

Dec. 31, 1968

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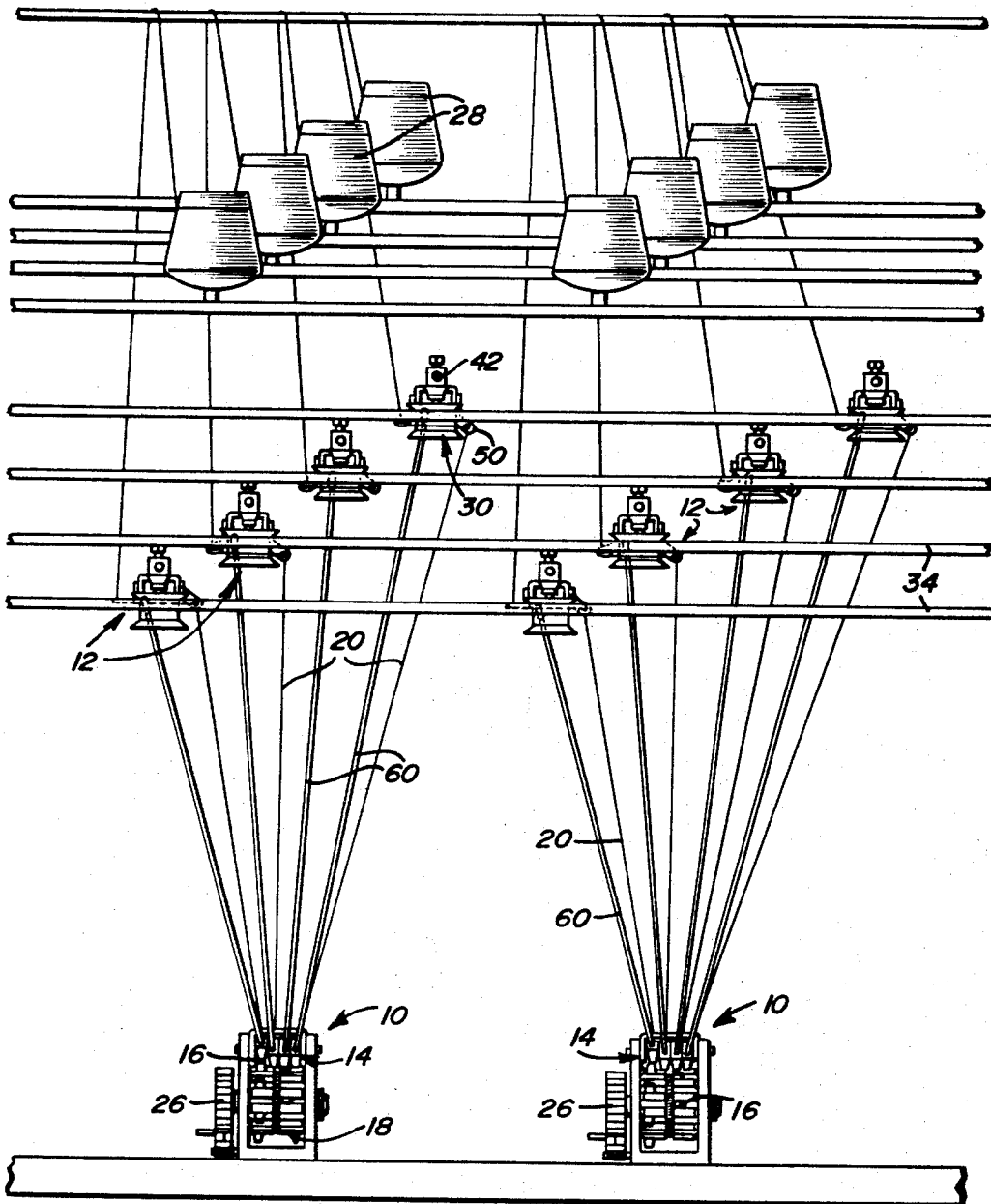
3,418,831

