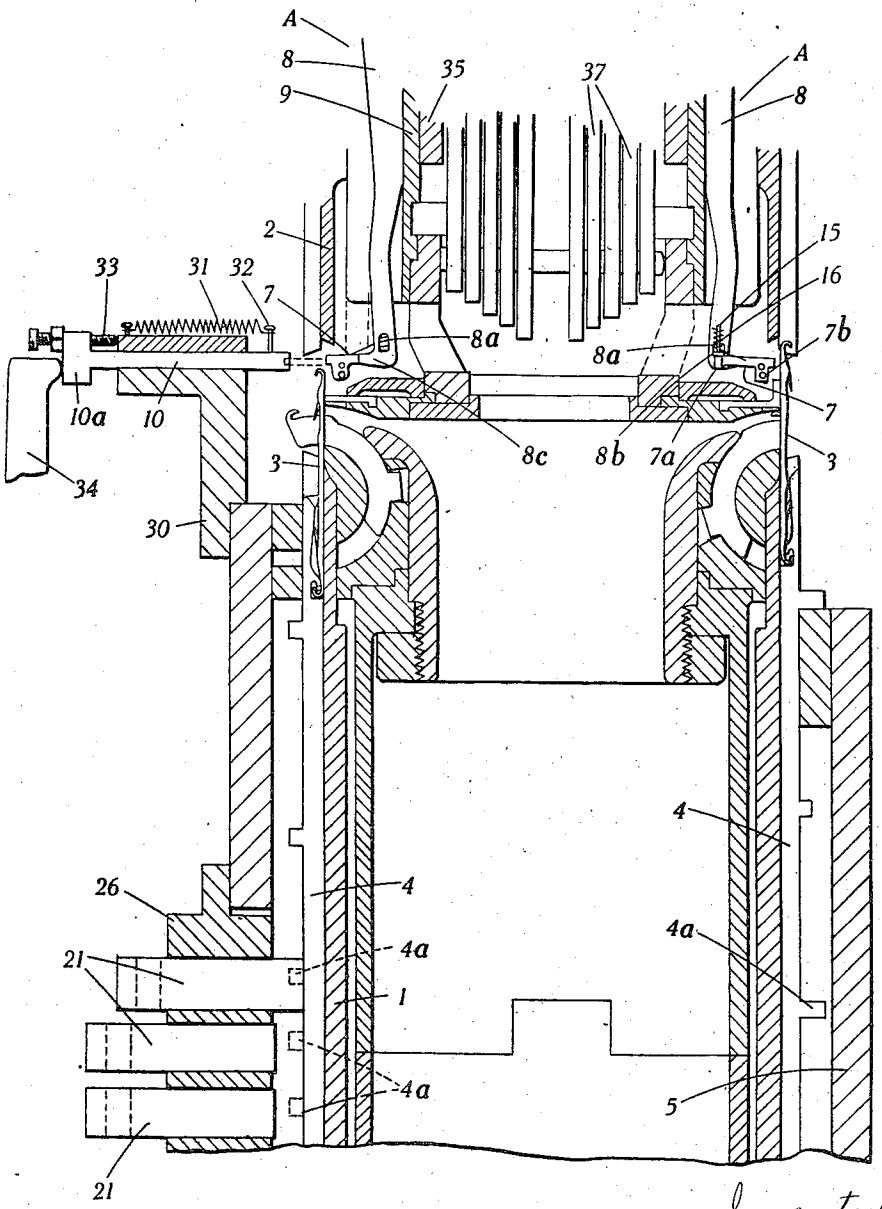
Sept. 19, 1944. H. H. HOLMES 2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Filed April 9, 1940 5 Sheets-Sheet 1

Fig. 1.



