Aug. 11, 1942. H. H. HOLMES 2,292,941

CIRCULAR KNITTING MACHINE

Filed July 31, 1941 3 Sheets-Sheet 1

Fig. 1.

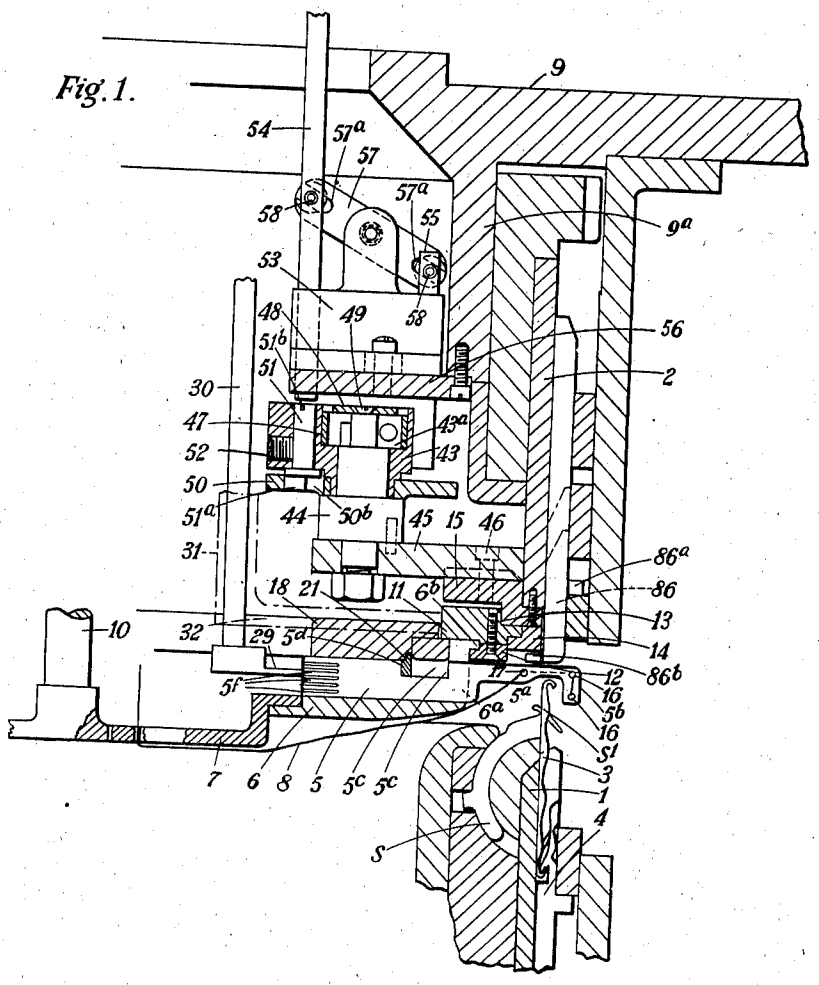
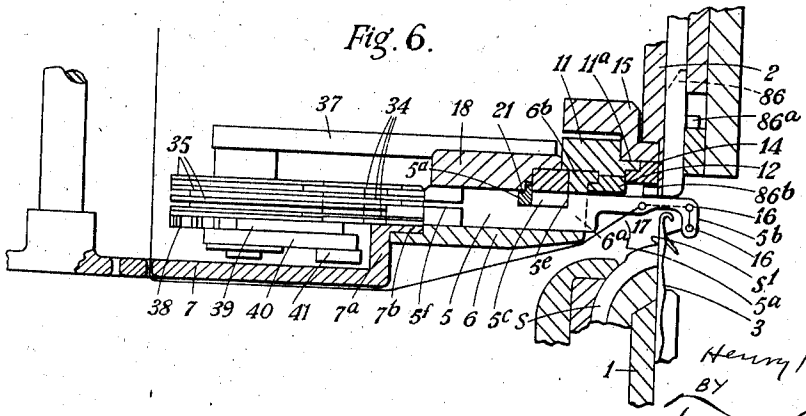


Fig. 6.



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Filed July 31, 1941 3 Sheets-Sheet 2

Fig. 3.

