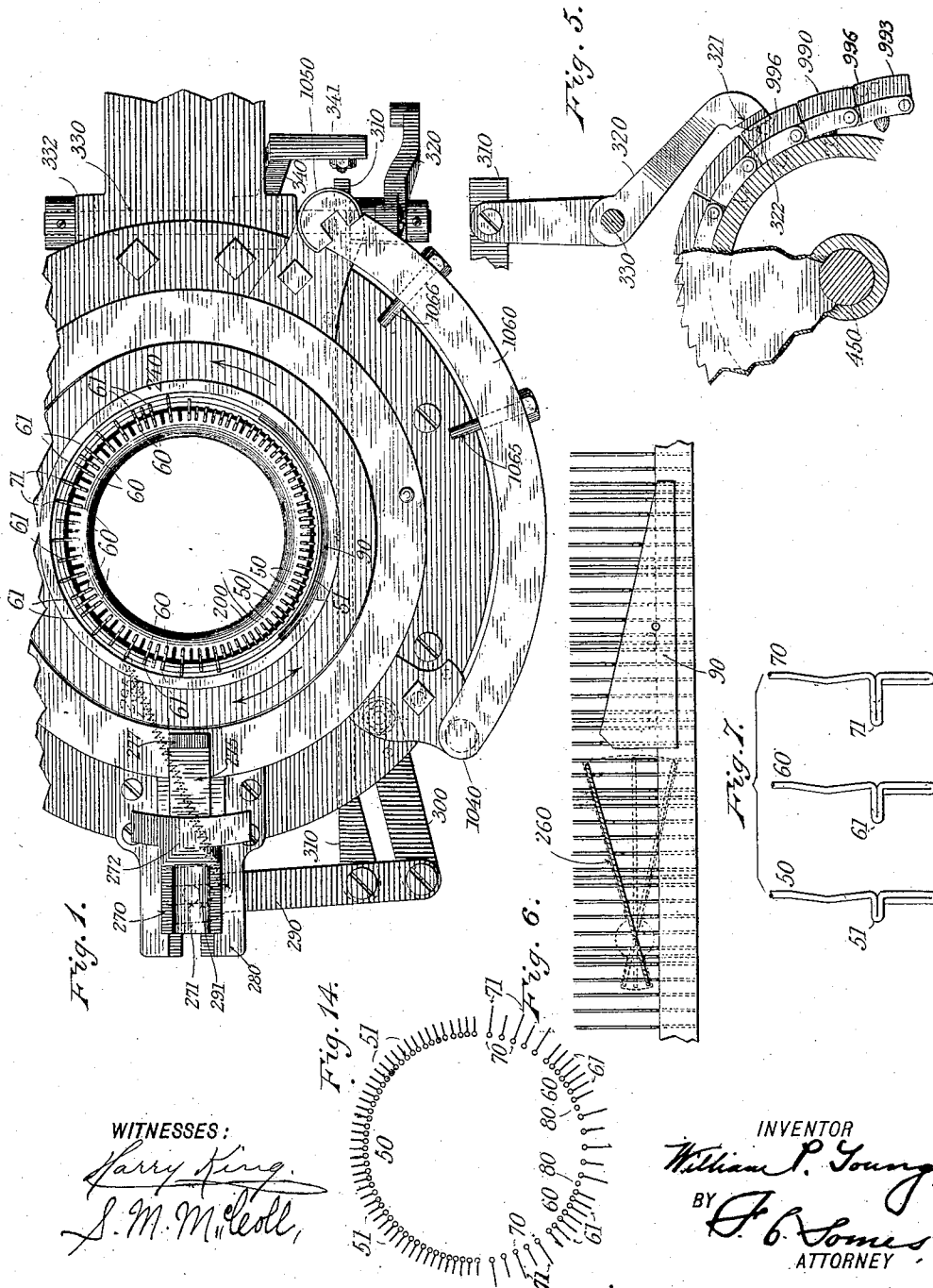


W. P. YOUNG.
 DUPLEX STRIPING MECHANISM FOR CIRCULAR KNITTING MACHINES.
 APPLICATION FILED JUNE 18, 1904.

965,428.

Patented July 26, 1910.

