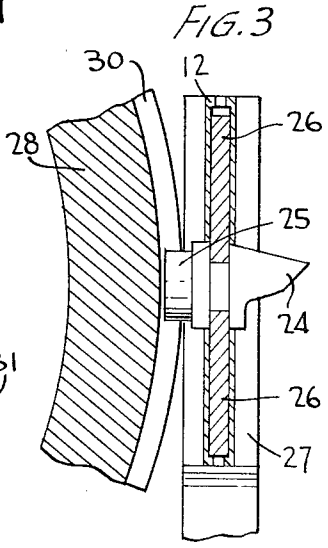
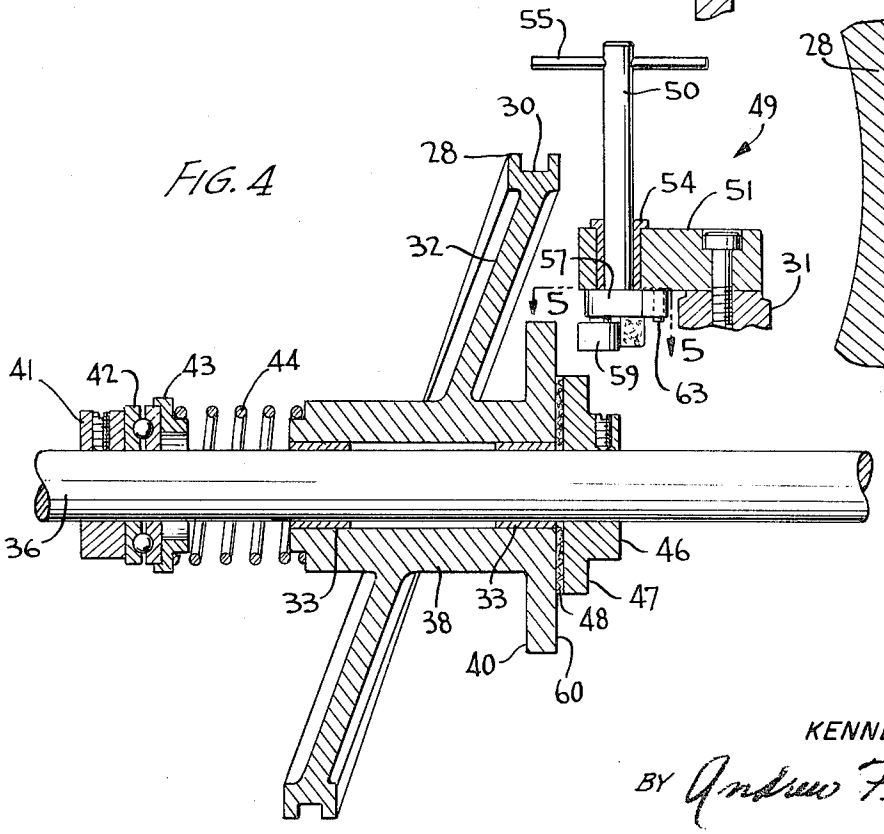


FIG. 4



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TRAVERSE CAM DECLUTCHING DEVICE FOR YARN TAKE-UP APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to yarn winding apparatus, and more particularly to a cam declutching mechanism for yarn winding machines.

A conventional yarn winding machine may comprise five or more winding stations with a plurality of bobbins being wound at each station. A traversing guide is required at each station for conducting the yarn onto a print roll, from which it passes into the yarn packages. Each guide is driven by a cam that is fixed on a cam shaft running the length of the winding machine.

The cam shaft is driven from a central location and therefore all of the traversing cams are either simultaneously in motion or shut down. This manner of operation is undesirable in at least two instances. In order to inspect the traverse guide mechanism or replace it because of excessive wear or damage, it is necessary to stop its translating motion momentarily. Further, during continuous winding operations wear of the traverse guides proceeds randomly. Therefore, replacement of defective traverse guides or other worn parts of the traverse guide mechanism is necessary at different times at the various stations.

When either of the above conditions occurs or under any other conditions when it is necessary to stop a single winding station, the entire machine must be shut down when a plurality of cams are driven by a single drive shaft. The inefficiency of this arrangement is self evident. Therefore, it would be desirable to be able to independently shut down an individual winding station without affecting the rest of the winding operation without the necessity of having individual motors for each winding station.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide an apparatus which will eliminate the necessity of shutting down an entire machine or a substantial section thereof when it is necessary to stop a single winding station.