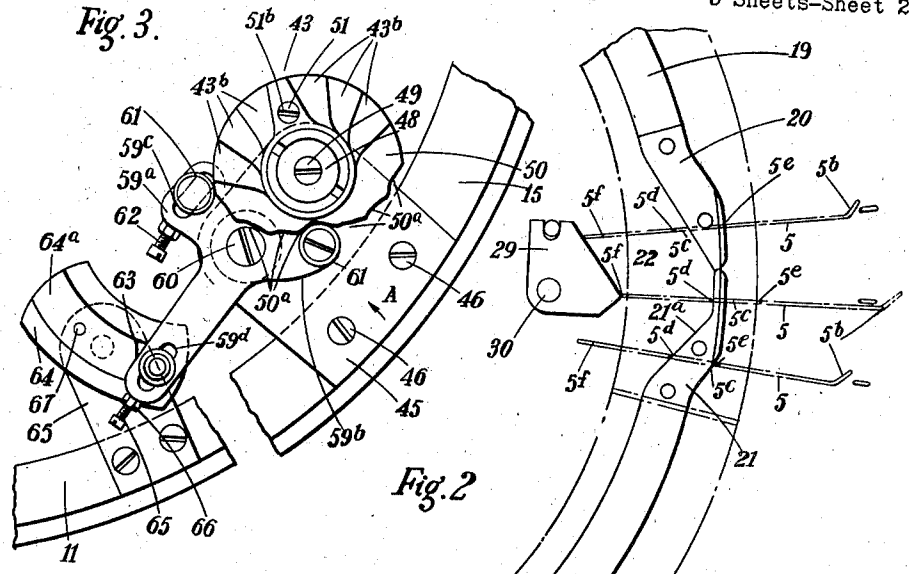


Fig. 2

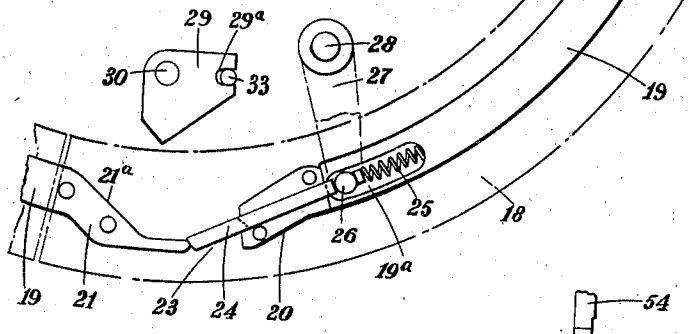


Fig. 5.

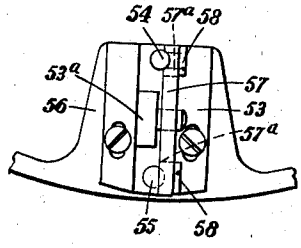
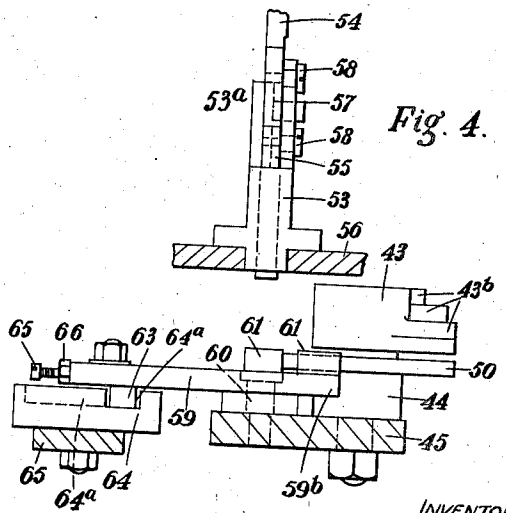


Fig. 4.



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Filed July 31, 1941 3 Sheets-Sheet 3