FEED CONTROL FOR AUTOMATIC STRIPER

Filed Oct. 27, 1967

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Fig. 1



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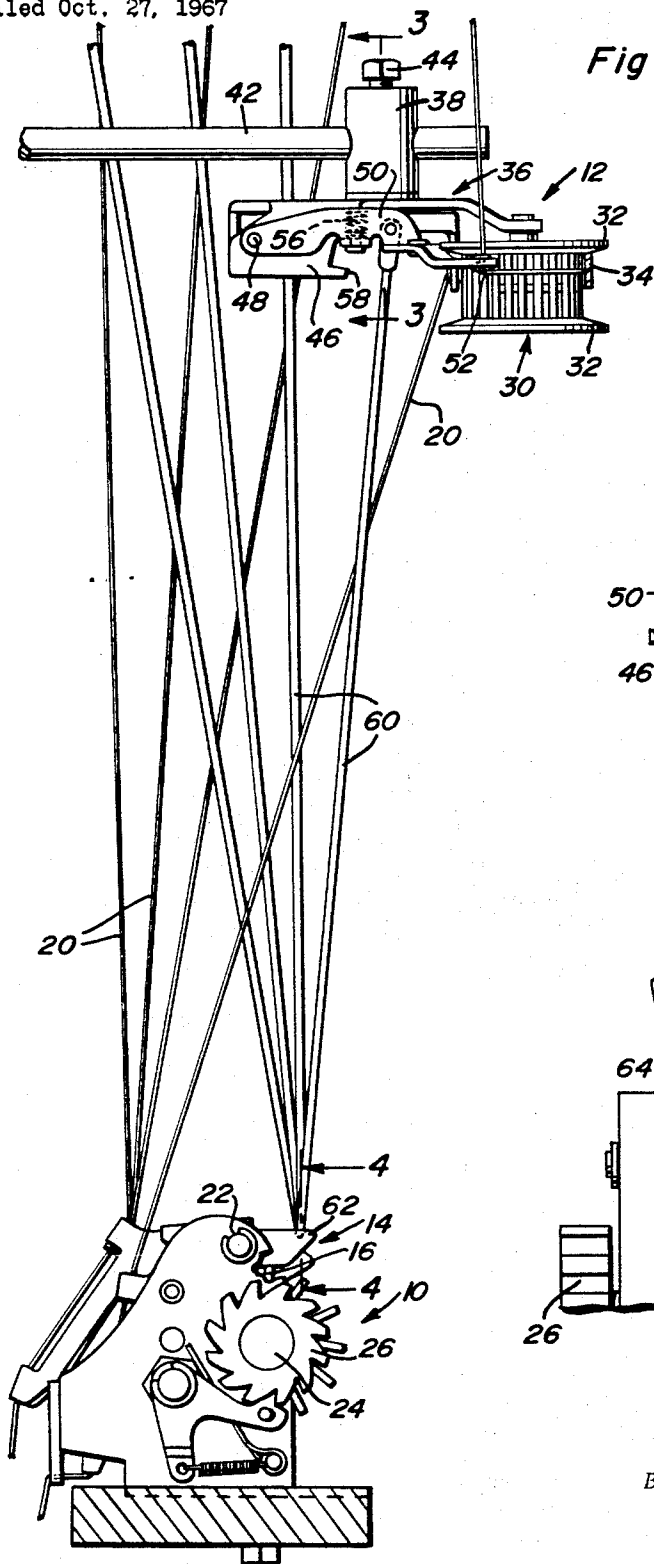


