

April 26, 1966

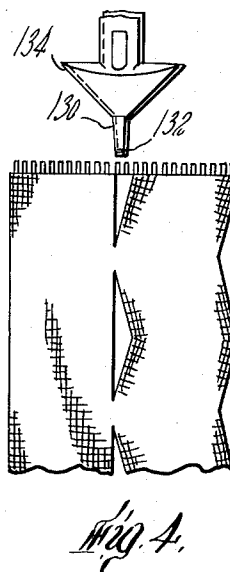
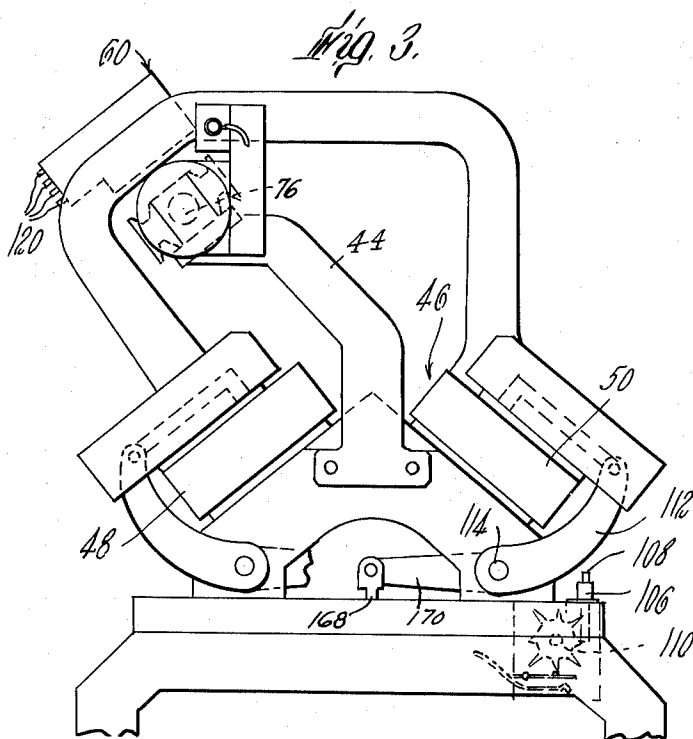
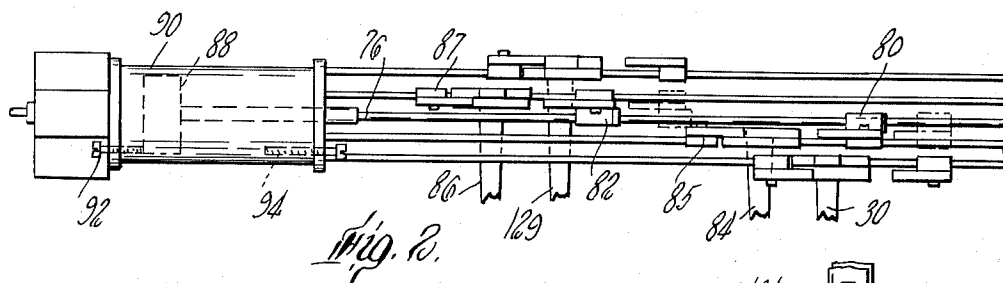
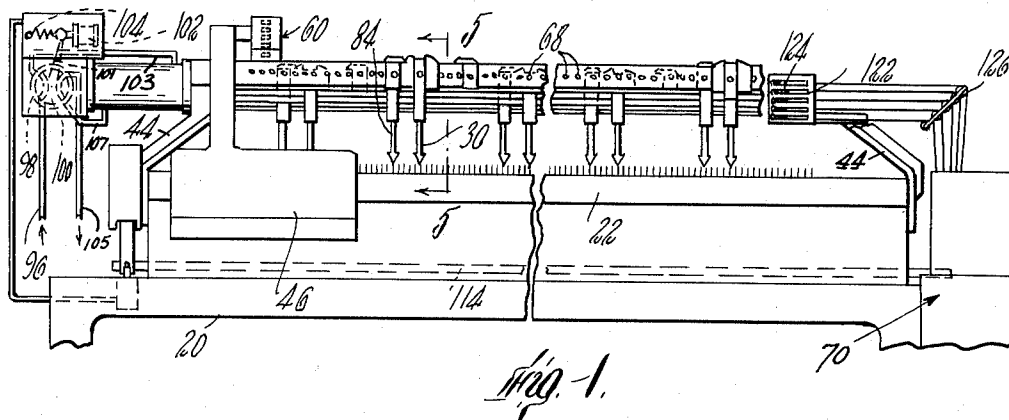
G. SCHUTZENGEL