4 SHEETS—SHEET 1.



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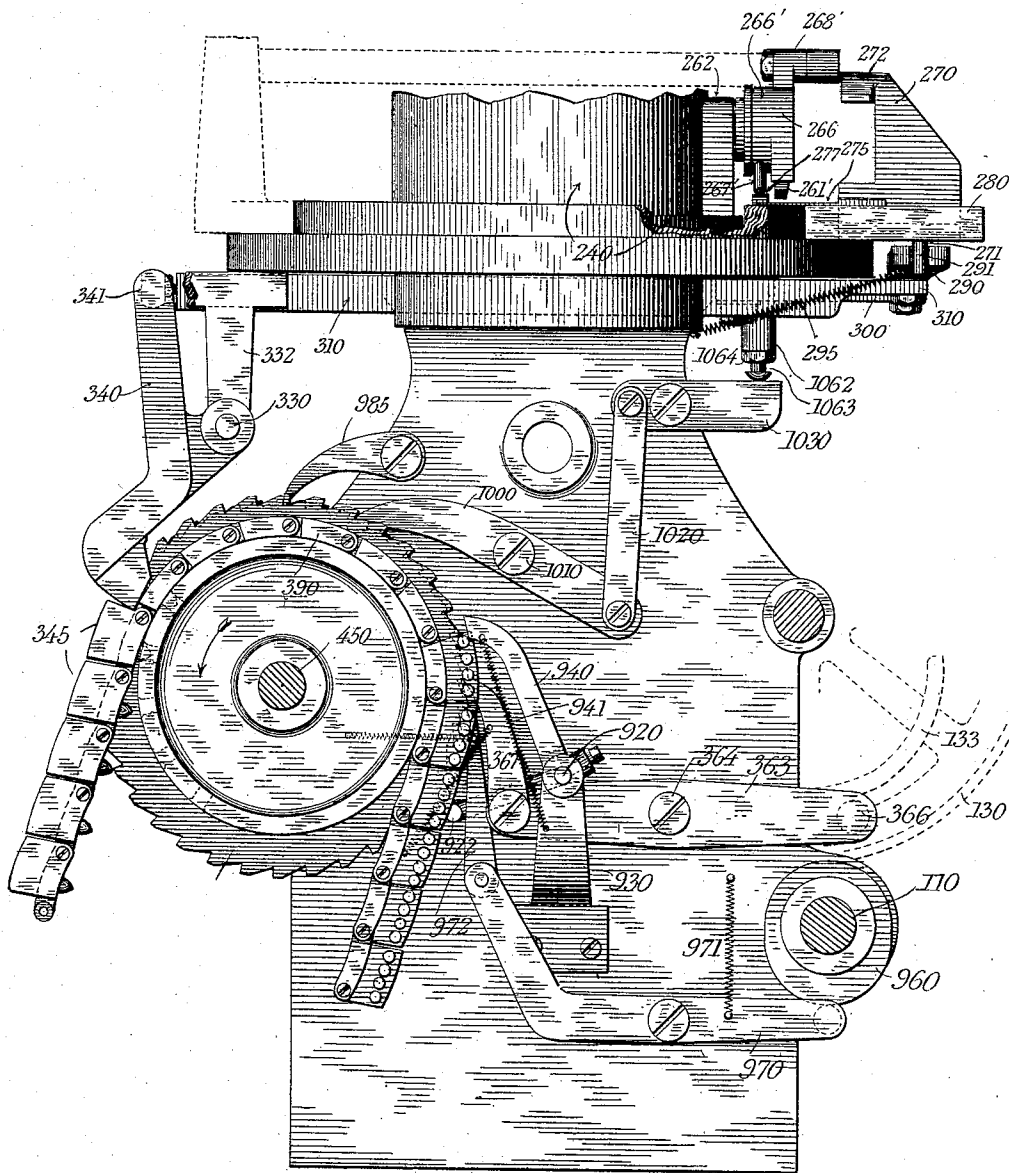
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4 SHEETS—SHEET 2.

Fig. 2.