Fig. 2

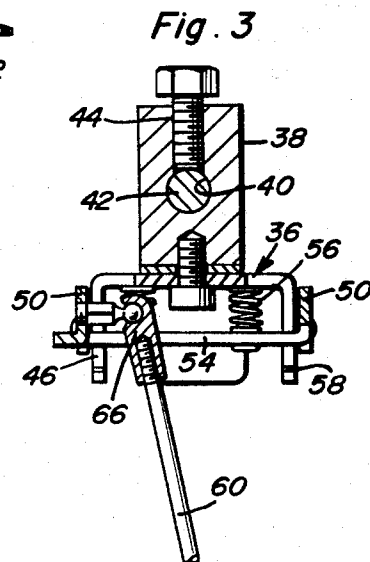


Fig. 3

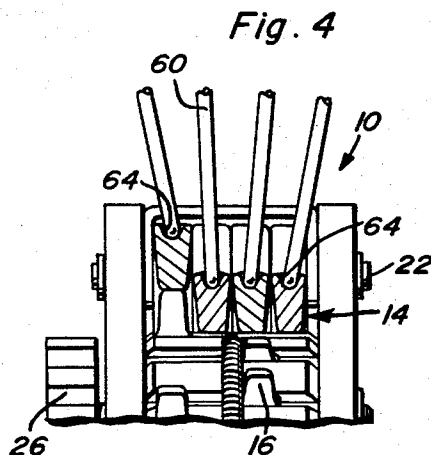


Fig. 4

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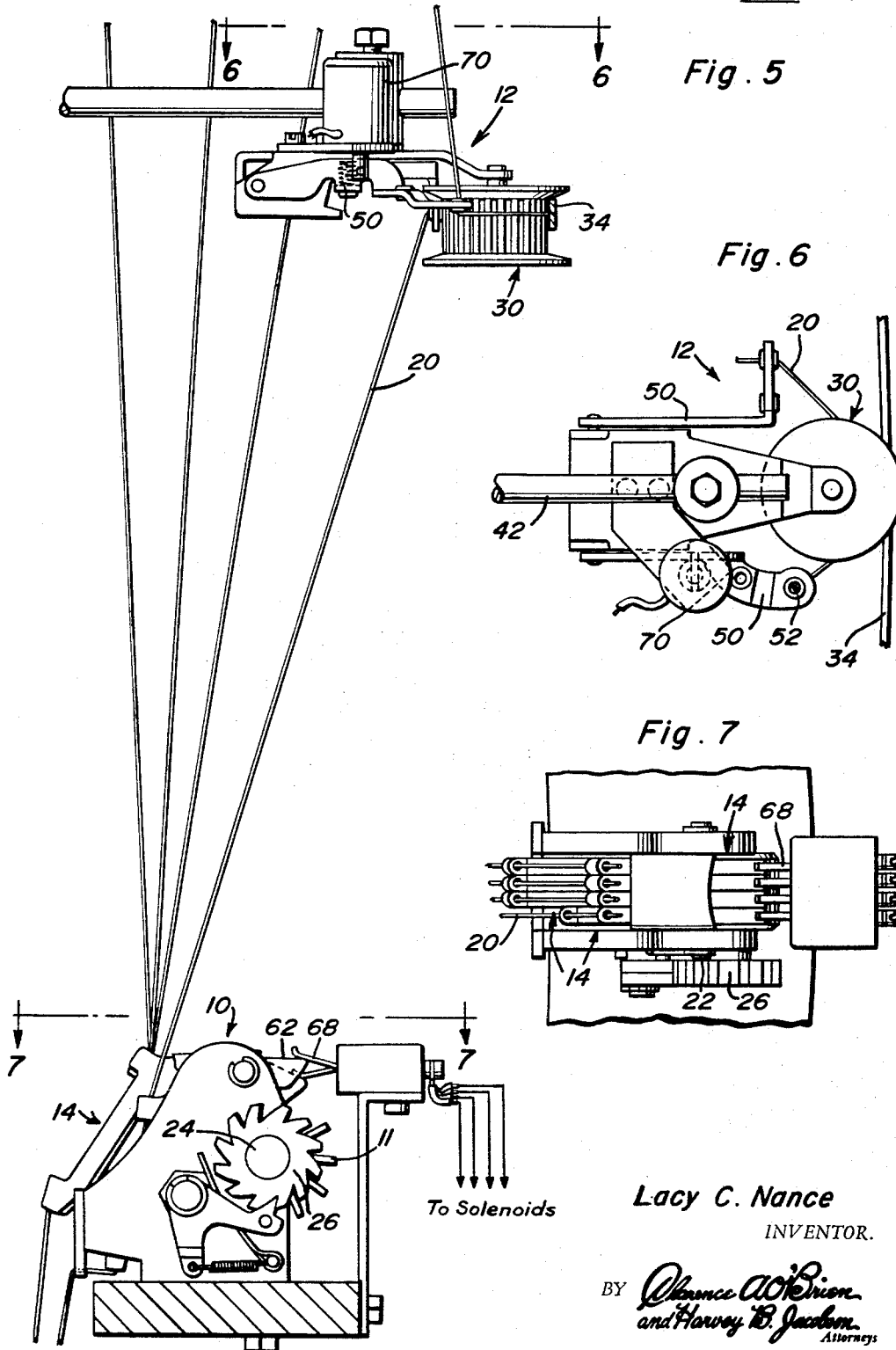
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FEED CONTROL FOR AUTOMATIC STRIPER