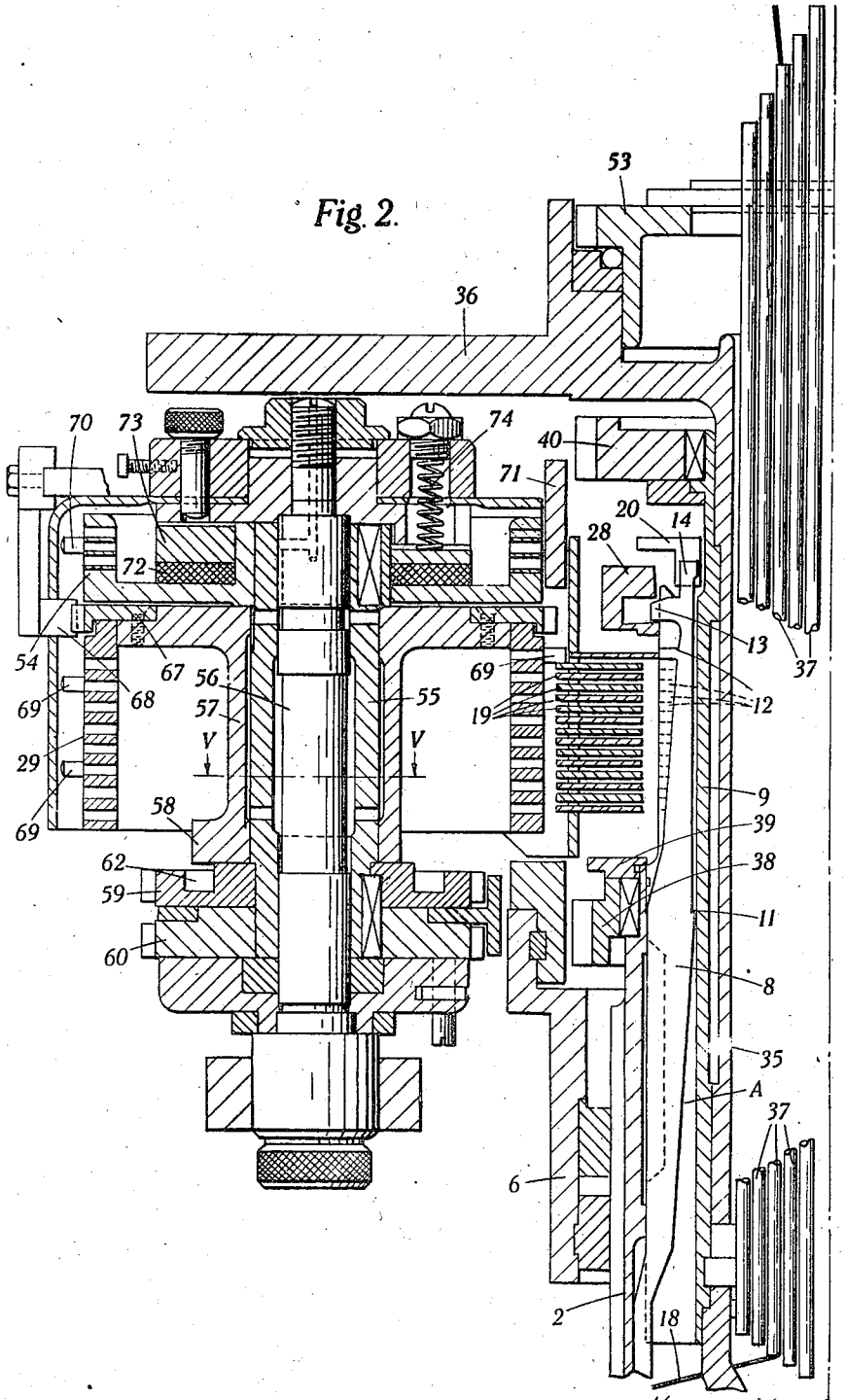
Inventor,
Henry Harold Holmes,
By Frank S. Appleman
attorney.

Sept. 19, 1944. H. H. HOLMES 2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Filed April 9, 1940 5 Sheets-Sheet 2

Fig. 2.



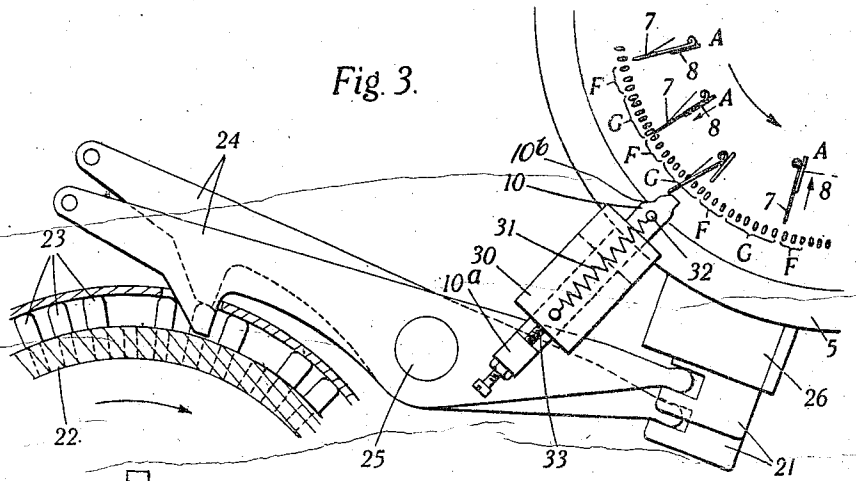
Inventor,
Henry Harold Holmes,
by Frank S. Appleman
Attorney

Sept. 19, 1944. H. H. HOLMES 2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Filed April 9, 1940 5 Sheets-Sheet 3

Fig. 3.



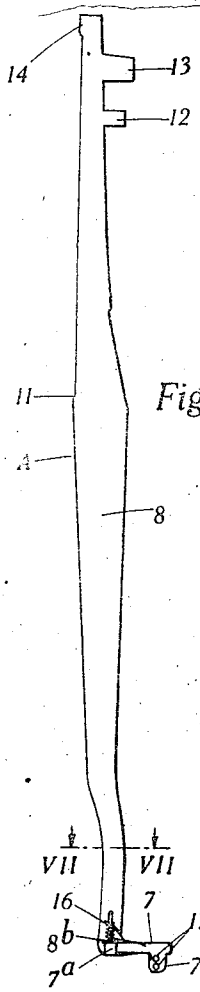


Fig. 6.

Fig. 7.

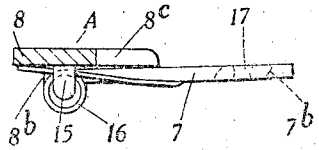
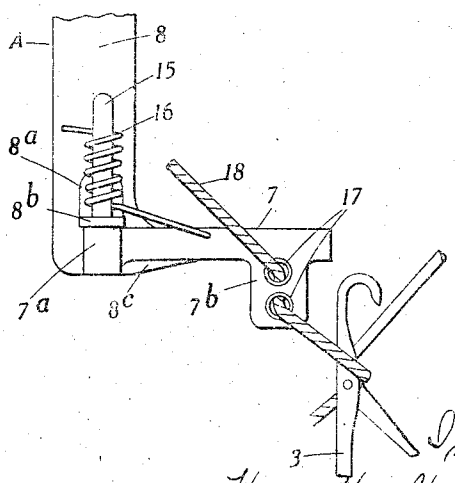


Fig. 8.