3,247,687

YARN CARRIER CONTROL FOR A KNITTING MACHINE

Filed July 17, 1962

3 Sheets-Sheet 1



April 26, 1966

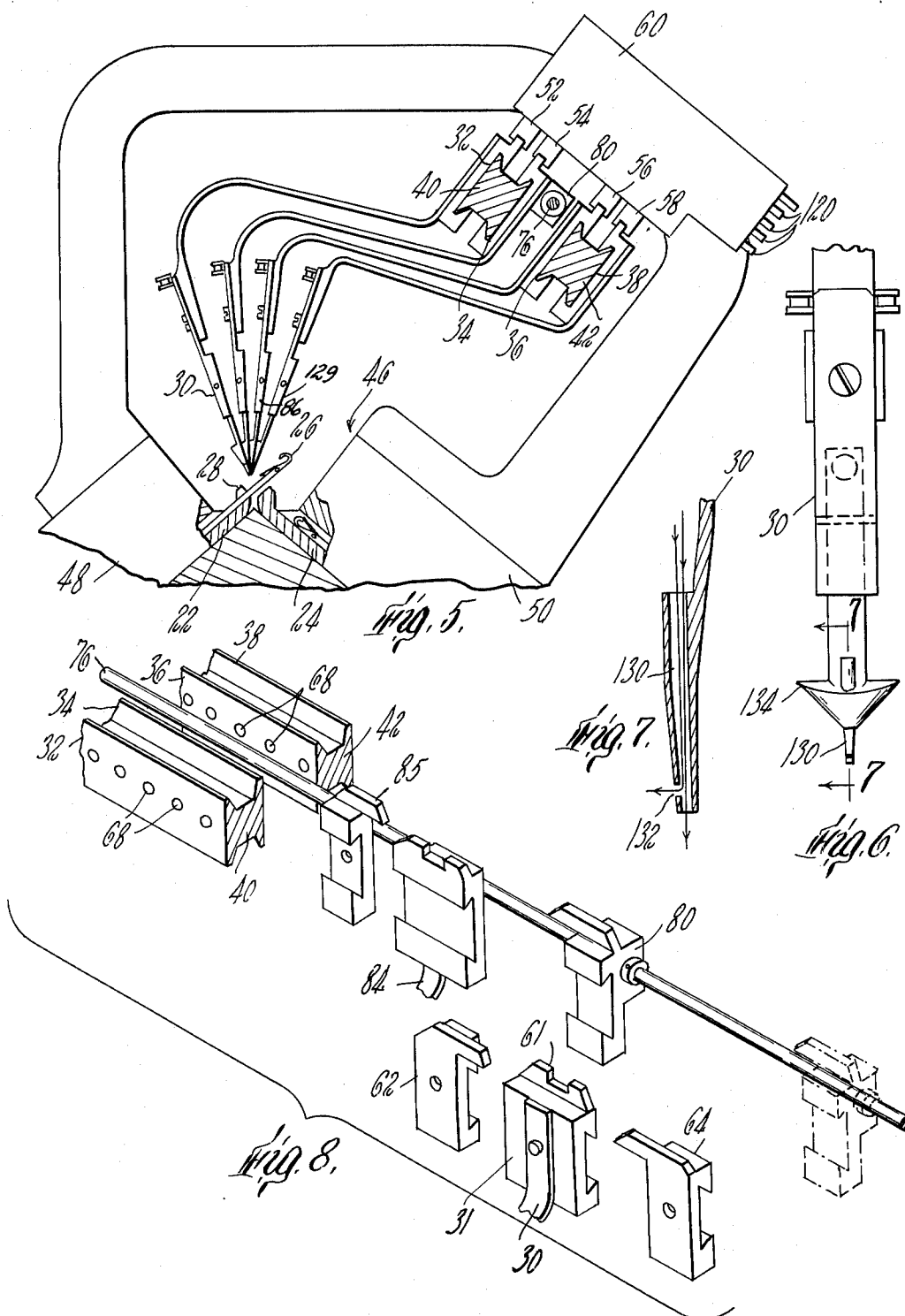
G. SCHUTZENGE

3,247,687

YARN CARRIER CONTROL FOR A KNITTING MACHINE

Filed July 17, 1962

