Nov. 15, 1955 G. D. STIBBE ET AL 2,723,545

YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

Filed Nov. 30, 1951 8 Sheets-Sheet 1

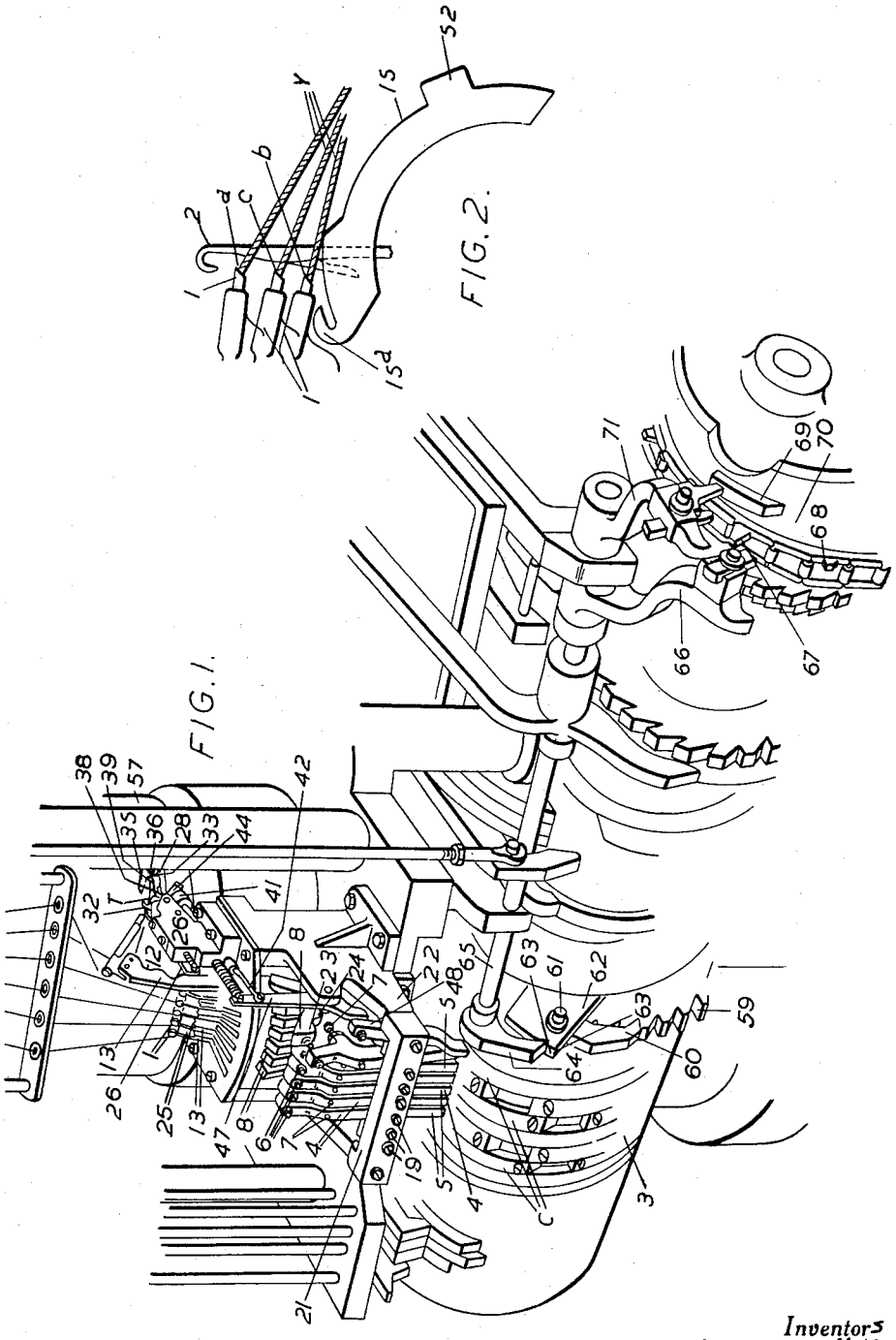


FIG. 1.

FIG. 2.

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FIG. 4.

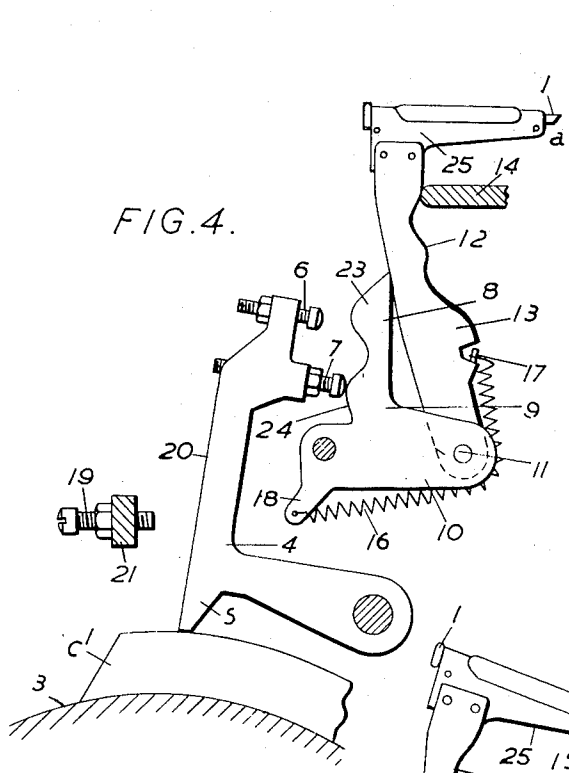
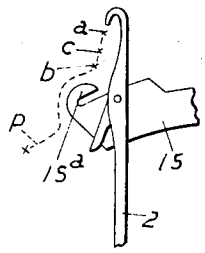


FIG. 3.



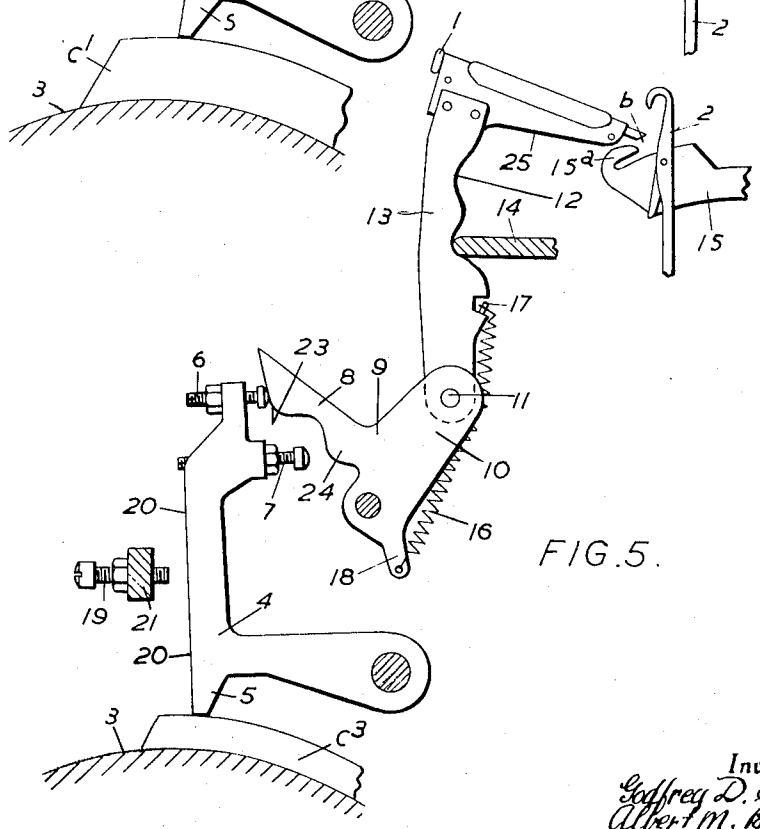


FIG. 5.