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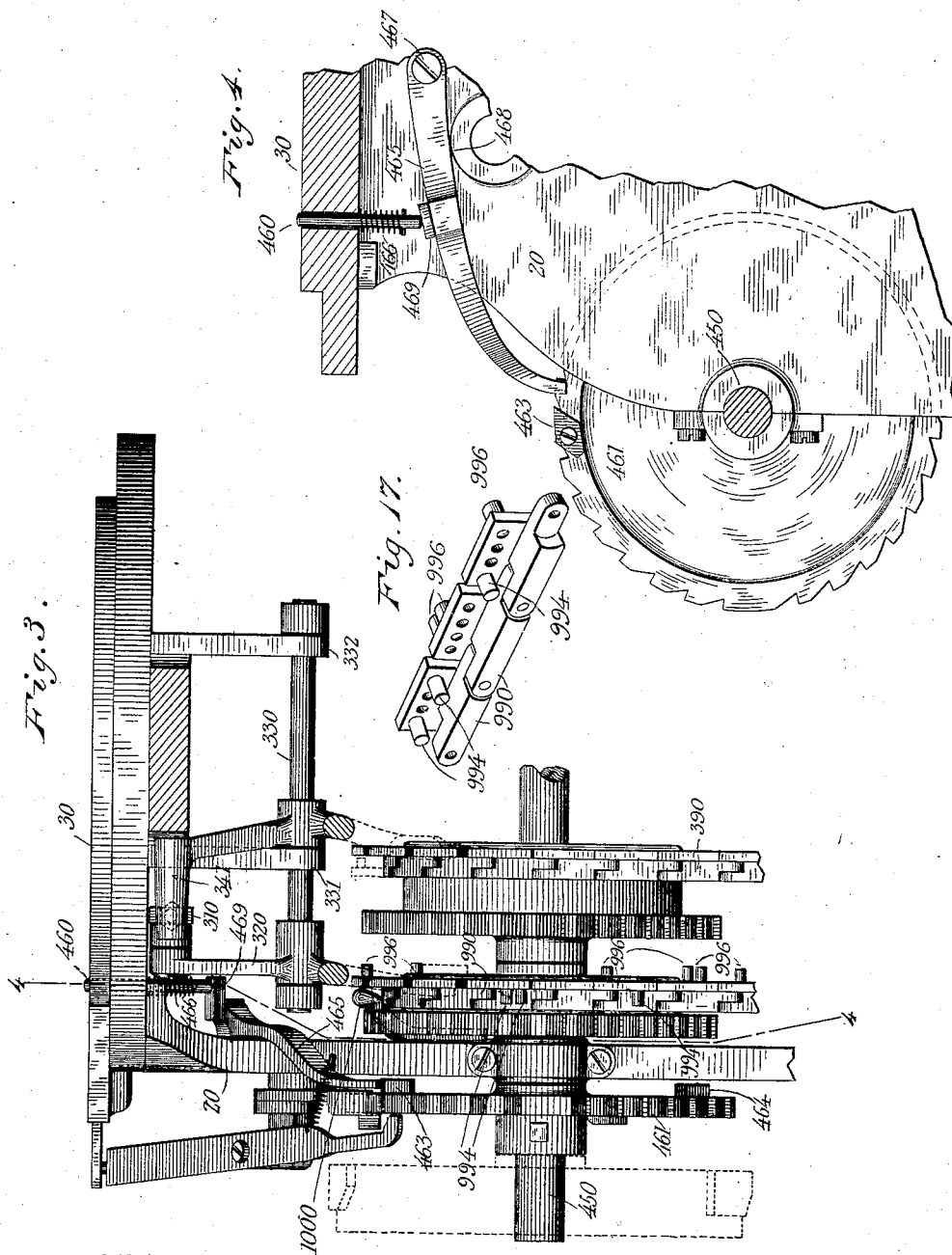
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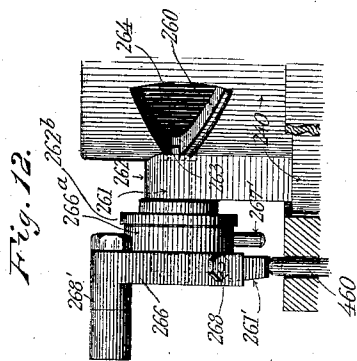


Fig. 12.

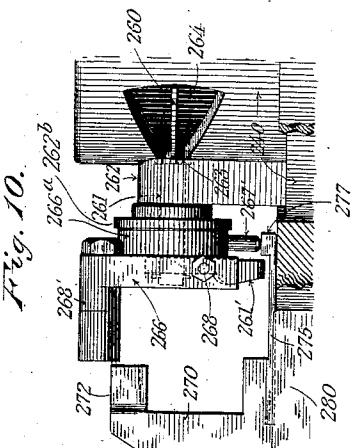


Fig. 10.

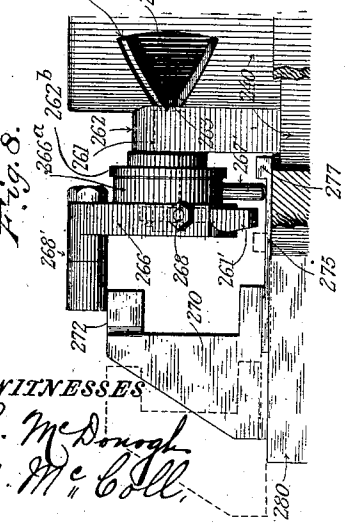
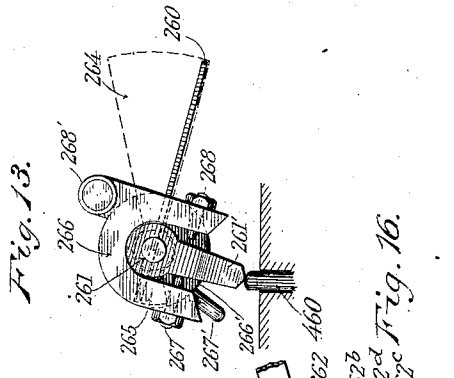


Fig. 8.

WITNESSES

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UNITED STATES PATENT OFFICE.

WILLIAM P. YOUNG, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO AMERICAN KNITTING MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

DUPLEX STRIPING MECHANISM FOR CIRCULAR-KNITTING MACHINES.

965,428.

Specification of Letters Patent.

Patented July 26, 1910.

Application filed June 18, 1904. Serial No. 213,163.

To all whom it may concern:

Be it known that I, WILLIAM P. YOUNG, a citizen of the United States of America, and a resident of Philadelphia, in the county of Philadelphia, State of Pennsylvania, (formerly of Providence, in the county of Providence, in the State of Rhode Island,) have invented certain new and useful Improvements in Duplex Striping Mechanisms for Circular-Knitting Machines, of which the following is a specification.