Inventor,
Henry Harold Holmes
By Frank S. Appleman
Attorney.

Sept. 19, 1944. H. H. HOLMES 2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Filed April 9, 1940 5 Sheets-Sheet 4

Fig. 4.

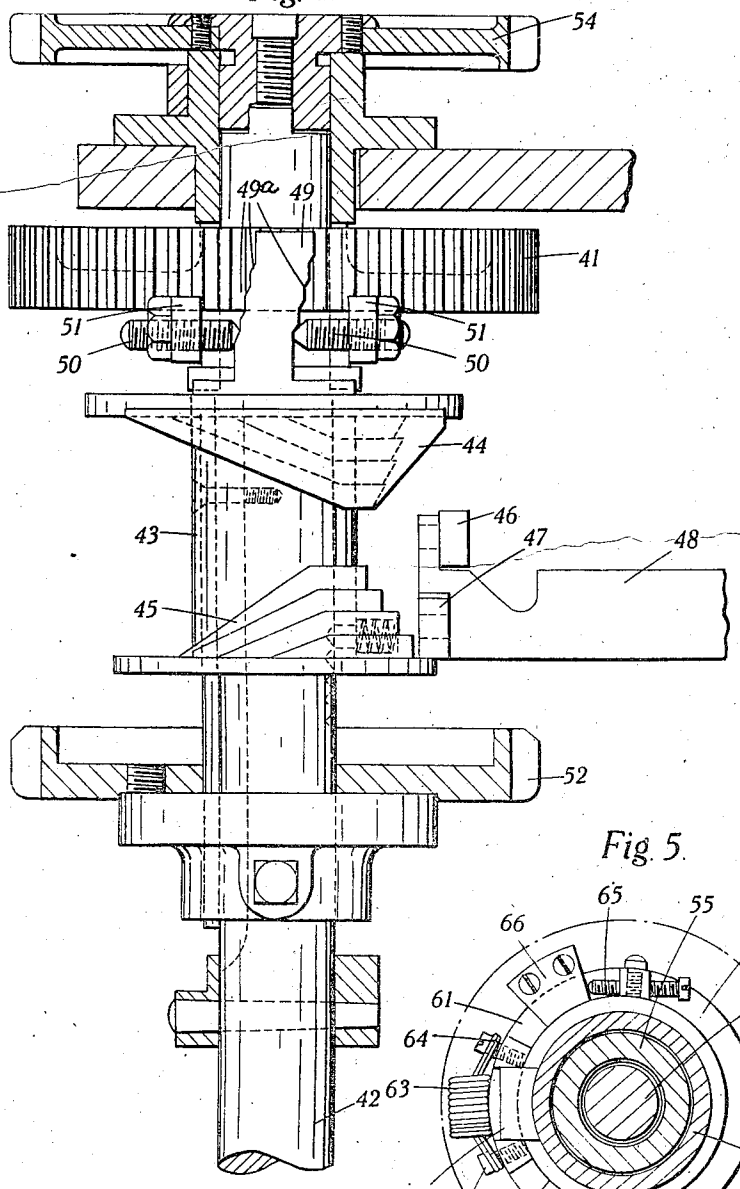


Fig. 5.

Inventor,
Henry Harold Holmes,
by Frank S. Appleman
attorney.

Sept. 19, 1944. H. H. HOLMES 2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Filed April 9, 1940 5 Sheets-Sheet 5

Fig. 9.

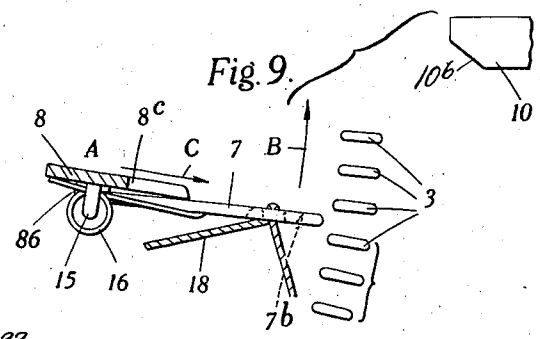


Fig. 13.

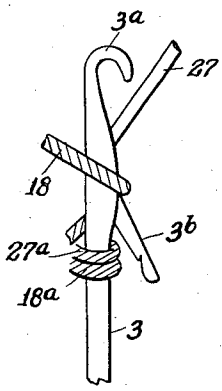


Fig. 10.

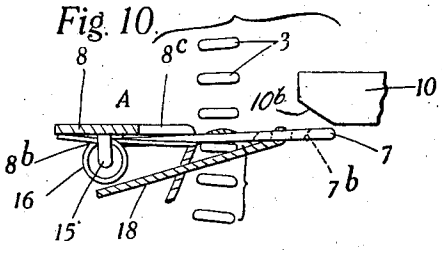


Fig. 11.