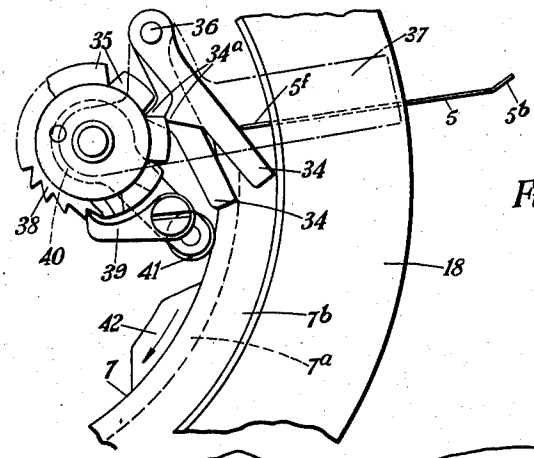
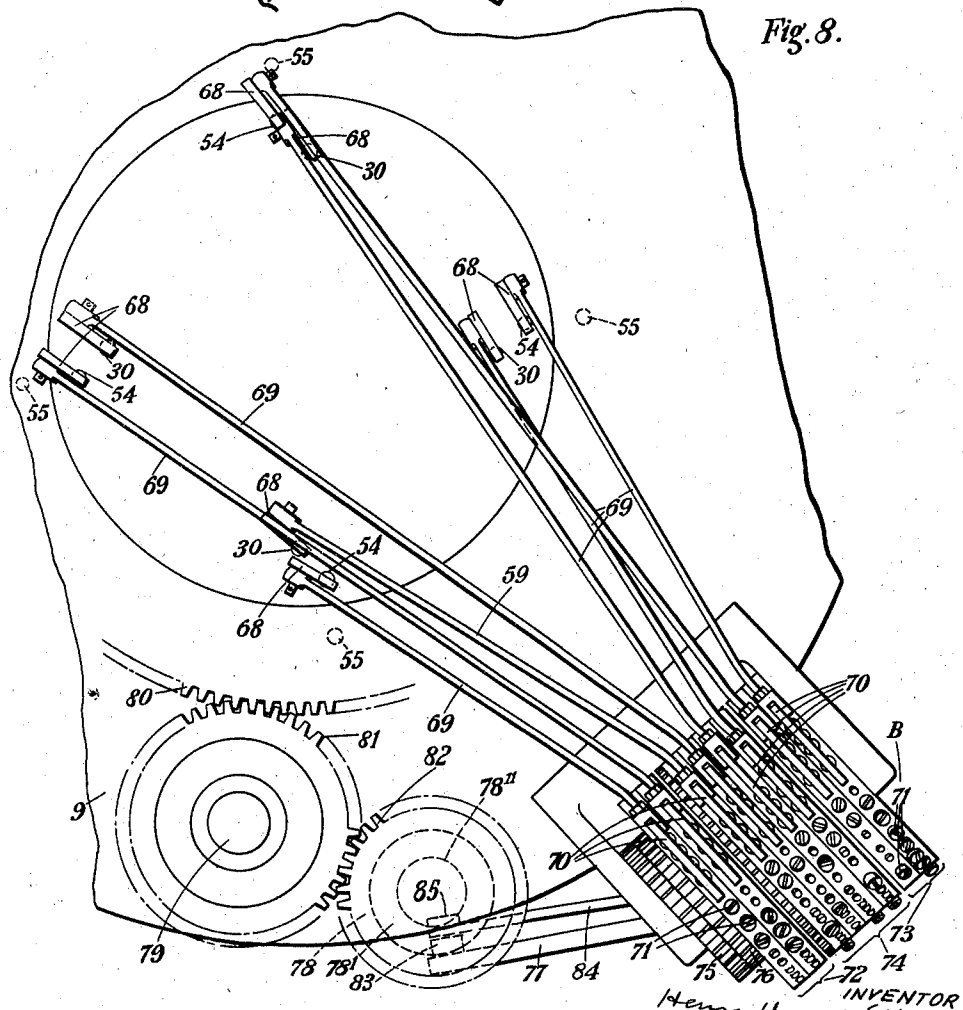


Fig. 7.

Fig. 8.



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Patented Aug. 11, 1942

2,292,941

UNITED STATES PATENT OFFICE

2,292,941

CIRCULAR KNITTING MACHINE

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Application July 31, 1941, Serial No. 404,923
In Great Britain August 6, 1940

12 Claims. (Cl. 66—135)

This invention relates to circular knitting machines, and concerns those of the kind furnished with patterning mechanism comprising movable thread guides for lapping or wrapping design threads around desired needles, such threads being additional to the main yarn or yarns ordinarily supplied, for the purpose of obtaining what are now commonly known as lap or wrap striping (embroidery plating) effects.

The invention is applicable both to plain circular, i. e., non-rib, machines having but a single needle cylinder and to circular rib knitting machines. In this latter respect the invention may, for instance, be applied to circular rib knitting machines of the type comprising double cylinders arranged co-axially and each adapted to contain needles, or needles and associated jacks or sliders. As examples of such machines may be mentioned those of the characteristic type employing superposed needle cylinders and equipped with double-ended needles operable by sliders whereby needles can be transferred from one cylinder to another for the purpose of changing from plain knitting to rib knitting and vice versa, and it is primarily to such machines that the present invention is intended for application without, however, being limited in this particular respect.

Furthermore, it is primarily the intention to apply the invention to circular knitting machines for the production of body fabric and garments such as pullovers, jumpers and the like or parts thereof, although it may also be applied to smaller machines for producing, say, seamless hose, half-hose and like articles, separately or in string formation.

An object of the invention is to provide a circular kniting machine of the kind herein referred to which is of a generally improved and comparatively simple construction designed to provide ready accessibility to the lap or wrap thread guides suchwise as to facilitate their insertion into or removal from the machine.

Another object or aim is to furnish such a machine with improved means for selectively operating the thread guides, as will be hereinafter described.

Considered from its broadest aspect, the invention resides in the provision, in a circular knitting machine of the kind concerned, of a grooved or tricked dial, ring, disc or like carrier adapted for reception of the lap or wrap thread guides, said carrier being arranged so as to enable the guides to be moved in a plane which is normal to the axis of the needle cylinder or cylinders of the machine, and means for operating the guides, preferably in a selective manner.