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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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FIG. 6.

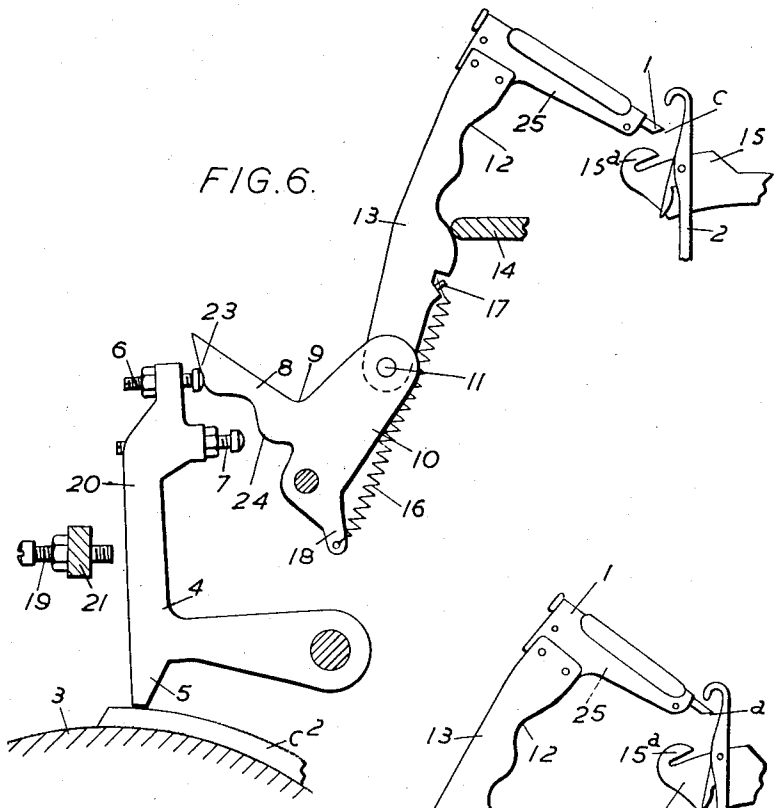
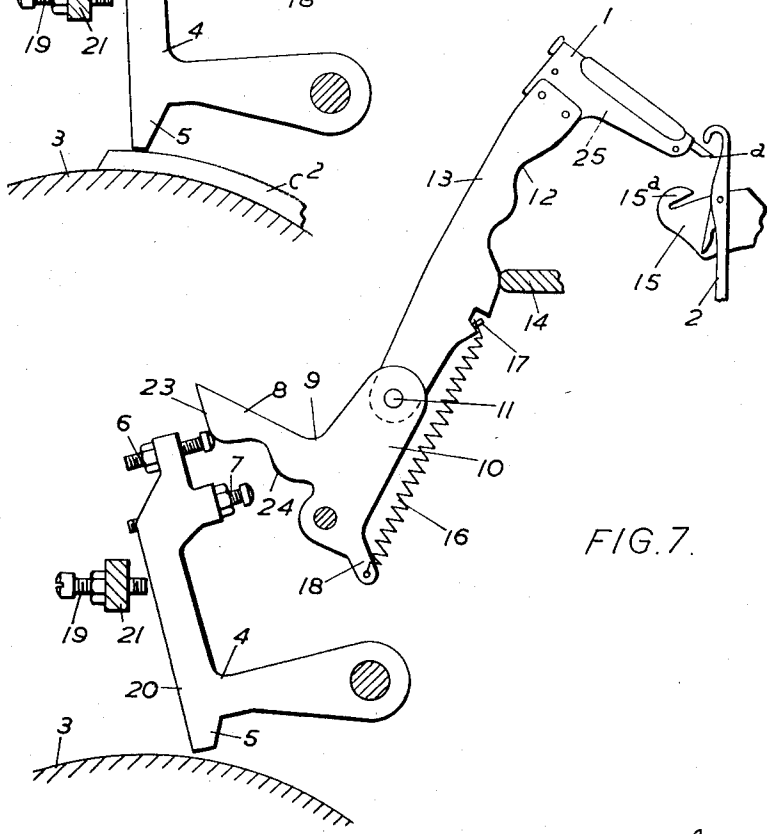


FIG. 7.



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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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FIG. 8.

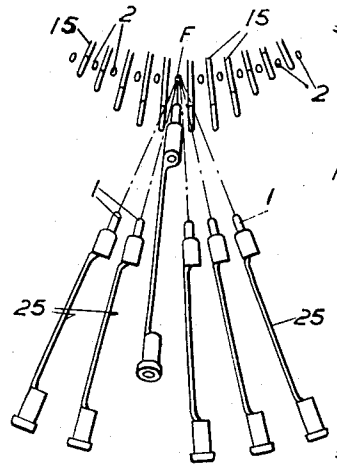


FIG. 10.

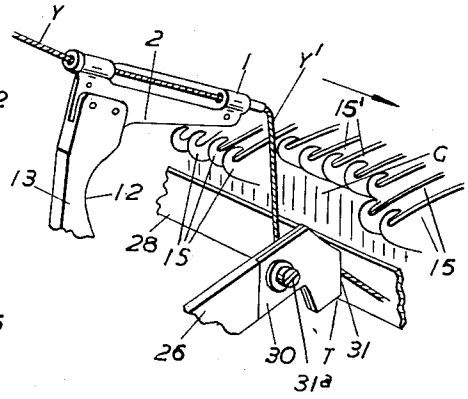


FIG. 11.

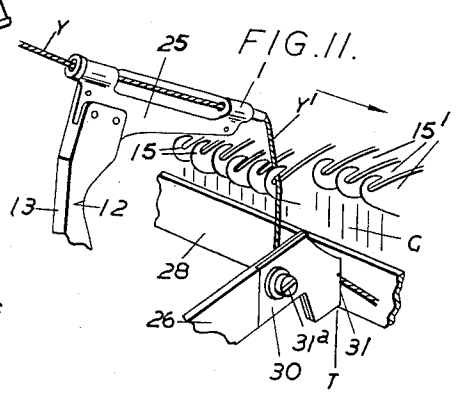


FIG. 9.