3 Sheets-Sheet 2



April 26, 1966

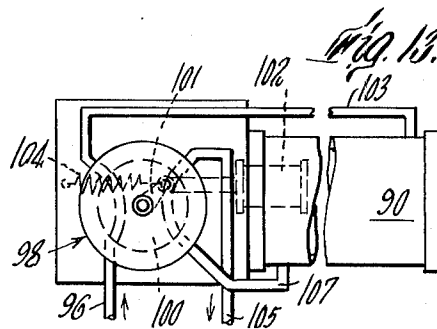
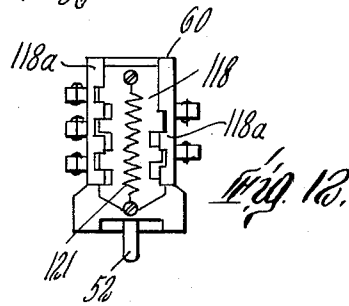
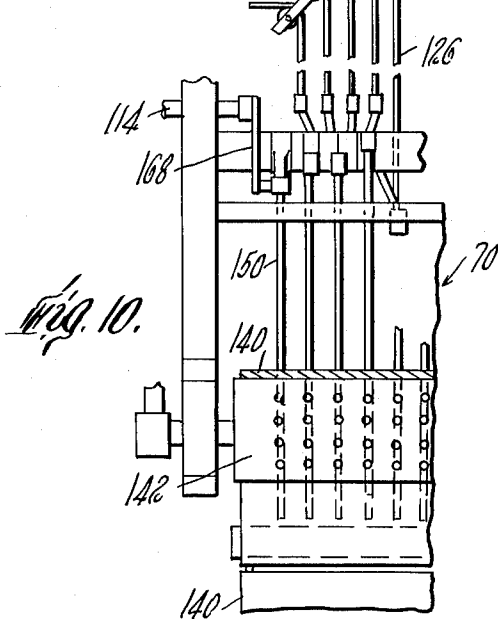
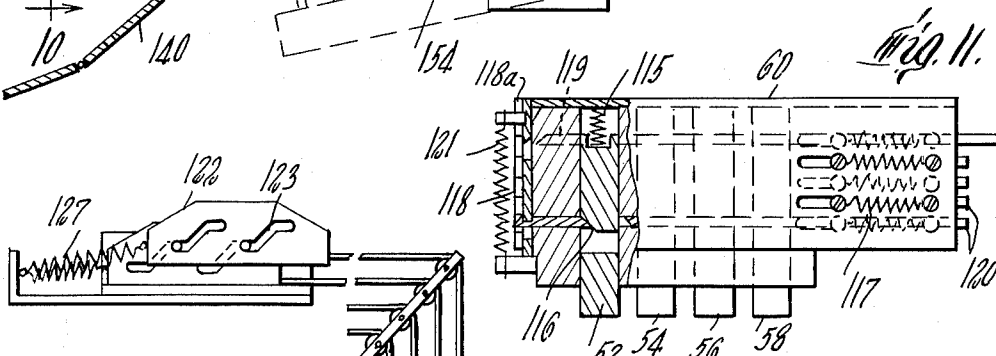
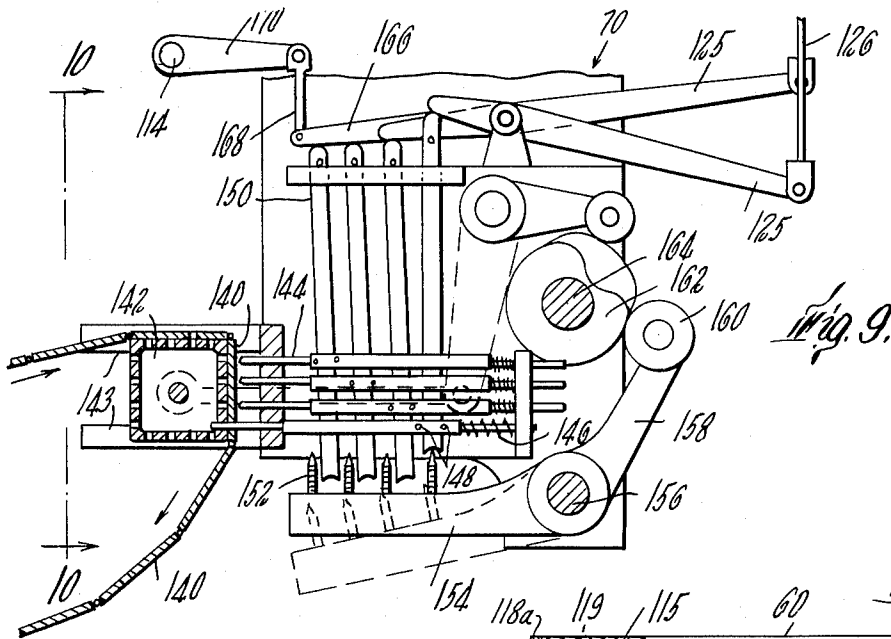
G. SCHUTZENGE