This invention is especially applicable to circular knitting mechanisms for the production of seamless stockings and socks.

The principal object of this invention is to provide a circular knitting machine with a combined striping and lacing attachment capable of forming circumferential stripes of different colors by the use of two or more threads and longitudinal stripes of lace-work or different colors extending through the horizontal color stripes, which attachment can be switched into and out of operation at will, so that the machine may be used without alteration for either plain work, striped work, laced work or combined striped and laced work, and to provide means for automatically controlling the pattern mechanism of the attachment by the main pattern mechanism which controls the knitting mechanism.

Figure 1 of the accompanying drawings represents a plan view of a knitting head embodying features of this invention and omitting the sliding sinkers which coöperate with the needles, the sinker cams and other parts common to this class of machines and not necessary for illustrating this invention, a portion of the left hand side of the knitting head and of the yarn bracket being broken out. Fig. 2 represents a vertical transverse section of the body of a knitting machine embodying features of this invention, and a side elevation of the bed-plate surmounting said body and of the knitting head supported thereon. Fig. 3 represents a rear elevation of the bed-plate and parts of the several driving mechanisms of the machine. Fig. 4 represents a vertical section on line 4—4 of Fig. 3, showing means for actuating the needle switch mechanism which switches one-half, more or less, of the needles into inoperative position for pouch knitting and into active position for

continuous circular knitting. Fig. 5 represents a portion of the mechanism for actuating the yarn-changer to produce circular stripes in the work, including a fragment of the combined striping and lacing pattern chain. Fig. 6 is a diagram showing the lacing cam which is fixed to the cam cylinder and operates to lift the lacing needles into inactive position and also showing the switch finger pivoted to the cam cylinder and operative for bringing said needles into active position. Fig. 7 represents fragments of the three forms of needles used in this machine, one form having a long stud, another a short stud and another a stud of intermediate length. Fig. 8 represents an enlarged side elevation of the needle switch mechanism attached to the cam cylinder, and the slide for actuating said mechanism to produce lace effects, the switch finger being in elevated position for restoring the needles to active position. Fig. 9 represents an end view of the parts shown in Fig. 8, the switch finger being in the same position. Fig. 10 represents a similar view to Fig. 8, the switch finger being in intermediate position. Fig. 11 represents an end view of the same mechanism, the parts being in the same position as in Fig. 10. Fig. 12 represents an enlarged side elevation of the needle-switch mechanism attached to the cam-cylinder, the latter being a quarter turn to the right from the position shown in Fig. 8, the needle studs for switching the needles into inactive position, said mechanism being actuated by the narrowing and widening stud and the switch finger being in its lowest position ready to engage and lift the needles of half the cylinder into inactive position preparatory to fashioning for heel and toe. Fig. 13 represents an end view of the mechanism shown in Fig. 12 in the same position as that figure. Fig. 14 represents a diagram of a circular series of needles comprising the different forms of needles used in this machine arranged in one form for performing the work. Fig. 15 represents a vertical diametrical section on line 15—15 of Fig. 11 of the actuating mechanism for the needle switch finger. Fig. 16 represents a horizontal radial section thereof showing the friction device for holding the finger in adjusted position. Fig. 17 represents an enlarged perspective view of a fragment of

the duplex striping chain provided with detachable stud cams for actuating the circular striping mechanism and the longitudinal striping and lacing mechanism.

- 5 The same reference characters indicate corresponding parts in the different figures. This combined striping and lacing attachment may be applied to any circular knitting machine to which it is applicable.
- 10 The drawings are designed to illustrate it as applied to what is known to the trade as the "New Victor Knitting Machine," the general structure of which is shown in United States Patent No. 537,802 having a fashion-
- 15 ing mechanism similar to that shown in United States Patent No. 596,933, a yarn changer similar to that shown in United States Patent No. 580,825 and United States Patent No. 694,515, and a striping mechanism similar to that shown in United States Patent No. 713,370. These patents have
- 20 reference to circular knitting machines for knitting stockings and socks, in which the knitting is performed by a circular series of needles which are moved up and down in vertical grooves in the needle cylinder
- 25 under the action of the knitting cams on the cam cylinder, which encircles the needle cylinder, the knitting of the tubular portion of the work, forming the leg and foot, being
- 30 performed in continuous circular courses by all the needles under a continuous rotary motion of the cam cylinder in the direction of the single-headed arrow of Fig. 1 and
- 35 the pouch knitting or "fashioning" for the formation of the heel and toe being performed in arc-shaped courses by a part of the needles under the reciprocatory motion of the cam cylinder, as indicated by the
- 40 double-headed arrow of said figure. Any known or suitable means may be employed for rotating and reversing the motion of the cam cylinder. Such parts only of the machine as may be necessary to show the
- 45 connection of the duplex striping attachment, are illustrated herein.