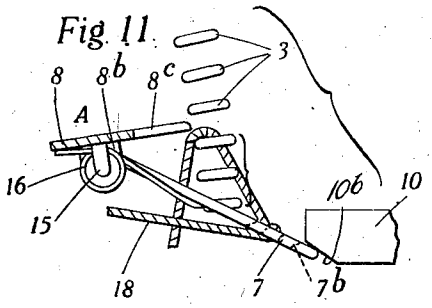


Fig. 14

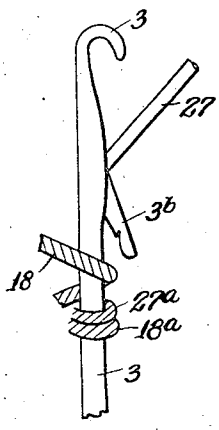
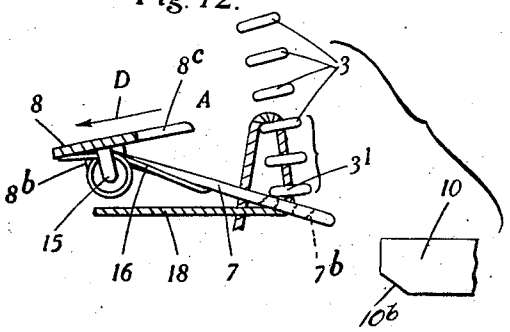


Fig. 12.



Inventor,
Henry Harold Holmes,
by Frank S. Appleman,
attorney.

Patented Sept. 19, 1944

2,358,640

UNITED STATES PATENT OFFICE

2,358,640

CIRCULAR KNITTING MACHINE OF THE DOUBLE AXIALLY OPPOSED NEEDLE CYLINDER TYPE

Henry Harold Holmes, Leicester, England, assignor to Wildt and Company Limited, Leicester, England, a British company

Application April 9, 1940, Serial No. 328,788
In Great Britain March 27, 1939

7 Claims. (Cl. 66—135)

This invention relates to circular knitting machines of the double axially opposed needle cylinder type, and concerns machines of this type which are furnished with lap or wrap striping mechanism for the purpose of producing embroidery plating in which a design thread or threads is or are knitted on the face of fabric knitted from a ground yarn or yarns, such a machine being hereinafter referred to as a machine of the kind described.

The invention is intended for application mainly to machines of the characteristic type aforesaid wherein there is a circular series of guiding elements for supplying lap or wrap striping threads but is not to be regarded as limited in this respect as it may be applied to machines having but one thread guiding element, or two such guiding elements diametrically opposite to each other, as for example in a seamless hosiery machine for producing clocking and like effects.

Moreover, it is the intention to carry the invention into practical effect in machines of the kind described having superimposed needle cylinders with double ended needles operable by means of sliders such as are employed for producing articles with ribbed and plain portions.

The invention is also applicable to machines built on the stationary needle cylinder principle as well as to machines built on the rotary needle cylinder principle.

The present invention has for its object to make provision in a machine of the kind described for increasing the range of the thread lapping or wrapping movement of the thread guide or each or any of such guides according to the number provided as will be hereinafter set forth.

In order that the invention may be more clearly understood and readily carried into practical effect, some specific examples thereof as applied to a machine having superimposed needle cylinders with double-ended needles operable by means of sliders will now be described with reference to the accompanying diagrammatic drawings.

In the drawings,

Figure 1 is a vertical sectional view of so much of such a machine as is necessary to illustrate one embodiment of the invention.

Figure 2 is a vertical sectional view of so much of the upper portion of said machine as concerns the invention.

Figure 3 is a diagrammatic plan view including a layout of a few of the needles of the machine and associated thread guides, a deflector for moving the thread guiding portions laterally at appropriate times and a needle selecting arrangement all as will be hereinafter described.

Figure 4 is a side elevational view, partly in section, showing mechanism whereby the thread guides can be shogged bodily in a circumferential direction relatively to the needles, for a purpose hereinafter to be explained.

Figure 5 is a detail sectional plan view taken on the line V—V of Figure 2.

Figure 6 is a side view of one of the thread guides per se.

Figure 7 is an enlarged sectional plan view of the guide taken on the line VII—VII of Figure 6.

Figure 8 is an enlarged detail view showing the lower portion of a guide with its thread lapped or wrapped around a needle.

Figures 9–12 are detail plan views illustrating respectively different stages of a thread lapping or wrapping operation.

Figures 13 and 14 are further detail views showing the positions of respectively different lap or wrap striping threads on the needles consequent upon needle selection.

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

The machine illustrated in Figures 1 and 2 includes rotary plain or bottom and rib or top cylinders 1 and 2 respectively equipped with double-ended needles 3 and associated needle-operating sliders. The sliders in the plain or bottom cylinder are indicated at 4 (see Figure 1), but those customarily provided in the rib or top cylinder have been omitted for convenience in illustration. The bottom cam box is represented at 5 and the top cam box at 6. The machine is furnished with thread lapping or wrapping mechanism of the general character described in the specification of United Kingdom Letters Patent No. 455,801. As will be seen, this mechanism includes thread guides such as A in the form of blade-like elements each provided with a thread guiding portion 7 which extends at an angle, e. g. at right angles, from the main portion 8 of the blade or like part, said guides being mounted in a cylindrical bed or like carrier such as 9 so as to extend in an axial direction or substantially so with respect to the needle cylinders, for movement radially across the needle circle from the inside to the outside and vice versa.

For the purpose of the present invention the thread guiding portions 7 of the thread guides A are fashioned and mounted so as to be adapted to pivot or swivel laterally under spring control as will be hereinafter more fully described, and a deflector 10 in the form of a cam or an abutment is so formed and arranged adjacent to such thread guiding portions that when the guides are projected radially from their normal position said portions are engaged by the deflector and deflected laterally to the extent of two or more needles. In this form of the invention the deflector 10 is common to all of the guides A and lateral deflection or swivelling movement of the portions 7 seriatim is engendered by the

rotational movement of the series of guides and the deflector one in relation to the other. Thus, since the machine being described is a revolving cylinder machine, lateral deflection or swivelling movement of the thread guiding portions 7 is engendered, in this particular example, by the rotational movement of the guides A in company with the needles 3, in relation to the deflector 10.