3,247,687

YARN CARRIER CONTROL FOR A KNITTING MACHINE

Filed July 17, 1962

3 Sheets-Sheet 3



1

2

3,247,687 YARN CARRIER CONTROL FOR A KNITTING MACHINE

Gabriel Schutzengel, Worcester, Mass., assignor to
M.K.M. Knitting Mills, Inc., Manchester, N.H., a cor-
poration of New Hampshire

Filed July 17, 1962, Ser. No. 210,359

6 Claims. (Cl. 66-128)

The present invention relates to improvements in yarn carrier controls for a flat independent needle knitting machine of the general type having relatively fixed carrier slide bars, yarn carriers slidably mounted thereon, stoppers for the individual carriers, and a reciprocating carriage having needle actuating cams and drivers to engage and advance the individual carriers.

The invention is herein disclosed as embodied in a well known flat bed knitting machine manufactured by H. Stoll & Co. of Wuertenburg, Germany, having two opposed needle beds of substantial length, independently operated latch type needles, guide bars providing four yarn carrier slide tracks for the usual yarn carriers and their stoppers, a carriage reciprocating along the length of the needle beds, on which are mounted the usual needle operating cams and the drivers selectively operable to drive the several yarn carriers, and at one end of the machine a jacquard type pattern control by means of which the operation of the needles and yarn carriers with their associated drivers is controlled in accordance with any desired pattern.

It is a principal object of the present invention to provide an improved yarn carrier control for a flat independent knitting machine of this description which will permit of a more efficient use of the yarn carriers employed in knitting narrow fabric patterns such as tapes to permit a maximum number of such knitting operations to be carried on simultaneously at a plurality of knitting stations along the length of the needle bed.

More specifically it is an object of the invention to provide a suitable means for effecting a simultaneous shift of the stoppers associated with one or more carriers operating at each of said knitting stations, thereby to substantially increase the flexibility of design available with a minimum number of carriers at each said station.