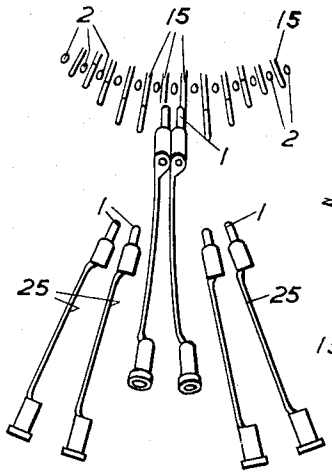
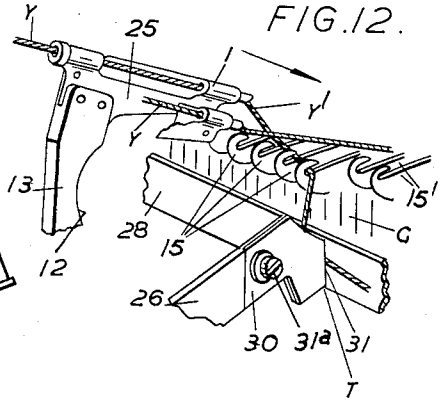


FIG. 12.



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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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FIG. 13.

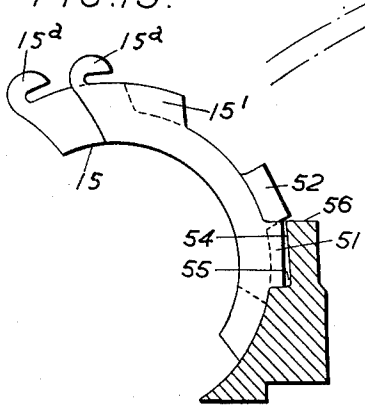
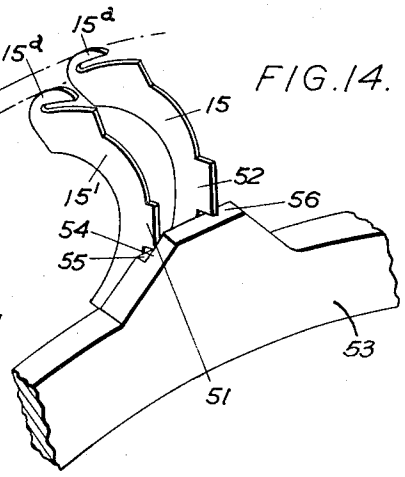


FIG. 14.



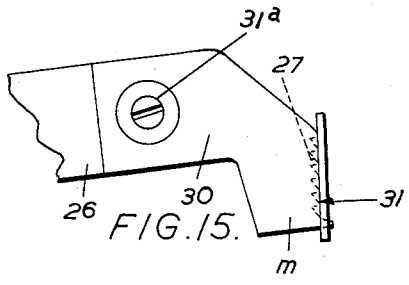


FIG. 15.

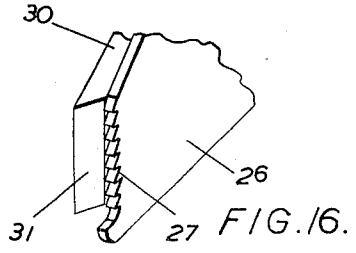
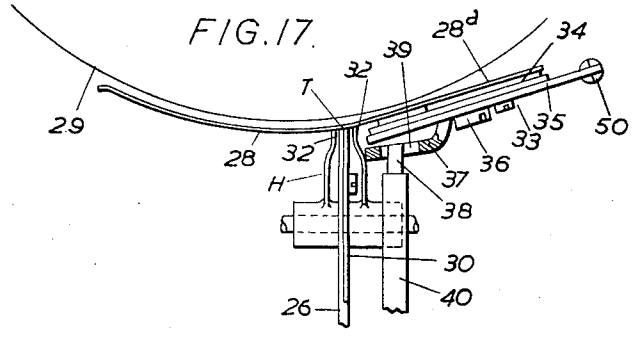


FIG. 16.

FIG. 17.



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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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FIG. 18.

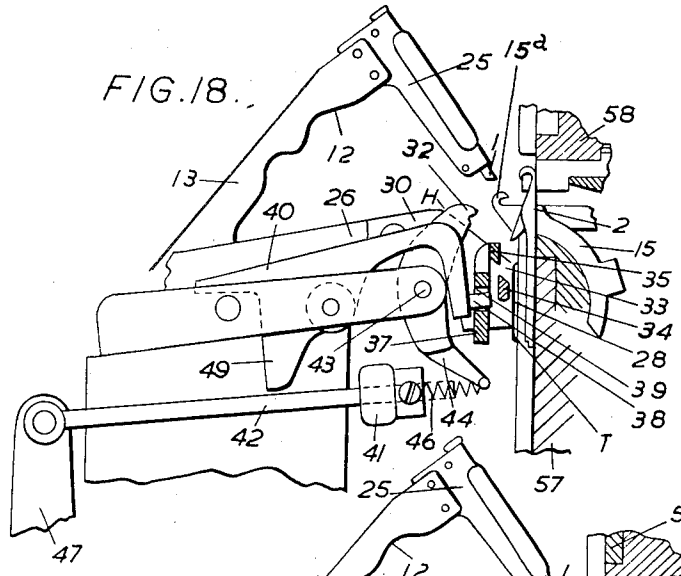


FIG. 19.

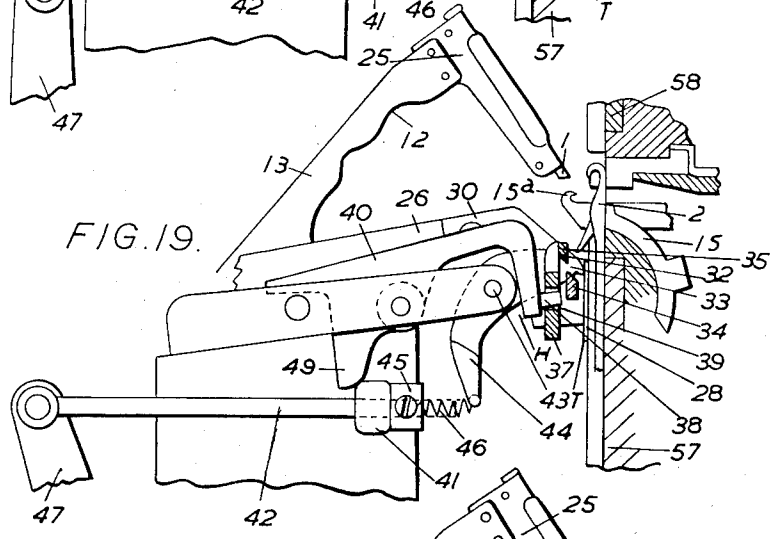
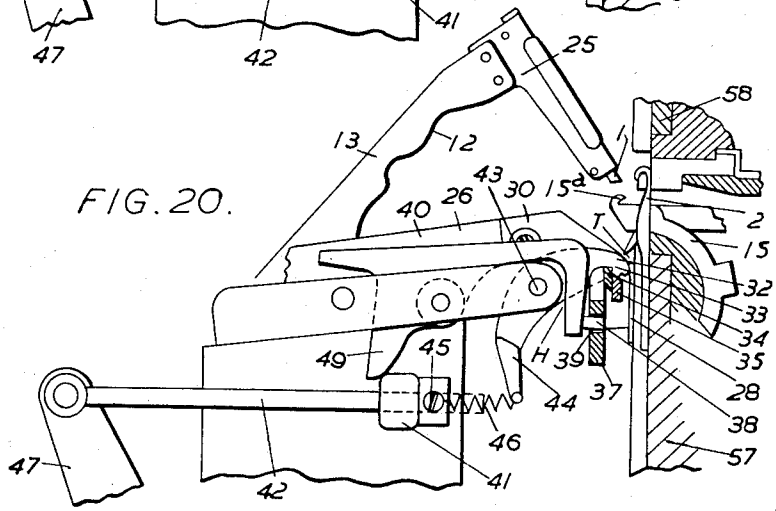