- The drawings show a needle cylinder 200 supplied with a circular series of independent needles of different forms distinguished
- 50 one from the others by the difference in length of their lateral studs or butts, whereby they may be actuated by different needle-switch mechanisms for different purposes. One half of the needle cylinder, say the
- 55 right hand half, is furnished with needles 50 having short-studs 51 and the other half of the cylinder, say the left hand half, is supplied with two forms of needles, the
- 60 of medium length and the long-stud needles 70 having long lateral studs 71. All the circular series of needles cooperate in continuous circular knitting; the short-stud needles forming the back of the leg and
- 65 bottom of the foot and the medium and

long-stud needles forming the front of the leg and the top of the foot; and the short-stud needles act exclusively in fashioning or reciprocatory knitting to form the

70 pouches constituting the heel and toe, the other forms of needles being switched out of action during such knitting. The long-stud needles are switched into inactive position at intervals in the circular knitting

75 and brought back into position after receiving a plurality of cross threads to form lace-work or longitudinal stripes. Certain needles may be omitted from this part of the cylinder and their spaces may or may not be filled with studless blank needles 80 as

80 shown in Fig. 14, whereby open work may be formed at parts of the tubular fabric where such omissions occur.

The cam cylinder 240 is provided with the ordinary knitting cams not herein shown for

85 reciprocating the needles vertically to produce the stitches such for instance as those shown in Patent No. 537,802 and with narrowing and widening cams and mechanism for actuating them not herein shown for

90 switching the short-stud needles 50 separately or in pairs into and out of action for the fashioning or pouch knitting such for instance as those shown in Patent No. 596,933. The cam cylinder is also provided

95 with needle switch mechanism similar to that shown in United States Patent No. 566,295 and with two separate actuating mechanisms therefor, one of said mechanisms being similar to that shown in said

100 patent for lifting all the needles as 60 and 70 at the left hand side of the cylinder at once into inactive position preparatory to pouch knitting to produce the heel or toe

105 and for lowering all of said needles at once into active position for tubular knitting for the leg or foot. This old actuating mechanism which is controlled in the ordinary manner by the main pattern chain 390, comprises

110 a switch finger 260 curved to correspond with the curvature of the inner face of the cam cylinder and fixed to the inner end of a pivot shaft 261 journaled in a bracket 262

115 secured to the outer face of said cam cylinder. This bracket has a boss 262^a to which a friction disk or collar 262^b is secured. This pivot shaft 261 has an enlarged split

120 or slotted inner end which projects into the wall of the cam cylinder at the junction of two sectoral slots 264 and 265 therein. The switch finger 260 is of a length to extend

125 from the arc-shaped end of one slot to the arc-shaped end of the other, and as its pivot is turned the body of the finger swings in the larger slot and the shank in the opposite direction in the smaller slot, there being no

130 chance for endwise displacement. The inner edge of this switch finger projects beyond the inner face of the cam cylinder sufficiently to engage both the long-stud needles

70 and the medium-stud needles 60, but the short-stud needles 50 pass said switch finger without contact therewith.

A yoke 266 is fixed to the pivot shaft 261 outside the bracket 262 and the pivot shaft is made tight by friction in its bearings so as to remain in adjusted position. For this purpose the yoke is provided at its back with a disk or plate 266^a which covers the outer face of the boss 262^a. This disk has sockets open on its inner face in which are disposed springs 262^b and friction pins 262^c. The friction pins are forced by the springs against the face of the disk 262^b with sufficient tension to hold the yoke in adjusted position. Or the yoke may be provided with other means for holding it in adjusted position, such for instance as the means shown in said Patent 566,295. A trip arm 261' is hung loosely on the pivot shaft and depends between the arms of the yoke, being provided with a pointed lower end adapted to be engaged by a movable actuating rod 460, which projects upward through the base-plate 30 at the right hand side of the machine. This rod is moved at proper times under the action of suitable mechanism for that purpose, controlled by the main pattern chain, into and out of the path of the arm 261'. When the rod 460 projects into said path, the arm 261', during the rotation of the cam cylinder, comes in contact with said rod and is thereby caused to swing to one side carrying with it the yoke 266, whereby the pivot shaft 261 is turned and the switch finger 260 swung into either of its two extreme positions as the case may be, it being thrown into its downward position on its forward stroke during the continuous forward motion of the cylinder in circular knitting preparatory to reciprocatory knitting and into upward position in the backward motion of the cylinder at the end of the reciprocatory knitting preparatory to the resumption of circular knitting. As soon as the arm 261' is carried in either direction over the end of the rod 460, being hung loosely on its pivot, it falls into normal low position ready to engage said rod from the opposite direction when the latter is next projected into its path. The adjustable contacts or screws 267 and 268 regulate the length of the throw of the yoke. The means herein shown for lifting the rod 460 into the path of the arm 261' are similar to those shown in said Patent 566,295 and comprise a lever 465 pivoted at its front end on an inwardly projecting stud 467 on the inner face of the end 20 of the frame. This lever rests in normal position on a boss 468 or other suitable stop on the end frame 20 and it extends backward, downward and outward, its lower rear end being normally in the path of the cams 463 and 464 on a cam disk 461 disposed on a cam shaft 450 and in this in-

stance outside of the end frame 20. This lever 465 is provided with a ledge 469, fixed to its upper side about midway between its pivot and its lower end and the rod 460 rests at its lower end on this ledge, and a spring 466 operates to hold it normally in depressed position. Thus far the needle switch mechanism and its actuating devices are substantially the same as those shown in United States Patent 566,295, excepting the means for holding the yoke in adjusted position.