The illustrated machine is set up for knitting at each of a plurality of stations along the length of the needle bed a divided beading which consists of two narrow knitting tapes knitted on adjacent groups of needles and connected at intervals by a number of knitted courses which extend across both of said needle groups. In accordance with the invention a yarn carrier control is provided which acts when rendered operative to render one of said carriers inoperative and which at the same time causes one of the stoppers associated with the other yarn carrier to be shifted to an alternate position in which the second carrier is permitted to knit a number of tying courses spanning said adjacent groups of needles.

The mechanism provided for effecting a simultaneous shift of selected stoppers at each of said knitting stations from one to another position comprises a fluid-operated cylinder and a control rod connected to be actuated thereby extending along the length of needle bed and having attached thereto each of said selected stoppers. The cylinder is operated by the pattern mechanism of the machine to shift the control rod axially from one of another of two alternative positions in which the selected stoppers controlled thereby are effective to produce a long or a short traverse of the associated carriers.

With the above and other objects in view as may hereinafter appear the several features of the invention consist also in the devices, combinations and arrangement of parts hereinafter described and claimed which to-

gether with the advantages to be obtained thereby will be readily understood by one skilled in the art from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a view in side elevation of a flat independent needle knitting machine embodying therein the several features of the invention;

FIG. 2 is a fragmentary plan view of the yarn carrier system including the two carrier support bars, the carrier slide tracks, and two adjacent knitting sets including yarn carriers and stoppers on each of said slide tracks, and fluid actuated cylinder and control rod for shifting selected stoppers;

FIG. 3 is an end view of the machine looking from the left, illustrating particularly the electrical connections for actuating the cylinder to shift selected stoppers;

FIG. 4 is a detail view on an enlarged scale illustrating the overlapping positions of two carriers on one knitting set at that point when the carriage traveling in a leftward direction has caused one of said carriers to knit across the right-hand tape and before the second carrier has been brought into operation to knit the left-hand tape, it being assumed further that the rear needle bed has been stepped outwardly by three needles thus providing a three needle gap between the two tapes;

FIG. 5 is a detail sectional view of the yarn carrier system for the machine taken on a line 5-5 of FIG. 1 illustrating portions of the needle beds, the two carrier bars, the carrier drive mechanism, and a yarn carrier mounted on each of the four carrier slide tracks of the machine;

FIG. 6 is a fragmentary detail view scaled to actual size of applicant's improved yarn carrier illustrating particularly the carrier tube having a portion thereof extending downwardly beyond the usual guide darts;

FIG. 7 is a sectional view of the carrier tube taken on line 7-7 of FIG. 6 but on an enlarged scale;

FIG. 8 is an exploded perspective view of the carriers and stoppers associated therewith comprising one knitting set arranged for the knitting of the connected two-tape pattern shown in FIG. 4;

FIG. 9 is a fragmentary detail view of the pattern jacquard assembly indicated in FIG. 1 looking from the right;

FIG. 10 is a fragmentary detail view of the pattern jacquard assembly looking from the front of the machine and taken along a line 10-10 in FIG. 9;

FIG. 11 is a detail view partly in section of the driver assembly shown in FIG. 5;

FIG. 12 is an end view of the driver assembly of FIG. 11 looking from the left; and

FIG. 13 is a detail view on a larger scale of the pneumatic cylinder reverse actuating mechanism diagrammatically shown in FIG. 1.

The machine illustrated in the drawings as embodying in a preferred form the several features of the invention is a flat two-bed independent needle knitting machine of a type manufactured by H. Stoll and Co. above referred to, having a frame 20 on which are mounted two oppositely inclined needle beds 22, 24 (FIGS. 1 and 5) extending along the length of the machine.

The knitting instrumentalities comprise two opposed series of independently slidable latch needles 26 which operate in slots in the needle beds between fixed knocking over surfaces 28. Yarn carriers, for example yarn carrier 30 supported for a limited yielding forward and back adjustment on slide blocks, for example the slide block 31 are mounted to slide on four guide tracks 32, 34, 36 and 38 provided on opposite sides of two parallel carrier bars 40, 42 which are rigidly mounted on brackets 44 secured to the frame 20 at the two ends of the machine.