FIG. 20.



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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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FIG. 21.

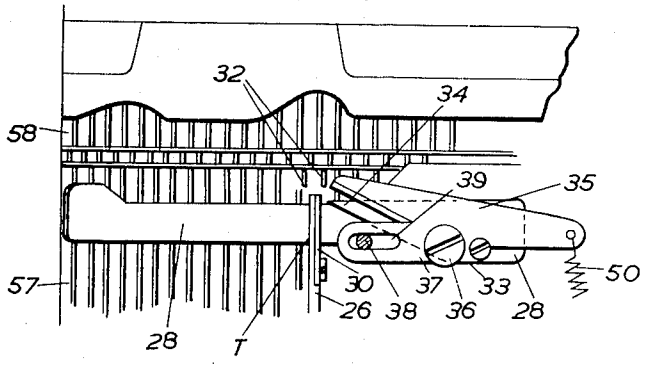


FIG. 22.

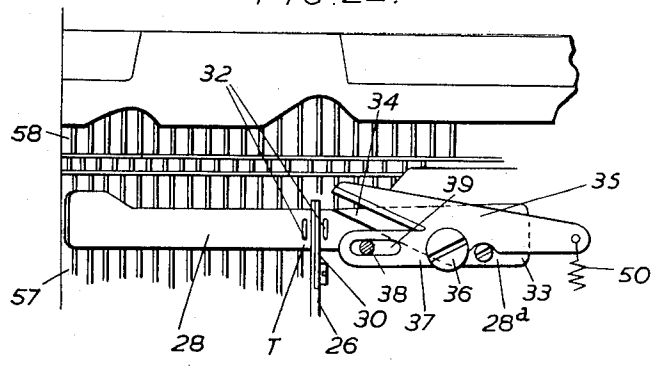
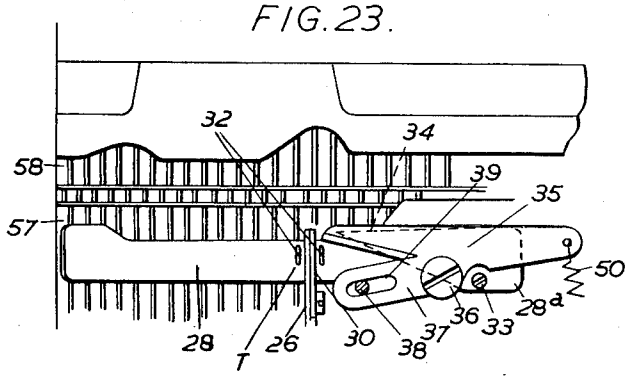


FIG. 23.



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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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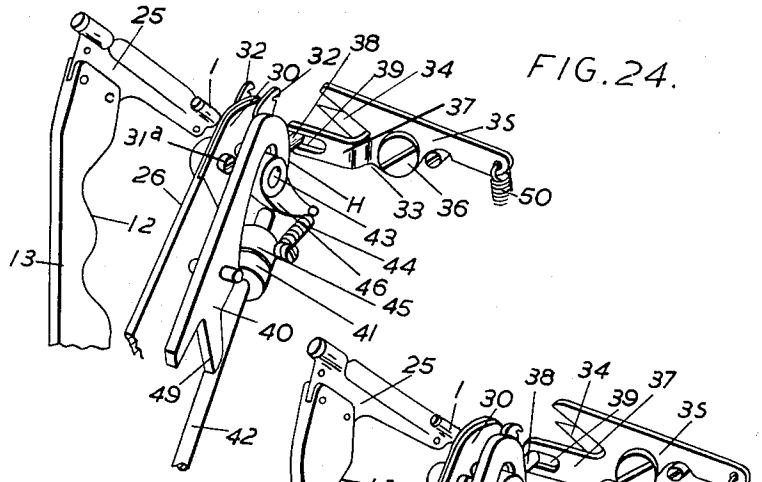


FIG. 24.

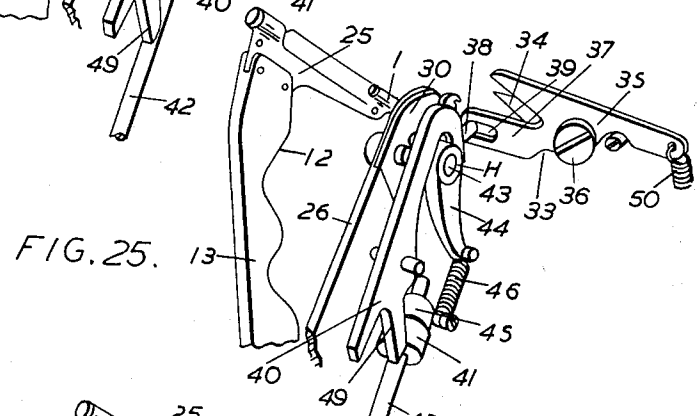


FIG. 25.

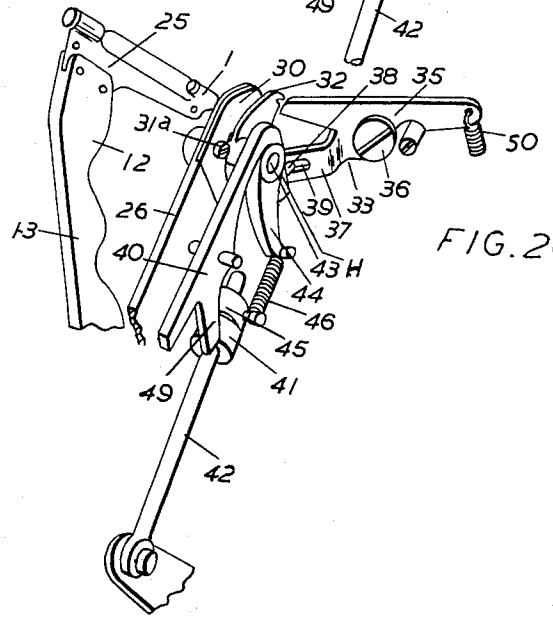


FIG. 26.