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Filed Oct. 27, 1967, Ser. No. 678,627

2 Claims. (Cl. 66—132)

ABSTRACT OF THE DISCLOSURE

A feed control system for an automatic striper incorporating a positive feed wheel associated with each yarn package and directly controlled by a separate feeder finger of the striper for effecting an instantaneous engagement and disengagement of the yarn from the feed wheel. This control is directly responsive to movement of the feeding finger independently of the yarn itself, such being effected by either a linking rod extending between the finger and the feed wheel, or a solenoid actuating circuit wherein a physical movement of the finger engages an appropriate microswitch and energizes the circuit.

The instant invention generally relates to yarn feeding for multifeed knitting machines, and more particularly relates to a controlled positive feed for a striping machine.

It is a primary object of the instant invention to present an automatic control system which enables the incorporation of positive yarn feeding means into a striper knitting machine in a manner whereby the requisite switching from one yarn package to another, so as to produce the desired striping, can be effected without a pause in the knitting and in a manner which, through a direct control of the associated positive feeds, ensures an even stripe pattern.

In conjunction with the above object, it is a significant object of the instant invention to automatically provide an even stripe pattern without undesirable variations in the stripe spacings automatically and without direct operator control or supervision.

In stripers, as will be appreciated, an essential feature is the systematic drawing of yarn independently from different yarn packages or sets thereof. This necessary switching between yarn packages in a manner so as to avoid undesirable variations in the spacings between the stripes gives rise to substantial difficulties when attempting to incorporate positive feed means in a striper. One reason for such difficulties resides in the fact that positive feeds, as now incorporated into knitting machines of various types, are controlled directly through the yarn itself utilizing stop motion or dropper devices which inherently incorporate a slight time delay as well as a variation in the yarn tension, both of which, when not striping, would not affect the knit material. However, in a striper, the variations resulting from a time delay or change in yarn tension would be noticeable and highly detrimental in the finished product. Thus, the instant invention proposes a system whereby positive feeds can be utilized in a striper through a direct control of the individual feeds from the associated feeding finger, rather than through the yarn itself. In other words, a movement of a feeding finger to the inoperative position will result in an instantaneous disengagement between the corresponding yarn and positive feed, while a movement of the finger to its operative position will result in an instantaneous reengagement of the yarn with the associated positive feed, the instantaneous nature of the operation enabling a continuous or nonstop operation of the knitting machine notwithstanding the switching between yarns of different color. It is