In order that the invention may be more clearly understood and readily carried into practical effect, constructional examples thereof as applied to a circular knitting machine of the superposed rotary needle cylinder type equipped with double-ended latch needles operable independently by means of sliders will now be described with reference to the accompanying diagrammatic drawings, wherein,

Figure 1 is a vertical sectional view of so much of such a machine as is necessary to illustrate the application thereto of one example,

Figure 2 is a plan view of a portion of the dial cam system of the machine showing cams for controlling and operating the lap or wrap thread guides,

Figure 3 is a plan view of the constructional form of shogging mechanism shown in Figure 1,

Figure 4 is a part sectional side view of the same as seen in the direction of the arrow A in Figure 3,

Figure 5 is a detail plan view of a carrier block and plungers or tappets carried thereby for controlling the shogging mechanism,

Figure 6 is a vertical sectional view similar to a portion of Figure 1 but showing an alternative form of selecting mechanism for the lap or wrap thread guides,

Figure 7 is a plan view of said selecting mechanism, and

Figure 8 represents a layout of the patterning or controlling mechanism for a four feeder machine.

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

Referring to Figure 1, the rotary bottom or plain and top or rib cylinders are indicated at **1** and **2** respectively. One of the double-ended latch needles is shown at **3**, and **4** represents the upper portion of a needle-operating slider in the bottom or plain cylinder. A single circular series of lap or wrap thread guides such as that shown at **5** is provided, said guides being arranged in a horizontally disposed dial **6** which is mounted within the needle cylinders **1** and **2** concentrically therewith. The dial is arranged in a plane which extends between and is normal to the axis of the opposed needle cylinders. The dial **6**, moreover, is of ring-like form and is attached at its inner periphery to a perforated disc **7**. This disc assists in guiding the design threads **8** to the thread guides **5** from a number of bobbins, cones, spools or reels (not shown) carried

by a bracket or like structure arranged above the top plate 9 of the machine, and is secured to the lower end of a central spindle 10 associated with said bracket or like structure. The upper face of the dial is formed with radial tricks or grooves 6a for reception of the thread guides 5. At its outer periphery the dial is formed with a flange 6b to enable it to be additionally supported between an annular support 11 and a clamping ring 12 which latter are secured together by screws 13. The annular support 11 is also flanged at 11a so as to enable it to be arranged for movement circumferentially between two superposed supporting rings 14 and 15 attached both to each other and to the bottom of the top or rib cylinder 2. By reason of this construction the dial can be shogged. Moreover, the dial 6 which, of course, rotates with the cylinders 1 and 2, is located at such a level that the operative extremities of the thread guides are projectable and retractable between the clamping ring 12 and the nibs s^1 of sinkers or web holders s associated with the bottom or plain needle cylinder 1. Each of the thread guides 5 is of blade-like form and is recessed at 5a at its lower edge in the region of its operative end suchwise as to provide at said end a downwardly directed right-angular extension 5b which is laterally bent in the manner depicted in Figure 2. This extension is thereby obliquely disposed with respect to the main portion of the guide, and has formed therein two thread receiving holes 16 arranged one above the other. A further hole 17 is formed in that portion of the guide adjacent to the extension 5b. The upper edge of each thread guide is recessed, the recess 5c being of rectangular form so as to present shoulders 5d and 5e for engagement with suitable operating cams. In addition, each guide has a rearwardly extending tail butt 5f so as to enable same to be used in conjunction with selecting means for controlling the operation of the guides according to the effects to be achieved. The tail butts are provided at respectively different levels so as to be located in correspondingly different planes heightwise. If desired, and as shown in Figure 1, the thread guides may initially each be formed with a plurality of frangible tail butts 5f which can be readily broken off according to requirements. A stationary cam plate 18—of sectional ring-like form—is supported immediately above the dial 6 and on its underside is furnished with cams for action on the guides 5. Thus, the underside of the sectional cam plate 18 and the tricked face of the dial 6 are closely opposed. The said cam plate has attached thereto curved cam portions 19 which are concentric with respect to the central axis of the machine and adapted to engage in the recesses 5c, the purpose of these cam portions being normally to maintain the guides in their inoperative, i. e., fully retracted, positions. At the feeder, or at each feeder of the machine the cam plate is provided with cam sections 20 and 21 together constituting a part which is appropriately recessed at 22 to enable selected guides to be freely advanced by the selecting means, and has an inclined face 21a for action upon the rearmost shoulders 5d of selected guides to retract the latter and restore same to their inoperative positions aforesaid. For convenience in illustration in Figure 2 the sections of the cam plate 18 are indicated merely in dot-and-dash lines.