Concerning the actual form and construction of the thread guides A, each of these is conveniently adapted to pivot or rock about a fulcrum point 11 and, as shown more clearly in Figure 6, has on its flat, main, axially extending portion 8 a frontal (pressure) butt 12, a main butt 13 and an upwardly extending butt 14. At its lower extremity the said main portion 8 is cut at 8a in the manner represented in Figure 8 and a part thereof is pressed out laterally and turned down suchwise as to provide an integral flat lug 8b. This lug therefore projects from one side of the guide, and constitutes as it were a bracket or support for a small vertically disposed pin 15. This pin is bent over at its upper end so as to make contact with the adjacent side face of the thread guide, while the lower portion of the pin extends through and beneath the lug 8b. The aforesaid thread guiding portion 7 is for the most part straight and is provided at its inner end with a bush or sleeve 7a adapted to fit and turn upon the pin 15. Provision of any suitable character may be made to prevent axial displacement of the portion 7 from the pin. The construction is therefore such that the thread guiding portion can pivot or swing on the pin 15. The lower end of the main portion 8 extends at right angles to the remainder thereof and in this way is adapted to present a relatively inflexible stop or abutment 8c against which the pivotal thread guiding portion 7 is normally pressed by means of a torsion spring 16. This spring is arranged to surround the pin 15 with one end thereof bearing upon the main portion 8 and its opposite end upon the pivotal portion 7 as shown in Figures 7 and 8. Accordingly, lateral movement of the portion 7, when required, is effected against the action of the spring 16. At or near its outer end the pivotal thread guiding portion of each guide A may conveniently be formed with a downwardly directed extension 7b which is provided with one or more, e. g. a pair of, eyes such as 17 for reception of a lap or wrap striping thread 18.

It has previously been mentioned that the guides A are projected radially to enable them to be engaged by the deflector 10. In this particular example the projection of the guides for this purpose is in an outward direction across the needle circle from the inside to the outside. In this connection, a bank of selector levers or cams 19 (Figure 2) is provided for action selectively upon the pressure butts 12, so that selected guides are pressed inwards at their upper ends and thereby projected radially at their lower ends. The machine is also furnished with a retracting cam 20 arranged for action upon the upwardly extending butts 14 seriatim for the purpose of restoring selected guides to their normal position. The arrangement is such that after a selected thread guide A has been projected radially outwards into the path of the deflector, and while the corresponding pivotal thread guiding portion 7 is still deflected, the said guide is caused to revert to its normal position, i. e. it is moved radially inwards back across the needle circle—this time from the outside to the inside—thus being brought out of contact with the deflector 10 so that the thread guiding portion springs back to its original lateral position in relation to the needles served by the guide.

Means are also provided for effecting appropriate relative lengthwise movement of the needles 3 and guides A so that by reason of such movement and the conjoint lateral deflection of the thread guiding portions 7 the threads 18 furnished by the guides may be lapped or wrapped about all of the needles in the groups served by the respective guides. In this connection either the needles may be moved towards the guides or the latter may be moved towards the needles, or both the needles and the guides may be moved lengthwise, appropriate cam or equivalent means suitably disposed being provided for this purpose in conjunction with cam means for imparting reverse movement to the needles or/and guides after the lapping or wrapping action. In the specific example illustrated both the needles 3 and the guides A are moved lengthwise, and such movement of the needles is taken advantage of to move them selectively so that in any group of two or more needles served by a guide, one or any one of the group may be caused to knit the thread supplied by the guide while the other or others do not. This last mentioned result may conveniently be achieved by initially moving both or all of the needles in each group to a favourable position to receive the thread supplied by the associated guide, and thereafter imparting further movement to a selected needle or needles suchwise that when such needle or needles is or are ultimately retracted and caused to knit, the thread is cast over the needle hook or hooks without being formed into an embroidery stitch or stitches. The selection of the needles in this way may be effected by means of a needle selecting arrangement or pattern controlled variable needle selecting means of any suitable type. Thus, as shown in Figures 1 and 3, the said means may comprise a bank of cams 21, say six in number, controlled by a pin drum 22 (see Figure 3) having therein removable pins 23 which act upon intermediate levers 24 pivoted individually on a spindle 25. The levers 24 engage the cams 21 to render same operative or inoperative. In Figure 1, the top-most cam 21 is operative, the other cams beneath it being inoperative. The pin drum 22 may conveniently be racked round by means of a pawl and ratchet mechanism (not shown). The cams 21 are slidable radially with respect to the plain or bottom needle cylinder 1 in a bracket 26 mounted on the machine bed. As will be understood, the said cams act selectively upon patterning butts 4a (Figure 1) of the sliders 4, there being as many butt positions as there are cams but not in every case a full complement of butts on each slider, butts being broken off the sliders according to pattern requirements. The bank of selecting cams 21 is located adjacent to a knitting cam system of conventional form in the bottom cam box 5. When any one of the cams is rendered operative by being advanced towards the needle cylinder 1 by a lever 24 acted upon by a pin 23 in the drum 22, a slider or sliders having a corresponding butt or butts is raised by reason of the cams being obliquely disposed, and the corresponding needle or needles is or are advanced somewhat. The remaining sliders are not affected and consequently their needles function in the normal way. The result of this selective