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contemplated that the system of the instant invention will significantly enhance the operation of stripers, resulting in both a faster and more economical operation in conjunction with an improved product.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a schematic front elevational view of a portion of a circular striper illustrating a pair of drum boxes and the associated feed controls;

FIGURE 2 is an enlarged side elevational view detailing the relationship between a drum box feeding finger and the associated yarn feed control;

FIGURE 3 is an enlarged cross-sectional detail taken substantially on a plane passing along line 3—3 in FIGURE 2;

FIGURE 4 is an enlarged cross-sectional detail taken substantially on a plane passing along line 4—4 in FIGURE 2;

FIGURE 5 is a side elevational view illustrating a modified form of control;

FIGURE 6 is a plan view taken substantially on a plane passing along line 6—6 in FIGURE 5; and

FIGURE 7 is a cross-sectional view taken substantially on a plane passing along line 7—7 in FIGURE 5.

Referring now more directly to the drawings, a portion of a circular knitting machine, and more particularly a striper or machine utilized in the formation of striped material, has been illustrated therein.

Basically, in achieving the direct feed control which results in a highly superior striped product as noted supra, each drum box 10 about the knitting machine has a positive feed 12 associated with each of the drum box feeding fingers 14 for direct operative control thereby. The illustrated drum box 10 is substantially conventional in construction and operation, including four feeding fingers independently actuated in a predetermined sequence determined by the orientation of the camming design drum inserts 16 mounted on the rotary striper design drum 18. As illustrated, the three right hand fingers 14 are orientated so as to functionally disengage the yarns 20 fed thereby from the feeding apparatus, while the left hand finger 14 has been cammed about the fulcrum shaft 22 by one of the inserts 16 so as to functionally engage the associated yarn 20 with the knitting apparatus. Upon a rotation of the rotary striper design drum 18, through the design shaft 24 and ratchet 26, another one of the fingers 14 will be cammed into operative position by an appropriate insert 16 while the first operating feeding finger 14 is returned to its functionally disengaged position by an internal spring-biased finger plunger associated therewith. This construction and operation is, as thus far set forth, basically conventional.

The instant invention contemplates the provision of positive feed means associated with the above described drum box in a manner whereby the feeding of the yarn is controlled directly from the drum box feeding fingers 14 and not through the yarn itself, such being done in a manner so as to enable an instantaneous engagement and disengagement of the feed means which enables a continuous operation of the knitting machine without the manual control heretofore required so as to avoid variations in the stripe pattern. Accordingly, a positive feed 12 is mounted above each of the feeding fingers 14, four such feeds 12 thus being associated with each drum box 10 with the yarn from the four associated cones or yarn packages 28 passing from the package 28 through the ap-

appropriate feeds 12 and to the corresponding feed fingers 14. The layout of the feeds 12 will generally follow that of the packages 28, such normally being arranged in stepped concentric circles, although other arrangements depending upon space limitations are also possible.