In a machine provided with this combined striping and lace-work mechanism otherwise termed a duplex striping mechanism, the cam cylinder 240 which rotates and reciprocates around the needle cylinder, is provided in addition to the other cams and devices heretofore referred to with a supplemental cam 90 herein termed the lacing cam. This lacing cam consists of a thin strip of metal curved to correspond with the curvature of the cam cylinder and attached to the inner face thereof. This lacing cam has an inclined upper edge or cam surface extending from its lowest point adjacent to the rear of the knitting cams considered with reference to the continuous rotation of the cam cylinder to its highest point adjacent to the pivoted switch finger 260. This lacing cam is sufficiently thin to permit the short-stud needles 50 and the intermediate needles 60 to pass it without engagement and of sufficient thickness or projection to extend into the path of the long-stud lacing needles 70. Therefore all said long-stud needles ride up this cam into inactive position immediately after passing the knitting cams and to form the tuck-stitch or lace-work they are allowed to remain upward in this inactive position until the cam cylinder makes several rotations and lays two or more threads across the breasts of said needles. Then the switch finger 260 is swung into its upward position and engages the long-stud needles 70 and brings said needles down into active position where they are engaged by the knitting cams as the latter come around on the next turn of the cam cylinder. The stitches then formed under the action of knitting cams constitute the tuck-stitching or lace-work and consist of elongated loops which embrace the several plain threads which were laid over the breasts of the needles. After this course of stitches is formed the switch finger 260 is swung into intermediate position as shown in Figs. 10 and 11 and the lace needles 70 are again lifted into inactive position by the lacing cam 90 on the next turn of the cam cylinder. The switch finger is allowed to remain in intermediate position until several more courses of threads are laid across the needles 70; then the switch finger is again shifted upward and the needles pulled down into active position as before. In the

knitting of plain work or plain lace-work composed simply of open stitches, the switch finger is swung in upward position so as to bring back the long-stud needles for the
 5 action of the knitting cams at each revolution of the cam cylinder.

The new and supplemental actuating mechanism for the switch finger 260 for adjusting it in its upward and intermediate
 10 positions to provide for the tuck-stitch or lace-work as hereinbefore set forth, will now be described. The pivot shaft 261 is provided back of the yoke 266, preferably on the disk 266^a with a lateral stud 267'.
 15 This yoke is also provided on its front face at a point about diagonally opposite the stud 267' with an outwardly projecting stud 268' preferably provided with an anti-friction roller. The means for engaging the
 20 front stud 268' of the yoke 266 and the lateral stud 267' thereof are preferably combined on a single radial cam slide 270 supported in a horizontal bracket 280 secured to the bed-plate 30 at the front of the machine. This cam slide has an elevated cam
 25 272 adapted to engage the front stud 268' and it also has a tongue 275 extending inward toward the cam cylinder and provided with a cam 277 at its inner end adapted to engage the lateral stud 267'. These
 30 cams are in such relation each to the other that when one is in the path of the stud which it is designed to engage, the other is out of the path of the other stud. When
 35 the cam slide is in its outermost or inactive position, both the cams are respectively outside the circles traveled by the studs referred to as shown in dotted lines in Fig. 8. When said cam slide is moved inward to its
 40 intermediate position, the cam 277 on the inner end of its tongue is in the path of the lateral stud 267' and when said cam slide is adjusted at its innermost position, said cam 277 is inside the path of said pin 267' and
 45 the elevated cam 272' is in the path of the front stud 268'. This cam slide 270 is provided on its underside with a stud 271 which is engaged by mechanism for actuating the slide. The actuating mechanism shown comprises a horizontally swinging lever 290
 50 pivoted at one end to an arm 300 attached to the underside of the bed-plate 30. This lever is provided at its free end with a slot 291 shown in dotted lines which engages the stud 271 of the cam slide 270. A spring 295 is connected at its front end to the horizontal lever 290 and at its rear end to the bed-plate and normally operates to pull said
 55 lever toward the machine and hold the cam-slide in inward position so that its elevated cam 272 may be engaged by the front stud 268 of the yoke 266 to swing the switch finger 260 into upward active position. A rod 310 is pivoted at its front end to said
 60 horizontal lever and at its rear end to a

lever 320 pivoted about midway of its length on a rod 330 supported in dependent brackets 331 and 332 attached to the bed-plate 30. The lower end of this lever rides on lacing
 70 projections or cams as 996 disposed on the left side of a striping pattern chain 990. This striping pattern chain may be similar to the one shown in Patent 713,370 except that in addition to the striping lugs or cams 993 or 993' as numbered in said patent said
 75 chain is provided with these lacing cams as 996, which may be in the form of studs attached to the lugs referred to. These lacing cams are disposed on the cam links 993 of the chain in such groups or distances
 80 apart as may be necessary to actuate the cam slide for shifting the lace needles to produce the desired design in the work.