action will now be more fully explained with reference to Figures 13 and 14. Figure 13 purports to show a needle 3 at the height to which it is moved, initially, to enable it to receive a lap or wrap striping thread 18; this thread is shown lapped or wrapped about the needle between the hook 3a and the latch 3b thereof. Whilst the needle is at this height, a ground yarn 27 is also presented thereto between the hook and latch. An old loop 18a of the thread 18 and an old loop 27a of the ground yarn 27 are shown around the needle stem beneath the open latch. Assuming, therefore, that the needle is not affected by the needle selecting means and is thereby permitted to function in a normal way, then upon subsequent retraction of the needle by a stitch cam, the latch 3b will be closed, the newly presented thread 18 and the yarn 27 will be formed into new loops and drawn through the old loops 18a and 27a, which latter will, of course, be cast off the needle. If, on the other hand, the needle 3 is selected and raised by an operative cam 21 (through the medium of the corresponding slider 4) to the height indicated in Figure 14, the latch 3b will pass above the lap or wrap striping thread 18, so that when the needle is ultimately retracted and caused to knit, only the ground yarn 27 will be formed into a loop, the thread 18 being merely cast over the hook 3a without being formed into an embroidery stitch. With regard to the aforesaid lengthwise movement of the thread guides A, a track or like cam 28 (see Figure 2) is provided for action on the main butts 13 seriatim, the formation of the track being such that the guides are slightly lowered and then raised. The lapping or wrapping action is facilitated by reason of the guides being lowered by the cam 28 but, of course, it is necessary to reposition the guides in a longitudinal direction before reselection.

So far as selection of the needles is concerned this may alternatively be achieved by normally maintaining the needles at a common position, e. g. level, in which they are too far from the thread guide to receive the thread so that when the thread guide is operative the thread will miss the needles, and advancing the desired needle or needles to a favourable position to receive the thread. In either of the arrangements, the pattern controlled variable needle selecting means may comprise a rotary needle selecting device, and the needles or associated jacks or sliders, as the case may be, may have patterning butts thereon appropriate for the purpose.

As already alluded to herein there may be two or more thread guides A of the form aforesaid for each group of needles and these guides may be selectively operated so that either or any one of them may be caused to serve the needles or any needle of the group, i. e. the threads 18 may be supplied interchangeably to the group or any needle thereof in order to vary the pattern effect. It is for this purpose that the selector levers or cams 19 are provided for action selectively upon the appropriately distributed pressure butts 12. These selector levers or cams are adapted to be rendered operative and inoperative under the control of a drum 29 which is included in a pattern device or unit hereinafter to be described. Alternatively, a chain, jacquard band or some equivalent unit with patterning formations thereon or therein may be employed instead of a drum such as 29.

The deflector 10 may occupy a fixed position radially with respect to the thread guides A so that wherever a guide is rendered operative the thread guiding portion 7 thereof is deflected as a matter of course. Alternatively, and as shown in Figures 1 and 3, the said deflector may be arranged for movement to and from an operative position in relation to the guides under the control of timing or pattern mechanism (not shown) of any conventional character so that it may be caused to operate on one or more of the guides and not on another or others, whereby any of the guides thus missed laps or wraps its thread about one needle only, instead of each being deflected to the extent of two or more needles. Thus, as will be seen, the deflector 10 in the particular example illustrated is adapted for sliding movement radially within a bracket 30 attached to the top of the cam box 5 and is controlled by a tension spring 31. One end of this spring is anchored to the bracket 30 while the opposite end thereof is anchored to a pin 32 carried by the deflector 10. The operative, i. e., innermost, position of the deflector is determined by a screw abutment 33 which is carried by the enlarged outer end 10a of said deflector and adapted at its leading end to make contact with an appropriate part of the bracket 30. By suitable adjustment of the screw abutment 33 the innermost position of the deflector can be varied within limits. A lever 34 adapted to be controlled by or from the main controlling or timing mechanism of the machine is provided for operating the deflector according to requirements. The operative extremity of this lever is arranged to press upon the outer end of the deflector (see Figure 1), the arrangement being such that the latter is pressed into its operative position against the spring action and permitted to return at appropriate times to a normal inoperative position under said action. In any event, the deflector may be in the form of a cam having an operative edge or face 10b appropriately shaped and positioned in the manner shown with respect to the path followed by the thread guiding portions of any thread guide moved radially in advance of the group of needles to be served, so as to hold the engaged guide deflected for the appropriate length of time.

The cylindrical carrier 9 for the guides A is rotatably mounted upon a sleeve 35 depending from the top plate 36 of the machine. The lap or wrap striping, i. e. embroidery, threads may be guided from bobbins, cones, spools or reels mounted upon a rotary bracket through tubes 37 appropriately clustered within the sleeve 35. The customary gear ring 38 on the rib or top cylinder 2 is furnished with grooved securing segments 39. A gear ring 40 is arranged normally to drive the cylindrical carrier 9 at the same speed as the rib or top cylinder 2.