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United States Patent Office 2,723,545 Patented Nov. 15, 1955

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YARN SUPPLYING AND CHANGING MECHANISM FOR KNITTING MACHINES

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Application November 30, 1951, Serial No. 259,052

Claims priority, application Great Britain December 7, 1950

18 Claims. (Cl. 66—137)

This invention relates to yarn supplying and changing mechanism for knitting machines, and has reference to such mechanism of the kind comprising a plurality of individually operable feeders, i. e. yarn guides, adapted to feed one or more yarns to the needles at a time, and capable of being operated selectively for the purpose of substituting one or more yarns for another or others of a different character, e. g. colour or/and count, texture or quality, according to requirements. A yarn supplying and changing mechanism of this kind includes devices suitably associated with the feeders for trapping and severing yarns withdrawn from knitting.

The invention may accordingly be applied to horizontal striping attachments. Moreover, although broadly applicable to a knitting machine of any appropriate type, it is principally the intention to apply the invention to circular knitting machines, more especially automatic rib machines of the superimposed needle cylinder type—including seamless hose and half hose machines.

The general aim of the invention is to provide, in or for a knitting machine, a yarn supplying and changing mechanism of the kind herein referred to of a generally improved construction having certain advantages, as will be hereinafter described.

The principal object is to provide, in or for an automatic rib seamless hose or half hose machine, a multi-feeder horizontal striping attachment which, besides having the advantages of a modern striper without its limitations, is adapted to effect positively controlled changes of yarn at a predetermined single point around the plain or bottom needle cylinder of the machine, and capable of producing particularly neat and strongly reinforced joins.

According to this invention, the feeders of the improved yarn supplying and changing mechanism are individually controllable, and each, or each of two or more, of the feeders is movable from a non-feeding, i. e. an out of action, position to a selected one of a plurality of yarn feeding positions, and vice versa.

In one embodiment of the invention, each of the feeders concerned may conveniently be movable, at predetermined times, from a non-feeding position to a selected one of at least two feeding positions, namely either a high, e. g. ground, feeding position or a low, e. g. face, feeding position. The terms "high" and "low" are used in relation to the hooks or heads of the bottom cylinder needles: consequently a feeder in a high feeding position is nearer to these hooks or heads than a feeder in a low feeding position, and the terms are accordingly to be interpreted in this sense. Thus, each of the feeders of the mechanism movable in the manner described is capable of co-operation with another such feeder for feeding to the needles of the machine at the same time two yarns in plating relation. Of any two such feeders moved so as both to be in their feeding positions at the same time, one of the said feeders is, therefore, in high position, say feeding a ground yarn to the needles, whilst the other feeder is in a comparatively low position feeding in a face or plating yarn. But the improved construction and arrangement are such that the relative feeding positions of the said two feeders can be reversed, according to requirements so that what was previously the ground yarn becomes the face yarn, and vice versa.

To avoid confusion, however, it is to be clearly understood that where, as is principally the intention, the improved mechanism is applied to a circular rib knitting machine, e. g. of the superimposed needle cylinder type, the expression "ground" and "face or plating" yarns means yarns which appear at the back and at the front or face respectively of plain knitted work. So far as rib knitted work is concerned, the expressions require to be reversed.

In order that the invention may be more clearly understood and readily carried into practical effect, a specific constructional example of the invention embodied in a striper applied to a circular seamless hose or half hose machine equipped with independent latch needles and inside sinkers or web holders will now be described with reference to the accompanying drawings, wherein,

Figure 1 is a general perspective view of so much of the said machine as is necessary to show the improved yarn supplying and changing mechanism, and the control means for selectively controlling the individually controllable feeders,

Figure 2 is a fragmentary detail side view depicting the operative end of a feeder in its high, low and intermediate feeding positions shown in relation to the head of a needle and a sinker or web holder,

Figure 3 is a diagram representing the path followed by the operative end of a feeder when being moved from its out of action position to its various alternative feeding positions, and vice versa,

Figure 4 is a side view, partly in section, illustrating one of the feeders and the corresponding connections throught the medium of which it is controlled from the control drum of the machine, the feeder in this particular figure being shown out of action,

Figures 5, 6 and 7 are three further views each similar to Figure 4 but showing the feeder in its face or low feeding position, its intermediate feeding position and its ground or high feeding position respectively.

Figure 8 is a detail plan view of all of the feeders showing how they converge almost onto a single common point, one only of the feeders being shown in an operative position,

Figure 9 is a plan view similar to Figure 8 but showing two adjacent feeders in the said operative position,

Figure 10 is a detail perspective view illustrating a panel of sinkers or web holders only partially projected to ensure positive introduction of a yarn to a definite and predetermined needle each time a feeder is moved into any of its alternative feeding positions, as will be hereinafter described,

Figure 11 is a somewhat similar perspective view showing the manner in which the said yarn is engaged by the first normally, i. e. fully, projected sinker or web holder at the appropriate side of the gap provided by the panel of partially projected sinkers or web holders,

Figure 12 is another similar perspective view further depicting the positive introduction of the new yarn and showing also the pulling out of the older yarn during a yarn change.

Figure 13 is a detail cross-sectional view, including sinkers or web holders in side elevation, showing the manner in which a panel of the sinkers or web holders is only partially projected to provide the aforementioned gap,

Figure 14 is a fragmentary perspective view showing, more clearly the formation of the sinker cam and the way this acts for the purpose specified upon sinkers or web holders having butts of different lengths,

Figure 15 is a side view of one form of the single trapper device included in the improved yarn supplying and changing mechanism,

Figure 16 is a detail perspective view of parts of the said trapper device,

Figure 17 is a plan view of the trapper device, showing also not only an operable hook assembly for engaging any yarn withdrawn from knitting and forcing it into the said device without the latter being released, but also a knife common to all of the feeders,

Figure 18 is a side view of the trapper device, the hook assembly and the knife, with a fragmentary portion of the adjacent needle cylinder of the machine shown in vertical section,

Figures 19 and 20 are two further views similar to Figure 18 with, however, the hook assembly and the knife shown in respectively different relative positions,

Figures 21, 22 and 23 are three front elevational views corresponding to Figures 18, 19 and 20 respectively, and

Figures 24, 25 and 26 are three detail perspective views of the hook assembly and the knife depicting these parts in the relative positions shown in Figures 21, 22 and 23 respectively.

Like parts are designated by similar reference characters throughout the drawings.

Referring to the drawings, it will be seen that the improved yarn supplying and changing mechanism comprises a plurality of individually and selectively operable feeders **1** adapted to feed one or more of the yarns Y at a time to the latch needles such as **2** of the machine.