It is a further object of the invention to provide a winding machine with a traversing cam which may be halted independently of the cam shaft rotation.

It is another object of the invention to provide a traversing cam device which may be selectively engaged with a rotating cam shaft or disengaged therefrom and braked with relation to the cam shaft.

These objects are accomplished in accordance with a preferred embodiment of the invention by mounting a traverse cam coaxially on a cam shaft. The cam is bushed with plain sleeve bearings and is free to rotate on the cam shaft. A friction faced clutch plate is secured to the cam shaft adjacent one end of the traverse cam and the hub of the cam is urged against the clutch plate, preferably by a compression spring. The other end of the cam is in contact with a freely rotating thrust bearing seated against a collar secured to the cam shaft.

The clutch also includes a rotary lever with a clutch and brake head positioned adjacent the cam clutch plate. The head is provided with a roller and friction pad which are offset from the axis of rotation of the lever. Rotation of the lever swings the roller into engagement with the flange on the traversing cam hub thereby displacing the cam away from the friction clutch plate. Further rotation of the lever causes the friction pad to engage the flange face on the cam hub to stop further rotation of the cam.

DESCRIPTION OF THE DRAWINGS

A preferred embodiment is illustrated in the accompanying drawings wherein:

FIG. 1 is a cross-sectional view, partially schematic of the yarn winding apparatus taken along section line 1—1 of FIG. 2;

FIG. 2 is a cross-sectional view of the apparatus of this invention taken along section line 2—2 in FIG. 1;

FIG. 3 is a cross-sectional view of the apparatus along section line 3—3 in FIG. 2 showing the traverse guide member and follower;

FIG. 4 is a cross-sectional view of the apparatus along section line 4—4 in FIG. 1 showing the traverse guide and cam mechanism;

FIG. 5 is a cross-sectional view of the apparatus along section line 5—5 in FIG. 4 showing the traversing cam with the clutch engaged; and

FIG. 6 is a cross-sectional view of the apparatus shown in FIG. 5 showing the traverse cam with the clutch disengaged.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIGS. 1 and 2, the apparatus of this invention includes an upright frame which has a substantial length. At suitable intervals along the length of the frame, there are central support members 8 and intermediate casting 2. While only two winding stations have been illustrated in FIG. 1, it should be appreciated that a plurality of identical stations exist which are longitudinally spaced along the frame 2. As shown in FIG. 1, these winding stations 4 are provided on both the front and rear side of the frame.

Each winding station 4 includes a drive roll 10 and a traverse guide 24 associated with each drive roll 10. Each traverse guide 24 conducts a pair of yarns onto the surface of the drive roll 10 in a reciprocal fashion. The drive roll thus serves as a print roll on which the yarn is laid by the transverse guide. The yarn is carried to the bobbins 56 and 58 on the drive roll 10 and is deposited or "printed" onto the bobbins. Although the term "yarn" is used herein to describe the filamentary structures that are usable with this apparatus, "yarn" is intended to include monofilaments, yarns, threads, strands, and similar structures.

The yarns may be prepared from natural materials such as wool, cotton or silk or they may be synthetic materials prepared from cellulose derivatives such as cellulose acetate or from other polymeric materials including viscose, acrylonitrile polymers, polyamides, polyesters, polyester-amides or vinyl polymers such as vinyl chloride polymers. Likewise, filaments from inorganic materials, such as metallic wires, may be wound utilizing the apparatus and method of this invention.

The filaments processed may vary widely in size. For example, cellulose acetate yarns from about 40 to 300 denier have been wound successfully by the process and apparatus of this invention. The yarns may be wound up at high speeds, preferably from about 50 to

1500 meters per minute. The process and apparatus of this invention may, of course, be utilized in connection with drawing processes and machines. The various parts of the apparatus may be made of any appropriate materials, such as metals, alloys, plastic, glass, enamels, etc.

As shown in FIGS. 1, 2 and 4, a pair of yarns 14 are conducted through traverse guide member 24, which is mounted for reciprocating movement between a piar of guide rails 26. Rails 26 are removably mounted in clips 12 and located in bracket 27. Preferably a pair of yarns 14 pass through individual slots in the guide member 24. The integrity and quality of the yarn package is enhanced by positioning the traverse guide member 24 in close proximity to the drive roll 10.