The recessed part just described, or one of these if there is more than one, is gapped or equivalently formed or constituted to provide a clear space 23 for insertion or removal of thread guides 5 into and from the tricked dial 6, and for normally closing this gap there is provided a movable gate 24 which is manually operable. According to the construction illustrated in Figure 2, the said gate 24 consists of a member which is controlled by a compression spring 25 and arranged to slide horizontally in one of the cam sections 20 carried by the cam plate 18. This gate is adapted to be acted upon by a pin or projection 26 on a lever 27 which is pivotally mounted at 28 upon a bracket (not shown) fixed on the cam plate. The appropriate cam portion 19 has an elongated slot 19a formed therein for reception of the pin or projection 26 and to permit of movement of the gate 24. A spindle is secured to the lever 27 and extends upwardly to the top of the machine. Thus, by turning the spindle in the appropriate direction, the gate 24 can be opened by withdrawing it into the slotted cam portion against the spring action. A catch of any suitable character may, if desired, be provided to hold the gate 24 in its open position at appropriate times. Alternatively, the gate may consist of a small rectangular block of a size to fit the gap and mounted for movement vertically in a support attached to the top of the cam plate, in which instance the gate may be operated by a knob through the medium of a spindle.

For action upon the tail butts 5f at the or each feeder there is provided, in the example depicted in Figures 1 and 2, a horizontally disposed selector cam 29 which is movable vertically into any one of the aforesaid different planes in which butts are located, or to a neutral or inoperative position clear of all the butts, according to patterning requirements. The said selector cam is provided at a fixed location opposite to but just in advance of the inclined retracting cam face 21a at the feeder, and is designed for action upon the tail butts 5f suchwise as to advance corresponding thread guides for lapping or wrapping purposes. The selector cam, moreover, is secured to the lower end of a vertically disposed rod 30 which latter extends to the top of the machine and is slidable longitudinally within a boss or sleeve 31 formed on or carried by an arm or bracket 32 attached to the cam plate 18 (see Figure 1). By effecting movement of this rod to the required extent in the appropriate direction, therefore, the selector cam 29 can either be moved into the desired plane for action upon the tail butts 5f in that plane, or rendered entirely inoperative. The rod 30 is pattern controlled through any suitable intermediate connections from a device or unit of the general character hereinbefore described. As shown in Figure 2, the cam 29 at each feeder is slotted at 29a for reception of a fixed pin 33 which effectively serves to check any undesired turning movement of the said cam.

Turning now to Figures 6 and 7 it will be seen that instead of the selecting mechanism last described there is provided at the feeder, or at each feeder as the case may be, a bank of pivoted cam levers 34 arranged one above another in the different planes concerned for action selectively upon the respectively different series of tail butts 5f. These cam levers 34 are formed with nose-like formations 34a (Figure 7) adapted to be acted upon in a selective manner by a small unit which comprises a series of suitably spaced peripherally notched or gapped plates or discs 35 and is rotatable step-by-step by cam-operated pawl and ratchet mechanism. Both the unit and

the spindle **36** about which the cam levers **34** pivot are carried by an arm or bracket **37** which is fixed upon the top of the cam plate **18**. A ratchet wheel **38** is attached to the bottom of the unit and for racking round said wheel there is provided a pawl **39** which is carired by a cam-operated pawl lever **40**. The said lever is furnished with a roll **41** arranged so as to be acted upon by a cam carried by any suitable part which rotates at the same speed as the needle cylinders **1** and **2**. Thus, in the specific construction shown, the perforated thread guiding disc **7** is formed at its periphery with an upstanding wall **7***a* which is outwardly flanged at **7***b* to enable the dial **6** to be attached to it, and a cam **42** for action upon the roll **41** is provided on the inside of said wall.

The machine so far described represents the simplest form of the invention. For shogging the dial **6**, however, the constructional form of shogging mechanism shown in Figures 1, 3, 4 and 5 may advantageously be employed.