In the specific illustrated arrangement each of the feeders **1** is movable into either a high (ground) feeding position *a*, or a low (face) feeding position *b* or an intermediate feeding position *c*, these positions being clearly indicated in Figures 2, 3, 5, 6 and 7. The said feeders, moreover, are selectively controlled from a drum **3** (Figures 1 and 4–7) having thereon a plurality of circumferential series or rows of cams designated generally by the reference letter C, there being one row of such cams to each feeder **1**, and the cams being of three heights. A high cam such as that represented at C^1 in any one series or row determines the non-feeding position *d* of the corresponding feeder **1** (see Figure 4); a low cam C^2 in the series or row determines the intermediate feeding position *c* of the said feeder (Figure 6); a cam C^3 (Figure 5) of intermediate height determines the low feeding position *b* of the feeder, and, as shown in Figure 7, the absence of a cam on the drum **3** enables the feeder to assume its high feeding position *a*. To be acted upon by the cams C in each circumferential series or row there is provided, as depicted in Figures 1, 4, 5, 6 and 7, a pivoted cam lever **4** which has a toe **5** for contact by the cams and is furnished with adjustable abutment screws **6** and **7** for contact with one arm **8** of a two-armed fulcrummed lever **9** the other arm of which is suitably articulated at **11** to the tail end of the corresponding feeder **1**. In such an arrangement the front edge **12** of the shank **13** of each of the feeders **1** is appropriately profiled to provide a cam edge which is slidable over and permanently maintained in contact with the outer edge of an adjacently disposed relatively fixed plate **14** (Figures 4–7) or other suitable part, the arrangement being such that as the feeder is either sprung forward and upwards into a feeding position or withdrawn into its non-feeding position at the dictates of the appropriate drum cams C and through the medium of the relevant pivoted cam lever **4** and the associated two-armed fulcrummed lever **9**, the cam edge **12**, in sliding over the edge of the fixed plate **14**, determines the path P followed by the yarn guiding extremity of the feeder **1**. In the case of a superimposed needle cylinder machine such as that illustrated in Figure 1, equipped with independent latch needles **2** and inside sinkers or web holders **15**, the shaping of the cam edge **12** on each feeder shank **13** must be such that, whenever the feeder is either withdrawn to its non-feeding position or sprung forward and upwards into a feeding position, the yarn guiding extremity thereof follows a path P conforming with the contour of the customary latch guard (not shown) and of the nibs or noses **15***a* of the sinkers or web holders **15**. In this way a safe clearance is maintained at all times between the feeders and the latch guard and the sinkers or web holders. Maintenance of the shaped front edge **12** of each feeder shank **13** in permanent contact with the relatively fixed plate **14** is effected by a tension spring **16** one end of which is connected to the said shank at **17** while the other end is anchored to a lug **18** on the corresponding two-armed fulcrummed lever **9**.

To determine the high feeding position *a* of each feeder **1** there is provided at any convenient fixed loction an adjustable abutment screw **19** arranged for contact with the straight edge **20** of the cam lever **4**. As will be seen in Figure 1, the abutment screws **19** are carried by a fixed bar **21** attached to the front of the main bracket **22** of the yarn supplying and changing mechanism.

The two adjustable abutment screws **6** and **7** with which each pivoted cam lever **4** is furnished are arranged one above the other for contact respectively with outer and inner humps or similar protuberances such as **23** and **24** on the arm **8** of the corresponding two-armed fulcrummed lever **9**. Withdrawal of any of the feeders **1** from a feeding position to its non-feeding position is controlled in two stages, viz. first by action of the relevant upper abutment screw **6** on the outer hump or protuberance **23** of the corresponding lever **9** and then by action of the associated lower abutment screw **7** on the inner hump or protuberance **24**. That is to say, the lower screw **7** takes over from the upper scrtw **6** and completes the withdrawal of the feeder to the position shown in Figure 4.

As illustrated in Figure 8, the various feeders **1** of the improved yarn supplying and changing mechanism are so arranged as to converge almost onto a single common point F. This is to allow the yarn or yarns of whichever feeder or feeders are in operation to be fed in the most advantageous position.

The yarn guiding extremities of the said feeders may conveniently be associated with flexible parts on, or extension of, the feeder shanks **13**. The said flexible parts or extension are accordingly capable of deflection laterally, when feeders are moved relatively in contact with each other (as shown in Figure 9) this enabling feeders to be disposed closely side by side and to pass each other, by deflection, and yet be capable of returning to their normal undeflected positions when permitted so to do, i. e. when unobstructed. In this way the necessity to employ a complicated system of cams or the like for causing the feeders to take separate paths is avoided. Consequently when, as already indicated is principally the intention, some at least of the feeders are adapted to feed yarns to the needles in plating relation, the flexibility of the yarn guiding extremities readily permits of as many as four feeders at a time being momentarily at the knitting location during substitution of yarns from one pair of plating feeders by yarns from another pair of plating feeders and whilst making an overlap. Thus in the illustrated example of the invention, the actual yarn feeders **1** consist of tubes which are fixed in relatively thin flexible spring steel extensions **25** attached to the leading ends of the slidable feeder shanks **13** whereby the feeders are carried and moved back and forth.

In the specific striper now being described with reference to the drawings, there are six feeders in all, one being reserved for a heel and toe yarn, and the five main feeders being separately controllable for coloured yarn changes.

For trapping the yarns Y as and when they are withdrawn from knitting there is provided in the improved yarn supplying and changing mechanism a single trapper device (designated generally by the letter T) which device is common to all of the feeders **1** and so avoids the

necessity for a complicated series of individually controlled trappers. The single trapper device T enables all yarns which are out of action to be held at a single point as near as possible to that at which a new yarn is introduced to the needles 2 at each yarn change. As a consequence, the free end of uncontrolled yarn is reduced to the minimum length, thereby maintaining each join substantially uniform. As shown more clearly in Figures 17–23, the said trapper device comprises, in combination, a spring loaded blade 26 the operative end *m* of which is serrated as at 27, and a relatively thin spring-loaded "platform" member 28 against which the serrated edge 27 is yieldingly held. The blade 26 may advantageously be disposed at a slight angle with respect to the platform member 28, and the latter is of fair longitudinal extent and has a portion 28*a* extending tangential to the needle line 29 (see Figure 17). If desired, although this is not essential, the operative end of the blade 26 may also be rebated to receive a supplementary trapping blade 30 the leading edge 31 of which is bevelled as shown in Figure 16. When provided, the supplementary blade 30 may, as depicted in Figure 15, be retained by a single screw 31*a*. In any event, the construction and arrangement of the trapper device T are such that any yarn trapped therein is free to be pulled out in one direction only—that is in the direction of knitting but will be securely held if drawn back from the end of the relevant feeder. Thus, once a yarn is pushed into the trapper T, it cannot, owing to the presence of the serrated and bevelled edge 27 and 31, be released by being pulled either backwards or upwards.