The reciprocating movement of the guide member 24 is accomplished by cam 28. A follower 25 (note FIG. 3) on the member 24 cooperates with a groove 30 in the peripheral surface of the cam to cause movement of the member 24 back and forth along the length of a pair of the guide rails 26.

Referring to FIGS. 1 and 2, pillow blocks 31 are provided on the castings 2 at spaced intervals along the length thereof. Bearings 34 in these pillow blocks support a rotary cam shaft 36. Referring to FIG. 4, each traverse cam 28 is connected by spokes 32 to a hub 38. The hub 38 is provided at one end with a radial flange 40 having a clutch face 60. The hub 38 is supported on the rotary cam shaft 36 by a pair of sleeve bearings 33 which serve to permit relative rotation and translation between the hub and cam shaft.

The collar 41 is fixedly connected adjacent one end of the hub 38 to the rotary cam shaft 36 by a set screw or other conventional fastening means. A thrust bearing 42 is mounted against the collar 41 and serves as a mounting for a stationary spring retaining ring 43. A compression spring 44 is mounted between the ring 43 and the end of the hub 38 thus biasing the barrel cam toward the right as viewed in FIG. 4.

A clutch collar 46 is also fixedly attached to the cam shaft 36 by a set screw or other conventional fastening means and includes a radial flange 47. The flange is provided with a suitable clutch facing 48 having a high coefficient of friction. Thus, it will be appreciated that when the barrel cam 28 is biased against the clutch facing 48, the barrel cam will rotate with the cam shaft 36. Such rotation is depicted in FIG. 5 by arrows A, B and C.

Referring now to FIGS. 1, 2 and 4, there will be seen mounted atop the pillow block 31 a control device 49 for the clutch. This device comprises a shaft 50 which extends through a support block 51 in a radial direction with respect to the cam shaft 36. The shaft 50 is journaled for rotation within a sleeve bearing 54 in the support block 51. The shaft 50 is preferably provided at its upper end with a transversely extending bar 55 which serves as a suitable hand grip for rotation of the shaft 50.

Referring to FIG. 4, the shaft 50 is provided with an integral head 57 on the lower side of the block 51. The head 57 is mounted adjacent the outer peripheral portion of the hub flange 40. The head 57 is provided with a roller 59 (FIGS. 4, 5 and 6) having an axis generally parallel with the axis of the shaft 50. The distance between the axis of the roller 59 and the axis of the shaft 50 is greater than the distance between the axis of the shaft 50 and the clutch face 60 of the hub flange 40. Thus, it will be appreciated that upon clockwise rotation of the shaft 50, as viewed in FIGS. 5 and 6, the roller 59 will engage the clutch face 60 and displace the barrel cam 28 axially toward the collar 41, compressing the spring 44, thereby disengaging the flange 40 from the collar 46 and clutch facing 48. The use of the roller 59 for axially displacing the rotating cam 28 not only minimizes friction, but also minimizes shock on the cam shaft 36.

Once the flange 40 is disengaged from the clutch face 48, its rotation with respect to the cam shaft will decrease. However, in order to stop rotation of the cam quickly, a brake is also provided. A brake pad 61 is mounted on the head 57 and extends radially from the axis of shaft 50 approximately the same distance as the surface of the roller 59. The pad 61 may be composed of any suitable material having a high coefficient of friction. A shoulder 62 on the head 57 serves as an abutment against which the pad 61 is compressed when in engagement with the clutch face 60, as shown in FIG. 6. The roller and brake pad simultaneously engage the clutch face 60 upon rotation of the head 57, preferably about a 90 degree rotation.

In order that an operator may be freed from the task of judging when proper engagement has occurred between the flange face and roller and brake, a stop rod 63 is mounted on the support 51, as shown in FIGS. 4, 5 and 6. The head 57 is correspondingly fashioned with a pair of tabs 65 which extend a greater distance from the axis of shaft 50 than the axis of the stop rod 63 and therefore will abuttingly contact the rod at a desired rotation of the head 57. Referring to FIGS. 5 and 6, it will be seen that counterclockwise rotation of the head 57 will be stopped by the rod 63 when the roller 59 is disengaged from the flange clutch face 60. This is the normal operating condition. The opposite tab, as best seen in FIG. 6, will engage the stop rod 63 in response to a clockwise rotation of the cam and brake head when the clutch and brake simultaneously engage the face of the flange 40. This mode is desired during shutdown of the winding operation at a particular station.