The guides A may invariably serve the same groups of needles. Preferably, however, a machine of the character now being described embodies means for shogging the thread guides A bodily in a circumferential direction relatively to the needles 3 over one or more than one needle space, e. g. to the extent of a group of needles served by a guide, so that the guides can be caused to serve different groups of needles at different times. For this purpose the machine illustrated is equipped with shogging mechanism of the character described in United Kingdom Specification No. 455,801. The principal parts of such mechanism are shown in Figure 4, and the mechanism is employed as and when required to drive the cylindrical carrier 9 independently. Broadly considered, said shogging mechanism comprises

a pinion 41 freely mounted upon the top cylinder driving shaft 42. The pinion 41 is driven by a reel 43 slidably keyed on the shaft 42 and having opposed stepped cams 44 and 45 radially offset and engaged by rollers 46 and 47 on a pattern controlled slidable block 48. The reel 43 also has a projection 49 with stepped edges 49a to engage opposed screws 50 arranged on the underside of the pinion 41. The screws 50 are carried by slidable bars 51 adjustable so that the amount of shogging for a predetermined movement of the block 48 can be varied. A gear 52 which is rotatable with the shaft 42 meshes with the teeth on the gear ring 38 and the pinion 41 meshes with the teeth on the gear ring 40. With this arrangement, therefore, the cylindrical carrier 9 can either be driven from and at the same speed as the rib or top cylinder 2 (as it would normally be), or it can be shogged in either direction to the extent required by appropriate axial movement of the reel 43 upon the shaft 42.

It is convenient here to mention that the structure serving to support the aforesaid bobbins, spools, cones or the like is mounted upon a rotary toothed part 53 which is adapted to mesh with and thereby be driven by a gear wheel 54 in turn driven by the shaft 42.

The shogging mechanism herein described may conveniently be adapted to be controlled by the same pattern device or unit as that which is used selectively to operate the selector levers or cams 19. The pattern device or unit shown is of the general character described in the specification of United Kingdom Letters Patent No. 514,261 and will now be briefly described with reference to Figures 2 and 5. As will be seen, the said device or unit comprises two drums 29 and 54, one fixedly and the other freely mounted co-axially on a hollow spindle 55 in turn rotatably mounted on a fixed axle 56. The freely mounted drum 29 is formed with a neck 57 having a radial lug 58. The spindle 55 has keyed thereon ratchet wheels 59 and 60 arranged so as to enable forward or reverse rotation to be imparted to the spindle according to requirements. The ratchet wheel 59 is connected with the neck 57 by an arrangement comprising, in combination, a pair of arcuate blocks 61 (see Figure 5) located in a circular groove 62 in the wheel, one on each side of the lug 58, a tension spring 63 engaged with a pair of screws 64 one in each block at the end opposing the lug 58, a pair of screws 65 one inserted in each block at the other end, and a pair of plates 66 attached to the ratchet wheel 59 in the positions shown in Figure 5. The drum 29 has a toothed ring 67 attached to it, and a catch 68 is urged into engagement with said ring so as normally to prevent rotation of the drum. The catch 68 is operated by any suitable means in timed relation with the operative strokes of pawl and ratchet mechanism by means of which the spindle 55 is racked round. The arrangement is such that normally the spring 63 pulls the nearby ends of the blocks 61 up against the lug 58. When the ratchet wheels 59 and 60 are racked in either direction the drum 54 is racked to a corresponding extent and the spring 63 is tensioned so long as the freely mounted drum 29 is held by the catch 68. Consequently when said catch is operated to release the drum 29 the latter is racked by the spring 63. The two drums are therefore racked one after the other. As herein alluded to, the drum 29 is utilised for controlling selective operation of the thread guides A, while the other drum 54 is employed to effect or control shogging of said guides relatively to the needles. Both of the drums are adapted to receive pins or pegs, those—69—in the drum 29 being for action upon the selector cams or levers 19 and those such as 70 in the drum 54 for action on a lever 71. The lever 71 may be pivoted and adapted to effect through any suitable intermediate mechanism (not shown), movement of the slidable block 48. A spring-pressed disc 72 is adapted to act frictionally on the bottom of the drum 54 to prevent the latter from overrunning when racked round. The disc 72 is held down by an intermediate member 73 which is in turn acted upon by compression springs such as 74.

Having now completed the description of the improved machine in its preferred form, the various stages of a lapping or wrapping operation will now be described with reference more particularly to Figures 9–12. Assume that the thread guide A and the needles 3 shown in each of these four figures are moving in the direction of the arrow B (Figure 9) relatively to the stationary deflector 10. Of the six needles represented it will be assumed that three of them, i. e. those bracketed together, are to be lapped or wrapped by the thread 18. At the stage shown in Figure 9 the appropriate needles have previously been moved to a favourable position to receive the thread 18, and the various instrumentalities are approaching the deflector 10. At this stage, moreover, the guide A, although in its normal position with the thread guiding portion 7 thereof pressed against the stop or abutment 8c, is just about to be projected radially in the direction indicated by the arrow C. As the result of being projected in this way the thread guiding portion 7 is positioned adjacent to the deflector and the thread 18 is carried from the inside to the outside of the needle circle as shown in Figure 10. Consequent upon further rotational movement of the guide A in company with the needles in relation to the stationary deflector 10, the thread guiding portion 7—in passing said deflector—makes contact therewith and is thereby deflected laterally to the extent of three needles so that a portion of the thread 18 is caused to extend across the stems of the three bracketed needles at the front thereof as depicted in Figure 11. While the portion 7 is still deflected the guide A is moved back radially across the needle circle in the direction indicated by the arrow D in Figure 12. The thread guiding portion 7 is consequently brought out of contact with the deflector 10 and after the extension 7b has been completely withdrawn from contact with the side of the needle 3', said portion will spring back to its original position under the action of the associated spring 16, thereby completing the wrapping or lapping operation. Lengthwise movement of the guide facilitates the operation as hereinbefore described.