The auxiliary duplex striping pattern chain 990 is preferably composed of links 85 having a continuous series of full-length lugs provided at intervals with detachable screw-stud cams 994 on the right side for changing the yarn to produce circular stripes and with a series of detachable screw-
 90 stud cams 996 on the left side of the same cam plates for shifting the switch finger to produce longitudinal lace-work or longitudinal stripes. The cams 994 for the circular striping and the cams 996 for lacing
 95 or longitudinal striping may be so arranged in relation to each other that longitudinal stripes in colors may be produced down the front of the leg or top of the foot or both in continuous circular knitting while horizontal
 100 stripes in colors are produced at the back of the leg or bottom of the foot or both. This is accomplished by having both such cams arranged to act simultaneously; so as to shift the thread and the switch finger
 105 at the same time or between the same two turns of the cam cylinder, the parts being so arranged that after the striping is begun the long-stud needles 70 are always supplied with thread or yarn of one color
 110 only. In this way the long loops made by said needles will be folded over the cross threads of another color. The cross threads which are laid against the breast of the long-butt needles while the latter are in inactive
 115 position are thrown to the rear of the fabric and covered by the long loops which overlie said cross threads. Thus lengthwise stripes of one solid color are formed. Between these solid color stripes are stripes com-
 120 posed mainly of another color but showing both colors, the other color being in blocks separated from one another by slightly visible loops of the same color as the solid stripes. For instance: assuming that a sock
 125 is to be made of a main thread of black and an auxiliary striping or lacing thread of white, the knitting starts say at the top of the leg, and the black thread is supplied to all the needles, the switch finger 260 being
 130

in upward active position and operating to pull down the long stud needles 70 into active position at each turn of the cam cylinder. As many courses as may be desired are thus knit in solid black. Then the duplex striping pattern chain 990 is brought into operation as described in said Patent 713,370 and a cam as 994 thereon actuates the yarn changing mechanism and changes the yarn from black to white. Then the white thread is fed to all the needles and the short-stud needles 50 regularly knit a plain fabric in white forming a white horizontal stripe at the back of the leg, of say two to five courses as desired, while the medium needles 60 and long-butt needles 70 form a corresponding number of wales across the front of the leg. Then the striping pattern chain actuates the yarn changer and shifts the feed back to the black thread and on the same turn of the cam cylinder a lacing cam as 996 on the striping chain actuates the switch finger 260 and shifts it into inactive position as shown in Fig. 10 and the long-stud needles 70 are allowed to remain up out of action as thrown by the lacing cam 90. Then the black thread is fed to the short-stud needles 50 in active position and to the medium stud needles 60 also in active position and laid across the breasts of the stationary inactive long-stud needles 70.

The short-stud needles regularly knit a plain fabric in black forming a black horizontal stripe at the back of the leg and the intermediate needles regularly knit detached portions of regular fabric corresponding to their several groups and connected by the straight strands of the same courses laid across the breasts of the long-butt needles as aforesaid. Then another yarn changing cam as 994 on the striping pattern chain shifts the yarn back to white and another switch finger cam as 996 on said chain swings the switch finger 260 upward and the long stud needles 70 are brought down into active position and are then engaged by the knitting cams and long loops of white thread are formed which embrace the several breast threads of black on said needles, throwing said black threads to the rear of the fabric and forming longitudinal stripes of white on the front thereof. The forming of these long loops from the white threads of the previous white supply causes the white stitches formed on the medium stud needles 60 during such previous white supply to be drawn taut and the breast threads tend to spread so that comparatively little white appears in the front of the stocking between the stripes of white formed by the long-stud needles. All the needles are in action during this feeding of white yarn which may be for from two to five courses more or less. This operation is continued down the leg if

desired and may be resumed in the knitting of the tubular portion of the foot.

Means are provided for actuating the cam slide 270 direct from the main pattern chain 390 for throwing the lacing mechanism out of use for heel and toe knitting or other purposes. This mechanism comprises a lever 340 pivoted on the rod 330 and provided at its upper end with a lateral stud 341 which projects behind the rear end of the rod 310, the lower end of said lever resting on the main pattern chain 390. This main pattern chain may be similar to the main chain of the same number in Patent 713,370 and it is provided at proper intervals with cams as 345 herein for actuating said lever 340 to shift the cam slide 270 into such position as to bring the cam 277 at the inner end thereof into position to be engaged by the lateral stud 267' for swinging the switch finger 260 into horizontal inactive position.