In association with the trapper device T there may advantageously be provided operable means of any suitable character adapted to engage any yarn withdrawn from knitting and force it into the trapper device without the latter being released. These means may, as illustrated in Figures 17–26 consist of a hook assembly H comprising hooked elements 32 which are arranged at respectively opposite sides of the trapper blades 26 and 30 and are movable pivotally, at every yarn change. As will be appreciated, a yarn withdrawn from knitting passes naturally across the top of the serrated blade 26 of the trapper, the hooked elements 32 closing on the said yarn and forcing it between the blades 26 and 30 and the platform member 28. Incidentally, the hook assembly H maintains constant control over the various yarns as well as functioning as a self-clearing device for the trapper device.

For severing yarns withdrawn from knitting, there is provided a single knife 33 common to all of the feeders 1, this knife comprising a fixed blade 34 cooperating with a relatively movable scissor blade 35 and being so arranged and operable as to cut every outgoing yarn at one point and at a set instant of time during a yarn change, thereby ensuring yarn ends of substantially equal lengths at every join.

The movable scissor blade 35 of the common knife 33 is preferably so interconnected with the hook assembly H that the two can be operated and controlled conjointly from timing or controlling means of any suitable character through the medium of a common actuating and control rod or the like. Thus, in the specific arrangement illustrated in Figures 18–26, the movable scissor blade 35 is pivoted at 36 and provided with an extension 37 having a pin-and-slot connection 38, 39 with a fulcrummed trigger-like member 40 which is adapted to be acted upon by a collar 41 mounted on a common actuating rod 42. The shaft 43 of the rockable hook assembly H has rigidly secured thereto an arm 44 which is connected to a part 45 of or on the common actuating rod 42 by means of a tension spring 46 arranged to provide lost motion between the two. Thus, after rod 42 has been actuated from the control drum 3, through the medium of connections such as 47 and 48 (Figure 1) to effect an operative movement of the hook assembly H, a depending lug 49 on the trigger-like member 40 is acted upon by the collar 41 with the result that the said member 40 is turned to close the knife 33 and sever a withdrawn yarn forced into the trapper T by the hooked element 32. The movable scissor blade 35 is controlled by a tension spring 50. It is to be understood that in being forced by the hooked elements 32 into the trapper T, a withdrawn yarn automatically passes between the fixed blade 34 and the then open movable scissor blade 35 of the knife in readiness for being severed.

Now in operation of the improved yarn supplying and changing mechanism it is very important that whenever a feeder 1 is moved into a feeding position the short length of yarn extending between the yarn guiding extremity of the feeder and the trapping device T shall be positively introduced to and initially taken by a definite and predetermined needle 2. Any suitable provision may be made to ensure this result. In the illustrated example the desired result is achieved by arranging for a panel of a few, e. g. twelve, sinkers or web holders 15^1 to be maintained in a partially projected position at a location where the remaining sinkers or web holders 15 are normally fully projected suchwise as to provide a "gap" G (Figures 10, 11 and 12) in the projected sinkers or web holders, in which instance the length of yarn Y^1 extending between the yarn guiding extremity of a feeder 1 moved to a feeding position and the trapping device T is located within this gap so that it will be engaged by the first normally, i. e. fully, projected sinker or web holder 15 at the appropriate side of the gap and positively introduced by this particular sinker or web holder, upon subsequent retraction thereof, to the next adjacent needle. To enable the required panel of sinkers or web holders 15^1 to be only partially advanced at the feeding location, the operating butts 51 of these particular sinkers or web holders are, as shown in Figures 13 and 14, made shorter than the normal butts 52 on the sinkers or web holders 15, and the sinker cam 53 by which all of the sinkers or web holders are projected is rebated as at 54 so as to present to the sinker butts two ledges 55 and 56 at respectively different heights, i. e. a narrow ledge 55 at a lower level for action on the short butts 51 and a comparatively wide ledge 56 at a higher level for action on the normal butts 52. The positive introduction of a yarn to a definite needle enables another yarn which is to be withdrawn to be pulled out quickly, thereby resulting, as will be appreciated from Figure 12, in a short overlap. The overlap is substantially positive and uniform in length. The said overlap is such, moreover, that each yarn is single and not doubled or wrapped back at the join; this, of course, reduces the bulk of the join and is commensurately neater. Limited single course striping can, therefore, be carried out with the improved mechanism since the needles are enabled to clear themselves without being unduly loaded.

The join produced is strongly reinforced because the free ends of the yarns are caught up and knitted into the following courses of knitting.

In each of Figures 18, 19 and 20 the superimposed bottom or plain and top or rib needle cylinders are indicated at 57 and 58 respectively.

As depicted in Figure 1, the control drum 3 of the machine is fitted at one end with a ratchet wheel 59 and is adapted to be racked round by an associated pawl 60 which is pivotally mounted at 61 upon a racking arm 62. This arm is formed with a tooth 63 and is thereby adapted to be controlled by engagement, at appropriate times, by a control detent 64. Whenever the detent 64 is engaged with the tooth 63, oscillation of the racking arm 62 is prevented so that the drum 3 is quiescent. When, on the other hand, the control detent 64 is lifted clear of the racking arm 62, the latter is permitted to oscillate and rack round the drum. As will be seen, the detent 64 is secured upon the end of a rock shaft 65

fitted with a lever **66** adapted to be acted upon and raised to lift the said detent clear of the tooth **63**, at appropriate times, by studs or bits such as **67** on a timing chain **68**.

At each completion of a garment, or after a press off and a manual re-start of the knitting machine, the improved yarn feeding and changing mechanism is automatically re-timed at the dictates of a cam **69** on a timing drum **70** and through the medium of a further lever **71** on the rock shaft **65**.

The connections shown in Figure 1 for operating the hook assembly H conjointly with the knife **33** are a little different from those depicted in Figures 18, 19, 20, 24, 25 and 26; this difference is, however, merely to emphasise the fact that the constructional details of the mechanism may be varied.

The control of the yarns, so necessary on stripers, can be quite simply effected. To facilitate plating, means are provided for applying tension to yarns, individually. Any tendency for yarns to "race" is obviated by means of yarn guides furnished with friction engendering means, e. g. pins. Control of yarns at the point of introduction to the needles is automatic. As a feeder is projected into a feeding position, the relevant yarn is drawn taut between the operative yarn guiding extremity of the said feeder and the trapper device T. This eliminates any tendency for bellying or looping of a yarn at the moment of introduction to the needles.

In the application of the invention to seamless hose or half hose machines, heels and toes may be made at any appropriate times during the stripping progression without in anywise interfering with or breaking up the sequence of, say, striping colours. In this connection the heel and toe feeder is adapted to be selected separately from the main control drum and, when the said feeder is in action, it automatically suspends the striping.

When the feeders are out of action they rest in line so that an outgoing yarn is led naturally by the contour of the needles straight across the trapper device T and is thus disposed for engagement by the hooked elements **32** of the hook assembly H.