The feeds 12 are to be of the positive wheel type including, in each instance, a free rotating roller or wheel 30 which is drivingly engaged, between the opposed retaining flanges 32 thereof, by a tape or belt 34. One tape 34 is drivingly engaged with the rollers 30 of all of the feeds 12 in each tier or circle, the illustrated arrangement thus requiring four tapes 34, each of these tapes being driven from a central pulley about which it is entrained in an obvious manner. As best illustrated in FIGURE 2, the width of the tape 34 is substantially less than that of the bearing surface of the associated rollers 30 and is located adjacent the upper flange 32 so as to expose a substantial portion of the bearing face of the rollers 30 between the lower edge of the tape 34 and the bottom roller flanges 32. Each roller 30 is rotatably suspended from the outer end of a base plate 36 which in turn is secured to an upstanding mounting post 38 having a bore 40 therethrough which slidably and adjustably receives a rod 42 radially oriented to the circular knitting machine itself, thus providing for an adjustable mounting of the feed 12. An appropriate lock screw 44 will also be provided so as to fix the position of the feed 12 on the rod 42. The base plate 36, toward the rear or inner end thereof, is provided with a pair of laterally spaced depending flanges 46, each of which pivotally mounts, as at 48, a forwardly projecting guide arm 50. The forward end portion of each guide arm 50 is in turn provided with a yarn receiving and guiding eye or hole 52 therethrough. The eye bearing forward ends of the arms 50 are so located as to provide for a positive engagement of the yarn 20 extending therebetween with a substantial portion of the bearing face of the associated roller 30. In other words, the yarn 20 comes from the corresponding yarn package 28, passes through one guide eye 52, about the bearing face of the roller 30, through the other guide eye 52 and then down to the appropriate feeding finger 14. The two arms 50 are interconnected, at approximately the mid-point along the length thereof, by a transversely extending bar 54 which underlies the plate-like base 36 just forward of the depending side flanges 46. The two arms 50 are biased downwardly about the pivot points 48 by means of one or two coiled compression springs 56 engaged between the base 36 and the arm connecting transverse bar 54 as will be best appreciated from FIGURE 3. The lowermost position of the arms 50 is defined by a pair forwardly projecting lips or ledges 58 on the side flanges 46, this lowermost position of the arms 50 being such so as to position the yarn 20 below the corresponding tape 34 as will be apparent from the three right hand feeds 12 in each group in FIGURE 1. When the yarn is in the position, the corresponding roller 30 will turn freely therebehind. It is only when the yarn 20 is moved upwardly between the corresponding roller and tape 34 that a positive frictional gripping of the yarn 20 occurs so as to produce a positive or constant feed of the yarn at a predetermined rate determined by the speed of the tape 34.

In adapting a positive feed as described supra to a striper, it is essential that there be an instantaneous control of each individual feed 12 so as to enable a switching from one yarn package to another without a halt in the knitting operation. Further, this must be done in a manner which will not produce variations in tension in the yarn inasmuch as such variations in turn result in variations in the stripe pattern, such being clearly visible and highly detrimental in the finished product. Heretofore, in stripers, the feeding of the yarn was controlled directly from the feeding fingers 14 engaging and disengaging, this in turn resulting in substantial variations in the yarn tension and requiring a manual control of the stripe

pattern. It is in order to avoid this necessity for manual control that the instant invention has been devised, such being a means whereby each feeding finger 14 is provided with a positive feed 12 which is controlled directly from the finger and instantaneously operatively engaged and disengaged simultaneously with the engagement and disengagement of the feeding finger. This is provided for by utilizing a direct linkage, either mechanical or electrical, between each feeding finger 14 and its associated positive feed 12.

Turning initially to FIGURES 2, 3 and 4, it will be noted that the direct control comprises, in each instance, an elongated rigid control rod 60 extending between each feeding finger 14 and the corresponding positive feed 12. The lower end of each rod 60 is to be secured for limited pivoting movement to the vertically swinging forward end portion 62 of one of the feeding fingers 14, this engagement, as illustrated in the drawings, can consist of a mere seating of the lower end of the rod 60 within a slightly enlarged socket 64. The upper end of each rod 60 is in turn pivotally engaged with the thread guiding unit, through for example the ball and socket connection 66 illustrated in FIGURE 3, this ball and socket engagement with one of the arms 50 actually controlling the movement of both arms 50 through the transverse connecting bar 54. The length of the rod 60 is such so that upon a lowering of the forward end 62 of the feeding finger 14, as the feeding finger 14 is biased into disengaged position, the feeder spring or springs 56 will immediately depress the yarn guiding arms 50 downwardly so as to disengage the yarn 20 from beneath the tape 34. Incidentally, this continuous downward biasing action of the springs 56 functions so as to positively maintain the lower end of the corresponding rod 60 within its socket 64, assuming such a connection is utilized. By the same token, upon an upward movement of the forward end 62 of the finger 14 so as to engage the finger, the rigid rod 60 simultaneously moves the yarn guiding arms 50 upwardly so as to position the yarn beneath the tape 34 and effect a simultaneous positive feeding of the yarn 20 with the feeding of the yarn from corresponding finger 14. It is through this provision of a positive linkage between each feeding finger 14 and the positive feed 12 therefor that it is possible to utilize a positive feed on a striper in a manner so as to switch from yarn package to yarn package without stopping the knitting operation and without producing undesirable variations in the stripe pattern, while at the same time not requiring an operator constantly maintaining manual control for regulating stripe pattern variations heretofore resulting from variations in yarn tension arising from various causes, including the stopping and starting of the knitting operation previously required in stripers. Each feeder 12 is controlled directly from the associated feeding finger 14, thus, when the design drum 18 has been set up for the desired repeat, this at the same time results automatically in a synchronizing of the feeders 12 to the repeat in that the feeds 12 have the afore-described direct connection to the fingers. There is no reliance upon stop motions, variations in yarn tension, or the like which inherently produce variations in yarn tension and the corresponding undesirable stripe pattern variations.