The yarn changing mechanism for forming the circular stripes is operated as in Patent 713,370 through a pawl 1000 which is engaged by the cams as 993 on the right side of the striping pattern chain 990 or by the studs as 994 attached to the plate secured to some of said links. These cams may carry the projections 996 for operating the lace mechanism.

I claim as my invention:

1. The combination of a needle cylinder, a circular series of needles disposed therein comprising a series of short-stud needles, and a series of medium-stud needles and long-stud needles interspersed according to the design to be produced, a cam cylinder provided with a supplemental needle-lifting cam disposed behind the knitting cams and adapted to engage the long-stud needles to carry them out of range of the knitting cams and permit the medium stud needles and the short-stud needles to pass without action, and means for shifting at determined intervals the long-stud needles into active position independently of both the other forms of needles.

2. In a knitting machine, the combination of a needle cylinder, a circular series of needles disposed therein comprising a series of short-stud needles and a series of long-stud needles and medium-stud needles interspersed according to the design to be produced, a cam cylinder provided with a supplemental cam disposed back of the knitting cams and adapted to lift the long-stud needles into inactive position and to escape the short-stud and medium-stud needles, a pivoted switch finger mounted on said cam cylinder and adapted to engage both the medium-stud needles and the long-stud needles, primary means for swinging said switch finger into oppositely inclined positions for jointly switching said medium-stud needles and long-stud needles into and

out of active position, and a secondary means for swinging said switch finger into intermediate neutral position and into position for restoring the long-butt needles to active position at determined intervals.

3. In a knitting machine, the combination of a needle cylinder, a circular series of needles disposed therein comprising a series of short-stud needles and a series of long-stud needles and medium-stud needles interspersed according to the design to be produced, a cam cylinder provided with a supplemental cam disposed back of the knitting cams for lifting the long-stud needles into inactive position, and adapted to escape the short-stud and medium-stud needles, a pivoted switch finger mounted on said cam cylinder and adapted to engage both the medium-stud needles and the long-stud needles, primary means controlled by the main pattern chain for swinging said switch finger into oppositely inclined positions for jointly switching said medium-stud needles and long-stud needles into and out of active position, and a secondary means controlled by an auxiliary pattern chain for swinging said switch finger into intermediate neutral position and into position for restoring the long-butt needles to active position at determined intervals.

4. In a knitting machine, the combination of a needle cylinder, a circular series of needles disposed therein comprising a series of short-stud needles and a series of long-stud needles and medium-stud needles interspersed according to the design to be produced, a cam cylinder provided with a supplemental cam disposed back of the knitting cams for lifting the long-stud needles into inactive position, and adapted to escape the short-stud and medium-stud needles, a pivoted switch finger mounted on said cam cylinder and adapted to engage both the medium-stud needles and the long-stud needles, primary means controlled by the main pattern chain for swinging said switch finger into oppositely inclined position for jointly switching said medium-stud needles and long-stud needles into and out of active position, a secondary means controlled by an auxiliary pattern chain for swinging said switch finger into intermediate neutral position and into position for restoring the long-butt needles to active position at determined

intervals, and a supplemental actuating mechanism controlled by the main pattern chain for operating said secondary means at other intervals.

5. The combination of a cam cylinder, a pivot-shaft journaled therein, a switch finger connected to the inner end of the pivot-shaft, a yoke fixed on said pivot-shaft outside said cylinder, an arm hung loosely on said pivot-shaft between the arms of said yoke and adapted for contact with either of said yoke arms for oscillating said pivot-shaft, means for engaging said arm for swinging said switch finger into different positions, two studs on said yoke, a cam slide provided with two cams for respectively engaging said studs, and means for shifting said cam slide into position for both cams to escape both said studs, into position for one of its cams to engage one of said studs and into position for the other cam to engage the other stud.

6. The combination of a cam cylinder, a pivot-shaft journaled therein, a switch finger fixed to the inner end of said pivot-shaft, two studs connected with said pivot-shaft, a cam slide provided with two cams for engaging said studs respectively, and means for shifting said cam slide into positions to cause both its cams to escape said studs or either to engage its respective stud.

7. The combination of a cam cylinder, a pivot-shaft journaled therein, a switch finger fixed to the inner end of said pivot-shaft, two studs connected with said pivot-shaft, a cam slide provided with two cams for engaging said studs respectively, and means controlled by the main pattern chain of the machine for shifting said cam slide into three different positions.

8. The combination of a circular knitting mechanism, a plurality of yarn feeds therefor, a striping mechanism controlled by an auxiliary pattern chain for changing the yarn feed to produce circumferential stripes, and mechanism for manipulating the circular knitting mechanism to produce longitudinal stripes of lace-work, said lace-work mechanism being also controlled by said auxiliary pattern chain.

WILLIAM P. YOUNG.

Witnesses:

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WALTER F. HENRY.