The said shogging mechanism includes a stepped cam **43** which is mounted to turn about a fixed vertical stub axle **44** carried by an arm or bracket **45** which is attached by screws **46** to the top of the upper dial-supporting ring **15**. Means of any convenient character are provided in association with the stepped cam **43** to prevent it from turning too freely about the stub axle **44**. As shown in Figure 1, the said cam is for this purpose recessed at the top, the recess **43***a* being adapted to house a member **47** which is arranged to produce friction or impart pressure between the cam and the upper end of the stub axle. A small plate **48** attached by a screw **49** to the axle **44** above the recess **43***a* serves to maintain the friction or pressure member **47** in position. The cam **43** is formed with a plurality of stepped formations **43***b* half of which slope downwardly in one direction while the remainder similarly slope in the opposite direction (see Figure 3). Mounted beneath the stepped cam is a disc cam **50** a portion of the periphery of which is formed with a series of contiguous shallow recesses **50***a*. The peripherally recessed disc cam **50** is connected with the stepped cam **43** so as to turn therewith, and provision is made for relative adjustment between these two cams. Thus, the said cams are connected together by means of a vertically disposed adjustable pin **51** which extends right through the stepped cam **43** and is formed or provided at its lower end with an eccentrically disposed or cranked portion **51***a* arranged to project downwardly into a slot **50***b* formed in the disc cam **50** (Figure 1). A saw cut **51***b* is formed in the upper end of the connecting pin **51** to enable it to be turned, and a grub screw **52**, inserted in the stepped cam, serves to set the pin securely in position after adjustment. Thus, by turning the pin **51** in one direction or the other, the disc cam **50** can be advanced or retarded slightly and thereby accurately set with respect to the stepped cam **43**. Immediately above the stepped cam is located a block **53** through which extend a pair of spaced rod-like plungers or tappets **54** and **55** arranged for action upon the stepped formations **43***b*. This block is carried by a bracket **56** which is attached to a sleeve **9***a* formed integrally with the top plate **9**. One of the plungers or tappets, **54**, is longer than and connected with the shorter plunger or tappet **55** by means of a connecting link **57**. This link is pivoted centrally upon a lug **53***a* formed on the block **53** so that when one of the plungers or tappets is depressed the other is raised, and vice versa. The plunger or tappet **54** extends to the top of the machine and is pattern controlled, being movable up or down to varying extents according to the extent and direction of the shogging movement to be imparted to the dial **6**. The arrangement is such that upon downward movement of one of the tappets or plungers by action thereof upon the appropriate part of the stepped cam **43**, the latter and hence also the disc cam **50** will be turned to the required extent in one direction, whereas upon similar movement of the other tappet or plunger the stepped and disc cams will be turned in the reverse direction. Screw and slot connections **58**, **57***a* are provided between the plungers or tappets **54** and **55** and the connecting link **57**. Referring to Figures 3 and 4 it will be seen that the disc cam **43** is arranged for action upon a lever **59** which is pivoted at **60** upon the same arm or bracket **45** as that which carries the stub axle **44**. At one end this lever is formed with two arms **59***a* and **59***b* the outer end of each of which carries a roll **61** to be acted upon by the disc cam **43**. Each roll is of such size that it will seat in one of the shallow recesses **50***a* in the disc cam **50**. The arm **59***a* of the pivoted lever is slotted at **59***c* and provision in the nature of a screw **62** is made for adjustment of the corresponding roll **61**. At its opposite end the pivoted lever **59** is furnished, on the underside thereof, with a shoe **63** which engages in a grooved segment **64**. This segment is carried by another arm or bracket **65** which is attached to the annular dial support **11**. The groove **64***a* in the segment **64** is eccentrically disposed with respect to the axis about which the lever **59** pivots, so that whenever said lever is turned in one direction or the other, the segment and hence also the dial support **11** and the dial **6** will be forced to turn correspondingly. The shoe **63** is made adjustable upon the lever **59** to bring the tricks or grooves **6***a* in the dial into proper relationship. For this purpose the appropriate end of the lever is slotted at **59***d* (Figure 3) and a screw **65** with a locknut **66** is provided to adjust the shoe and to set it in its adjusted position. Provision may also be made for adjustment of the grooved segment **64** upon the arm or bracket **65** for the purpose of varying the extent of the shogging movement. A dowel pin **67** is employed to set the grooved segment in position. As will be appreciated, the construction and arrangement of the shogging mechanism is therefore such that by effecting movement of the disc cam **50** to a required extent in one direction or the other in the manner herein described, the pivoted lever **59** will be correspondingly operated so that the shoe **63** thereon moves along the groove **64***a* in the segment **64** and thereby imparts a shogging movement to the dial **6**. The extent and direction of this movement depend, of course, upon the movement imparted to the disc cam **50**.

If desired, the same patterning or controlling device or unit which is employed to control the selective operation of the lap or wrap thread guides **5** may also be used to control the shogging of such guides in relation to the needles **3**. For example, patterning or controlling mechanism of the general character described in the specification of prior United States Letters Patent No. 2,196,073 may be adopted for this purpose.

A specific arrangement of such mechanism as applied to a four feeder superposed rotary needle

cylinder machine will now be briefly described with reference to Figure 8. At each feeder in this machine there is provided a selecting mechanism including one of the selector cams **29** movable into different planes heightwise by a vertically slidable rod **30**, and also a shogging mechanism of the specific form herein described. The cam rod **30** and the longer, **54**, of the two shogging plungers or tappets at each feeder extend to the top of the machine where they are each connected to a small cranked lever such as **68** which is pivotally mounted upon an appropriately disposed bracket (not shown). Accordingly there are eight of the cranked levers **68** and these are connected by links **69** to a corresponding number of cranked operating levers **70** adapted to be influenced by patterning or controlling formations in or on the controlling device or unit designated generally at B. In the specific example illustrated, these formations consist of studs **71** of varying heights which are prearranged according to patterning requirements and screwed into tapped holes. The device or unit B comprises two spaced drums **72** and **73** fixedly mounted on a spindle and, between these fixed drums, a further drum **74** which is freely mounted on said spindle. The central drum, which is driven in the manner described in specification No. 2,196,073 aforesaid, controls the cam rods **30**, whereas the two outer drums serve to control the shogging plungers or tappets **54** and **55**. The spindle has secured thereon two ratchet wheels **75** and **76** arranged so as to enable forward and reverse racking to be imparted to the outer drums **72** and **73**. Pawl and ratchet mechanism is provided for racking round the outer drums, said mechanism being actuated by a lever **77** which is in turn operated by a rotary cam unit **78** driven, through gearing, from the top cylinder drive shaft **79** at a speed four times that of the needle cylinders **1** and **2**. Thus, as will be seen in Figure 8, a gear **80** on the rib cylinder meshes with a pinion **81** secured to the shaft **79**. Since the machine has four feeds the pinion **81** is arranged to be driven at four times the cylinder speed. The pinion **81** meshes with and drives a gear **82** upon which are mounted cams constituting the cam unit **78**. The lever **77** is furnished with a roller **83** for engagement with one of these cams—78^{1}. A pattern chain (not shown) for controlling the racking movements of the drums is also racked round by mechanism including a lever actuated from the rotary cam unit **78**. Similarly, a catch or detent corresponding in function to the catch or detent **23** described in the aforesaid prior specification is also operated by a lever, **84**, which is furnished with a roller **85** for engagement with a cam 78^{11}.