What we claim is:

1. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders such wise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, means to move each of the said feeders from a non-feeding position to a selected one of a plurality of yarn feeding positions and vice versa, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

2. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, means to move each of the said feeders from a non-feeding position to a selected one of two feeding positions, namely either a high or a low feeding position, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

3. A combination according to claim 2, wherein each of the feeders is also movable into a feeding position intermediate the said high and low feeding positions.

4. In a knitting machine, in combination, a needle bed, needles for operation in said bed, and a multicolour horizontal striping attachment comprising a group of individually operable feeders each for feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different colour each of the said feeders being movable under control from a non-feeding position into a selected one of three feeding positions, viz. high, intermediate or low, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

5. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, a control drum common to all of the said feeders, cams of varying heights on the said drum, connections operable by the cams and through the medium of which the feeders are selectively operated under control suchwise as to effect from time to time substitution of at least one yarn for at least one other yarn of a different character, each of the feeders being movable, under the said control and in a desired sequence, from a non-feeding position to a selected one of a plurality of yarn feeding positions, and vice versa, determined by the disposition and varying heights of the cams, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

6. A combination according to claim 5, wherein the control drum has thereon a plurality of circumferential series of cams, one series to each feeder, and the cams in each series being of different heights.

7. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, a control drum common to all of the said feeders, a plurality of circumferential series of cams on said drum, one series to each feeder and the cams in each series being of three different heights, connections operable by the cams and through the medium of which the feeders are selectively operated under control and in a desired sequence suchwise as to effect from time to time substitution of at least one yarn for at least one other yarn of a different character, a high cam in any one series determining the non-feeding position of the corresponding feeder, a low cam in the said series determining an intermediate feeding position of the feeder, a cam of intermediate height in the same series determining a low feeding position of the feeder and the absence of a cam on the drum enabling the feeder to assume high feeding position, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

8. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, a control drum common to all of the said feeders, a plurality of circumferential series of cams on said drum, one series to each feeder and the cams in each series being of three different heights, two-armed levers articulated to the feeders, cam levers which are arranged to be acted upon by the cams and are provided with abutments for contact with said two-armed levers, the various levers constituting means through the medium of which the feeders are selectively operated under control and in a desired sequence suchwise as to effect from time to time substitution of at least one yarn for at least one other yarn of a different character, a high cam in any one series determining the non-feeding position of the corresponding feeder, a low cam in the said series determining an intermediate feeding position of the feeder, a cam of intermediate height in the same series determining a low feeding position of the feeder and the absence of a cam on the drum enabling the feeder to assume a high feeding position, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

9. A combination according to claim 8, wherein to determine the high feeding position of each feeder there is provided at a fixed location an adjustable abutment arranged for contact with the corresponding cam lever.

10. A combination according to claim 8, wherein an edge on each feeder is profiled to provide a cam edge which is slidable over and permanently maintained in

contact with an edge of a relatively fixed part whereby as the feeder is projected into a feeding position or withdrawn to its non-feeding position at the dictates of the control drum the yarn guiding extremity of the said feeder is constrained to follow a predetermined path.

11. In a circular knitting machine, in combination, superimposed needle cylinders, needles for operation in said cylinders, inside web-holding sinkers mounted in the bottom cylinder for co-operation with said needles, in the knitting of fabric, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles and having a shank an edge of which is profiled to provide a cam edge, a relatively fixed part over which the cam edges are slidable, means for maintaining said cam edges on the feeders in contact with an edge of said fixed part, a control drum common to all of the feeders, cams of varying heights on the said drum, connections operable by the cams and through the medium of which the feeders are selectively operated under control suchwise as to effect from time to time substitution of at least one yarn for at least one other yarn of a different character, each of the feeders being movable, under the said control, and in a desired sequence, from a non-feeding position to a selected one of a plurality of yarn feeding positions, and vice versa, determined by the disposition and varying heights of the cams, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting, the shaping of the aforementioned edges on the shanks of the feeders being such that whenever a feeder is projected into a feeding position or withdrawn to its non-feeding position at the dictates of the control drum the yarn guiding extremity of the feeder will be constrained to follow a path conforming with the contour, but clear, of the operative ends of the web-holding sinkers.

12. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders so arranged as to converge almost onto a single common point and each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, each of the said feeders being movable from a non-feeding position to a selected one of a plurality of yarn feeding positions and vice versa, and devices associated with the feeders for trapping and severing yarns withdrawn from knitting.

13. A combination according to claim 12, wherein the yarn guiding extremities of the feeders are associated with flexible extensions of shanks of the feeders, these extensions being laterally deflectable when feeders are moved relatively in contact with each other.

14. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, means to move each of the said feeders from a non-feeding position to a selected one of a plurality of yarn feeding positions and vice versa, a single trapper device common to all of the feeders for trapping yarns as and when they are withdrawn from knitting, and means for severing such withdrawn yarns.

15. In a knitting machine in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, each of the said feeders being movable from a non-feeding position to a selected one of a plurality of yarn feeding positions and vice versa, a single trapper device common to all of the feeders for trapping yarns as and when they are withdrawn from knitting, means operable to engage any yarn withdrawn from knitting and to force it into the trapper device without the latter being released, and means for severing yarns withdrawn from knitting.

16. In a circular knitting machine, in combination, a needle cylinder, needles for operation in said cylinder, inside web-holding sinkers mounted in the cylinder for co-operation with the needles in the knitting of fabric, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, each of the said feeders being movable from a non-feeding position to a selected one of a plurality of yarn feeding positions and vice versa, a single trapper device common to all of the feeders for trapping yarns as and when they are withdrawn from knitting, means for severing such withdrawn yarns, means for fully projecting web-holding sinkers at the required location, and means for maintaining a panel of a few sinkers in a partially projected position at a location where the remaining sinkers are fully projected so as to provide a gap in the projected sinkers whereby a length of yarn extending between the yarn guiding extremity of any feeder moved to a feeding position and the trapper device is located within this gap so that it will be engaged by the first fully projected sinker at the appropriate side of the gap and positively introduced by this particular sinker to the next adjacent needle.

17. A combination according to claim 16, wherein operating butts on the web-holding sinkers of the panel are made shorter than operating butts on the remaining sinkers, and a cam provided for actuating the sinkers is so formed as to present two ledges of different widths at respectively different heights, for the purpose specified.

18. In a knitting machine, in combination, a needle bed, needles for operation in said bed, a group of individually operable feeders each capable of feeding at least one yarn at a time to the said needles, means for selectively operating the feeders suchwise as to effect periodic substitution of at least one yarn for at least one other yarn of a different character, means to move each of said feeders from a non-feeding to a selected one of a plurality of yarn feeding positions and vice versa, a single trapper device common to all of the feeders for trapping yarns as and when they are withdrawn from knitting, such single trapper device including a blade, the operative end of which is serrated, and a member against which the serrated end is yieldingly held, and means for severing such withdrawn yarns.

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