With reference to FIGURES 5, 6 and 7, it will be noted that another form of direct control has been illustrated therein, such being electrical in nature and comprising a bank of microswitches 68 associated with each drum box 10 with one switch 68 being engaged with the leading end 62 of each feeding finger 14 and being electrically connected to a solenoid 70 mounted on the corresponding feed 12 whereby a throwing of a switch 68 by a movement of the corresponding finger 14 to its engaged position will result in an energization of the corresponding solenoid 70 and an upward swinging of the arms 50 so as to engage the yarn 20 in driving position beneath the tape 34. Thus, the instantaneous control of

the positive feed 12 is achieved, again being directly responsive to the movement of the feeding fingers 14, and not to the yarn 20 itself. It will of course be appreciated that upon a retraction of the forward end 62 of the involved feeding finger 14, the corresponding microswitch 68 will shut off and deenergize the solenoid 70 which in turn will produce, either through an internal solenoid spring or spring similar to the springs 56, an immediate movement of the yarn 20 downwardly away from driving engagement between the tape 34 and the bearing portion of the roller 30.

From the foregoing, it should be appreciated that a highly unique control system for automatic strippers has been devised, such system providing for a direct control of each yarn feed from the corresponding feeding finger which in turn enables an instantaneous switch from one color to another without stopping the knitting operation and while maintaining a constant tension on the yarn necessary to automatically produce a perfect final product.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. Yarn feeding apparatus for a knitting machine comprising, in combination, a drum box, said box including a plurality of operably engageable and disengageable yarn feeding fingers, a positive feed for yarn associated with each finger, said positive feed including guide means for selectively engaging and disengaging yarn therewith for a positive feeding of the yarn thereby to the feeding finger, and control means independent of the yarn connecting each feeding finger with the guide means of the associated positive feed for effecting a simultaneous movement of the guide means with the movement of the finger for selectively engaging and disengaging yarn with

the positive feed in response to an engagement and disengagement of the feeding finger, said control means comprising a rigid rod having opposed ends, a first end of said rod being directly engaged with a feeding finger and the second end of said rod being directly engaged with the corresponding guide means of the associated positive feed in a manner whereby operative engagement of the finger effects, through the rod, a simultaneous movement of the guide means to instantaneously engage the yarn with the positive feed for positive feeding of the yarn, said positive feed comprising a roller and driven tape drivingly engaged with said roller, said tape being narrower than said roller and engaged with said roller toward one side thereof whereby a portion of the periphery of the roller is exposed, said guide means moving the yarn between a first position overlying the roller and underlying the tape, constituting the yarn engaged position, and a second position overlying the roller laterally of the tape, constituting the yarn disengaged position.

2. The apparatus of claim 1 wherein said positive feed includes means resiliently biasing the guide means to a yarn disengaged position.

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U.S. Cl. X.R.

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