In the arrangement just described there is therefore one controlling device or unit for patterning at the four feeds. Alternatively, however, there may be a controlling device or unit at each feed.

To enable the thread guides **5** to be projected between the lower end of the rib cylinder **2** and the nibs s^{1} of the sinkers or web holders *s* it is, of course, necessary to provide an adequate space between these parts. This is done either by omitting a verge which would normally be associated with the rib cylinder or by appropriately shortening the latter. Then, in lieu of the customary verge or verge portion, there are provided independently slidable "top sinkers" or knocking-over bits such as **86** (Figures 1 and 6) which are mounted in the lower end of the rib cylinder and furnished with operating butts **86***a* to enable them to be rendered operative seriatim, by suitable cam means, during rib knitting. For the purpose of holding down the fabric at such times as loops are being drawn by rib needles each of the top sinkers or knocking-over bits **86** is formed at the lower end with an inwardly directed radial extension **86***b*. These extensions are disposed at right angles to the sinkers or bits and are of such length as effectively to prevent rib loops drawn over them from becoming displaced and sliding up along the back edges thereof.

The improved machine is capable of producing lap or wrap striping (embroidery plating) effects such, for example, as vertical or diagonal strips, clocks, broken, zig-zag and various other effects on plain knitted fabric, or in conjunction with rib or/and purl stitch effects, according to the particular type of machine to which the invention is applied. Articles with ribbed portions and portions patterned as aforesaid can also be produced on a machine of the particular characteristic type herein described. Accordingly, the invention includes as a feature knitted fabric or articles made on the improved machine, preferably automatically in a continuous operation.

It is not proposed to describe a thread lapping or wrapping operation in this specification, such operations now being well known.

It is within the scope of the invention to provide in the improved machine means whereby embroidery threads can be knitted into the fabric on each course by passing a thread either into the hook, or around a needle without entering the hook, so that said thread appears either at the front or at the back of the fabric without loose threads in the manner described in the complete specification of prior United Kingdom Letters Patent No. 313,657. Patterning mechanism for achieving this result may have, in combination, thread guide actuating means which, on every course, moves each thread guide through a complete feeding movement, and selecting means for relatively adjusting the thread guides and their appropriate needles so that the threads will either be taken into the hooks or will be passed around needles without entering the hooks, e. g., below the latches or to pass over the beards, as the case may be, and all as and for the purpose fully described in the last mentioned specification.

What I claim then is:

1. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, said guides being differentiated from each other by reason of the disposition of patterning butts thereon, a grooved carrier for the thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane at right angles to the axis of the aforesaid cylinder, a bank of selector levers adapted to be rendered operative for action selectively upon the guides to move predetermined guides in one direction according to patterning requirements, a unit for controlling operation of said selector levers, said unit comprising spaced plates with frangible bits, and cam means for moving selected guides in the reverse direction.

2. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, said guides be-

ing differentiated from each other by the provision thereon of patterning butts so disposed as to be located in different planes, a grooved carrier for the thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane at right angles to the axis of the aforesaid cylinder, a selecting cam movable into any one of the aforementioned planes for action upon desired patterning butts for the purpose of moving predetermined guides in one direction according to patterning requirements, a unit for controlling the selector cam, and means for moving the selected guides in the reverse direction.

3. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means for operating the guides, and, in association with the carrier, a gate which is openable to provide a clear space to facilitate the insertion and removal of thread guides into and from the machine as occasion demands.

4. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means functioning to advance the thread guides selectively in accordance with patterning requirements, a cam plate furnished with cams for action on the thread guides, there being at least one retracting cam for restoring to their inoperative positions those thread guides which are selected and advanced for thread wrapping purposes and at least one cam for maintaining the guides in their inoperative positions at desired times, and, in association with the carrier, a gate which is openable to provide a clear space to facilitate the insertion and removal of thread guides into and from the machine as occasion demands, said gate consisting of a part which is slidably mounted in the aforesaid cam plate and adapted to be operated manually.

5. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means for operating the guides, and mechanism for effecting turning movements of the thread guide carrier independently of the needle cylinder for the purpose of shogging the thread guides, said mechanism comprising a stepped cam, a disc cam to which said stepped cam is connected, a support upon which said cams are mounted and which is fixed in relation to the needle cylinder, plungers arranged for action upon the stepped cam to impart turning movement to the latter and hence also to the disc cam in one direction or the other, means for controlling said plungers in accordance with patterning requirements, and connections between said disc cam and the thread guide carrier whereby the latter can be shogged to a desired extent in one direction or the other.

6. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means for operating the guides, and mechanism for effecting turning movements of the thread guide carrier independently of the needle cylinder for the purpose of shogging the thread guides, said mechanism comprising a stepped cam, a disc cam to which said stepped cam is connected, a support upon which said cams are mounted and which is fixed in relation to the needle cylinder, plungers arranged for action upon the stepped cam to impart turning movement to the latter and hence also to the disc cam in one direction or the other, means for controlling said plungers in accordance with patterning requirements, a shaped member mounted to move bodily with the thread guide carrier, a pivoted lever adapted to be acted upon by the disc cam, and a part on said lever which engages the shaped member whereby said carrier can be shogged to a desired extent in one direction or the other.

7. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means for operating the guides, an annular support to which the carrier is attached, rings secured to each other and to the cylinder and between which the annular support is capable of movement circumferentially to enable the carrier to be turned independently of the cylinder for the purpose of shogging the thread guides, and pattern controlled means for effecting such turning movements in one direction or the other to the extent desired.

8. In a circular knitting machine, in combination, at least one cylinder, needles in said cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved in a plane which is normal to the axis of the aforesaid cylinder, means for operating the guides, an annular support to which the carrier is attached, rings secured to each other and to the cylinder and between which the annular support is capable of movement circumferentially to enable the carrier to be turned independently of the cylinder for the purpose of shogging the thread guides and mechanism for effecting such turning movements, said mechanism comprising a stepped cam, a disc cam to which said stepped cam is connected, a support upon which said cams are mounted and which is fixed in relation to the needle cylinder, plungers arranged for action upon the stepped cam to impart turning movement to the latter and hence also to the disc cam in one direction or the other, means for controlling said plungers in accordance with patterning requirements, a grooved segment, a bracket which is attached to the an-

nular support and has the grooved segment mounted upon it, a pivoted lever adapted to be acted upon by the disc cam, and a part on said lever which engages the grooved segment, all for the purpose herein specified.

9. In a circular knitting machine, in combination, axially opposed rib and plain needle cylinders, needles in said cylinders, inside sinkers associated with the plain cylinder, movable thread guides for wrapping design threads around desired needles for the purpose of obtaining wrap striping effects, a grooved carrier for said thread guides which carrier is arranged suchwise as to enable the guides to be moved back and forth in a space between the inside sinkers and the opposed end of the rib cylinder in a plane at right angles to the axis of the cylinders, means for operating the guides, individually slidable knocking-over bits mounted in the rib cylinder and formed with inwardly directed angular extensions adapted to assist in holding down fabric at such times as loops are drawn by rib needles, and cam means for rendering said knocking-over bits operative seriatim during rib knitting.

10. In a circular knitting machine, in combination, a plain needle cylinder, an axially opposed rib needle cylinder, needles operable in said cylinders, independently movable thread guides for wrapping design threads around desired needles, said guides being formed suchwise as to be adapted to provide patterning butts disposed in different planes, a grooved carrier for the thread guides which carrier is so arranged as to enable the guides to be moved in a plane substantially at right angles to the axis of the cylinders, and means for action selectively upon the butts, for the purpose herein specified.

11. In a circular knitting machine, in combination, a plain needle cylinder, an axially opposed rib needle cylinder, needles operable in said cylinders, independently movable thread guides for wrapping design threads around desired needles, said guides being formed suchwise as to be adapted to provide patterning butts disposed in different planes, a grooved carrier for the thread guides which carrier is so arranged as to enable the guides to be moved in a plane substantially at right angles to the axis of the cylinders, a selecting cam movable into any one of said planes for action selectively upon the butts, and means for so moving said cam under suitable control.

12. In a circular knitting machine, in combination, a plain needle cylinder, an axially opposed rib needle cylinder, needles operable in said cylinders, independently movable thread guides for wrapping design threads around desired needles, said guides being formed suchwise as to be adapted to provide patterning butts disposed in different planes, a grooved carrier for the thread guides, which carrier is so arranged as to enable the guides to be moved in a plane substantially at right angles to the axis of the cylinders, a bank of selector elements adapted to be manipulated for action selectively upon the butts in the different planes, and means for controlling such manipulation.

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