In operation, when changing or inspecting guide mechanism 24, it is necessary that the traversing motion of the head 24 be halted.

In this connection, the combination cam and brake device 49 may be actuated by a clockwise rotation as best seen in FIG. 5. Engagement by the roller 59 with the clutch face 60 of the flange 40 will induce translation of the cam hub 38 along the rotary cam shaft 36, compressing the spring 44. Further rotation of the cam and brake device will bring one tab 65 into abutment with the stop 63. In this position, the roller 59 and the pad 61 are fully engaged with the clutch face 60 and rotation of the traversing cam 28 will be halted. The threading operation of the traverse guide member 44 may then be accomplished by hand in an efficient manner or any of the mechanisms at this station may be repaired.

When it is desired to resume the winding operation at this particular station, the operator grasps the handle 55 and rotates it counterclockwise until the tab 65 has reached the stop rod 63, thus preventing further rotation. The spring 44 will simultaneously bias the flange

40 against the clutch face 48 and the traversing cam will begin rotation with the cam shaft 36.

Thus, it will be appreciated that the apparatus of this invention will enable an operator to stop winding at a single station without shutting down an entire machine which may consist of 50 to 100 or more stations operating off a single rotating shaft. Further, the combination rotary cam and brake head serves to disengage the rotating cam from the cam shaft in an efficient and practical manner.

When the cam is stopped, removable rails 26 in clips 12 can be lifted out of bracket 27 and a new rail and guide assembly can be positioned in their place. The removable guide assembly insures that preassembled units, properly adjusted, lubricated and inspected, can be installed on the apparatus by operators having little or no mechanical training. Such assemblies can be prepared when it is convenient and stored in the operating area until required for the replacement of worn or damaged units.

Although the invention is described with reference to a preferred embodiment, it will be appreciated by those skilled in the art that additions, deletions, modifications and substitutions and other changes not specifically described and illustrated in this embodiment may be made which will fall within the purview of the appended claims.

What I claim is:

1. A cam declutching and braking device comprising in combination: a rotary cam shaft; a plurality of rotatable traversing cams freely mounted for rotation on said cam shaft; a friction clutch collar in juxtaposition to each of said rotatable cams and fixedly secured to said cam shaft, and means for selectively displacing said cams into and out of engagement with their respective clutch collars; a plurality of traversing yarn guides and print rolls spaced longitudinally of said cam shaft, each yarn guide being driven by a rotating cam and conducting yarn onto the surface of a print roll, each of said traversing cams including a hub having a central bore through which said shaft extends and having a radial clutch face in position to engage its respective clutch collar, each said clutch face extending radially outwardly from said shaft a greater distance than its respective clutch collar, thereby providing a radially extending peripheral engagement surface; rigid support means on said frame adjacent each said clutch collar; a roller, and means for mounting said roller on each said support means for rotation about an axis extending substantially parallel to its respective clutch face and for selective movement into engagement with said peripheral engagement surface and for displacing its respective cam away from its respective clutch collar whereby the roller permits the cam to rotate while the roller applies axial force to said clutch face for disengaging said clutch face from said clutch collar.

2. The apparatus of claim 1 including biasing means for constantly urging said traversing cam toward said clutch collar.

3. The apparatus of claim 1 further including friction brake means mounted adjacent said roller mounting means; and means for displacing said brake means into engagement with said clutch face while said clutch face is spaced from said clutch collar.

4. A cam declutching and braking device comprising in combination: a rotary cam shaft; a rotatable traversing cam; said rotatable traversing cam including a hub having a central bore through which said shaft extends for free rotation of said cam on said cam shaft; a friction faced clutch collar fixedly secured to said cam shaft in juxtaposition to a corresponding radial flange disposed on one end of said hub; lever means mounted for rotation about an axis perpendicular to said cam shaft, said lever having a head adjacent to said flange on said hub; a roller and friction pad mounted on said head at a fixed distance from the lever axis; said roller and said friction pad being sequentially engageable with said flange to displace said cam axially out of engagement with said clutch collar and then slow said cam.

5. The apparatus of claim 4 including biasing means for constantly urging said traversing cam toward said clutch collar.

6. The apparatus of claim 4 further including traverse guide means connected with said rotatable cam for reciprocating movement along a predetermined path upon rotation of said cam.

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