Spring or spring controlled thread take-up elements or means may be provided, e. g. one for each thread.

What I claim then is:

1. A circular knitting machine comprising, in combination, a needle cylinder, a second needle cylinder axially opposed to the first mentioned cylinder, double-ended needles in said cylinders, a carrier arranged concentrically with respect to said cylinders, thread guides independently movable radially in said carrier for supplying design threads to the needles, said guides extend-

ing in an axial direction with respect to the needle cylinders and each comprising a stem with a projection at one end, a thread guiding part pivotally attached to the projection, and spring means for normally pressing the thread guiding part against the adjacent end of the stem so that said part is capable of lateral deflection against the spring action, means for moving said guides radially with respect to the needle circle suchwise as to carry their threads across said circle, and means whereby each of said guiding parts is caused to have a lapping action to the extent of at least two needles, for the purpose herein specified.

2. A circular knitting machine comprising, in combination, a needle cylinder, a second needle cylinder axially opposed to the first mentioned cylinder, double-ended needles in said cylinders, a carrier arranged concentrically with respect to said cylinders, independent thread guides mounted to rock in said carrier for supplying design threads to the needles, said guides extending in an axial direction with respect to the needle cylinders and each comprising a blade-like stem with a projection at one end, a thread guiding part pivotally attached to the projection, and spring means for normally pressing the thread guiding part against the adjacent end of the stem so that said part is capable of lateral deflection against the spring action, means for moving said guides radially with respect to the needle circle suchwise as to carry their threads across said circle, a deflector arranged adjacent to the thread guiding parts so that when the guides are displaced radially from their normal position the said parts are engaged by the deflector and deflected laterally to the extent of at least two needles, and means whereby, while the said portions are still deflected, the guides are moved back across the needle circle, all for the purposes herein specified.

3. A circular knitting machine comprising, in combination, a needle cylinder, a second needle cylinder axially opposed to the first mentioned cylinder, double-ended needles in said cylinders, a carrier arranged concentrically with respect to said cylinders, independent thread guides mounted to rock in said carrier each adapted for supplying design threads to a group of at least two of the needles, said guides extending in an axial direction with respect to the needle cylinders and each comprising a blade-like stem with a projection at one end, a thread guiding part pivotally attached to the projection, and spring means for normally pressing the thread guiding part against the adjacent end of the stem so that said part is capable of lateral deflection against the spring action, means for moving each of said guides radially with respect to the needle circle suchwise as to carry its thread across said circle, a deflector arranged adjacent to the thread guiding parts so that when the guides are displaced radially from their normal position the said parts are engaged by the deflector and deflected laterally to the extent of at least two needles, and means for causing selective wrapping of the needles, for the purpose herein specified.

4. A circular knitting machine comprising, in combination, a needle cylinder, a second needle cylinder axially opposed to the first mentioned cylinder, double-ended needles in said cylinders, a carrier arranged concentrically with respect to said cylinders, independent thread guides mounted to rock in said carrier for supplying design threads to the needles, said guides extending in an axial direction with respect to the needle cylinders and being in the form of blade-like elements each provided with a thread guiding portion which extends at an angle to the blade, means for moving said guides radially with respect to the needle circle suchwise as to carry their threads across said circle, a deflector which is adapted for movement to and from an operative position adjacent to the thread guiding portions, so that when the deflector is operative and the guides are displaced radially from their normal position the said portions will be engaged by said deflector and deflected laterally to the extent of at least two needles, and means for operating and controlling said deflector, all for the purposes herein specified.

5. A circular knitting machine comprising, in combination, a needle cylinder, a second needle cylinder axially opposed to the first mentioned cylinder, double-ended needles in said cylinders, a carrier arranged concentrically with respect to said cylinders, independent thread guides mounted to rock in said carrier for supplying design threads to the needles, said guides extending in an axial direction with respect to the needle cylinders and each comprising a blade-like stem with a projection at one end, a thread guiding part pivotally attached to the projection, and spring means for normally pressing the thread guiding part against the adjacent end of the stem so that said part is capable of lateral deflection against the spring action, means for moving said guides radially with respect to the needle circle suchwise as to carry their threads across said circle, a deflector which is adapted for movement to and from an operative position adjacent to the thread guiding parts so that when the deflector is operative and the guides are displaced radially from their normal position the said parts will be engaged by said deflector and deflected laterally to the extent of at least two needles, and means for operating and controlling said deflector, all for the purposes herein specified.

6. A lap thread guide which comprises a blade-like stem with a projection at one end, a fulcrum on the stem, at least one butt on the stem, a pivot pin mounted in the projection, a thread guiding part pivotally attached to the projection by means of the pin, and spring means for normally pressing the thread guiding part against the adjacent end of the stem so that said part is capable of lateral deflection against the spring action, for the purpose herein specified.

7. A lap thread guide which comprises a blade-like stem one end of which extends in the same plane as but at an angle with respect to the remainder thereof to provide an abutment, a fulcrum on the stem, at least one butt on the stem, a pivot pin which is mounted at one side of the stem so as to extend lengthwise of the latter, a thread guiding part which is pivotally mounted upon said pin, and spring means for normally pressing the thread guiding part against the abutment so that said part is capable of lateral deflection against the spring action, for the purpose herein specified.

HENRY HAROLD HOLMES.