Operation of the needles and movement of the carriers for feeding yarn thereto is effected by means of a carriage 46 supported on ways (not shown) for reciprocating movement along the length of the needle bed. Knitting cams carried in knitting cam boxes 48, 50 act on the butts of the needles 26 for advancing the needles in accordance with any one of several knitting patterns. Movement of any selected carrier or carriers in advance of the knitting wave of the needles is effected by means of one of four plunger-type drivers 52, 54, 56 and 58 slidably supported in a block 60 secured to the carriage 46 for movement therewith. Said drivers are located so that they co-operate with carriers mounted on the guide tracks 32, 34, 36 and 38 respectively.

The yarn carriers and their associated stoppers are grouped along the length of the carrier slide tracks to provide a series of knitting sets for the simultaneous knitting of a number of similar articles. Each knitting set will include the yarn carrier or carriers required for the knitting of the article and the stoppers necessary for arresting the movement of the individual carriers in each direction. The arrangement of the yarn carriers and stoppers in knitting sets is conventional on opposed flat bed knitting machines of the type exemplified by the Stoll knitting machine illustrated.

Referring to FIG. 8, each individual carrier, for example, carrier 30 is carried on a slide block as, for example, the slide block 31 which is formed with an undercut T-shaped guide surface for engagement with the associated T-shaped guide track 32, and with a rectangular notch 61 to receive the associated driver. Movement of the carrier and slide block 31 in each direction is limited by stoppers 62, 64 which may be adjustably secured to the guide track 32 of carrier bar 40 on which the carrier is mounted by means of locking pins, not shown, which engage in cooperating recesses 68 in the associated carrier slide bar. Each stopper is formed with a cam surface to engage with and lift the cooperating driver, for example, driver 52, out of engagement with the rectangular slot 61 as the carrier reaches the stop engaging position. Each of the drivers, of which the driver 52 only is shown in detail, is biased downwardly by a spring 115 to an operative position in which the driver, moving lengthwise of the machine with the carriage 46, will strike and ride over the several stoppers located in the associated guide track into and out of the driving notches in the carrier slide blocks hereinafter described. The drivers are shifted between said spring pressed operative positions and raised inoperative positions by pattern controlled operating means well known in the art to which further reference will be made in connection with the description of the operation of my improved carrier controls.

The illustrated machine is provided with a pattern control mechanism including a pattern jacquard assembly generally indicated at 70 in FIG. 1, and operating connections therefrom which perform a variety of automatic operations in accordance with the usual practice on these machines. Amongst other operations the pattern assembly controls the position of the needle actuating cams which are thus adjusted for the knitting of several different types of fabric. Another function performed by the pattern assembly is the shifting of the several drivers 52 to 58 inclusive into and out of operative position thereby rendering the carriers on the guide track associated with the particular driver operative or inoperative as the case may be. Inasmuch as these mechanisms are well known in the art and do not form any particular part of the invention, only such reference will be made thereto as may be found necessary to illustrate connection of the invention therewith.

In accordance with the invention a mechanism is provided for automatically shifting selected stoppers from one to another position and thereby to cause the asso-

ciated carriers to traverse a larger or smaller number of needles. In the illustrated construction a control rod 76 is provided which extends along the length of the machine between the two carrier bars 40, 42, being supported for sliding movement in brackets 44, said control rod having rigidly secured thereto at intervals along its length, selected stoppers such as that designated at 80 (see FIGS. 2 and 8) which are supported for lengthwise adjustment at intervals along the length of guide track 34, and a group of selected stoppers such as that designated at 82 (see FIG. 2) supported at intervals along the length of guide track 36. Each stopper 80 forms an element of the knitting set illustrated by way of example in FIG. 8, and is arranged to arrest movement of an associated carrier 84 on the guide track 34 at the end of its movement to the right, while a stopper 85 fixed to the guide track 34 arrests movement of said carrier to the left. Each of the selected stoppers 82 on guide track 36 is similarly arranged to arrest movement of an associated carrier 86, while movement of said carrier 86 to the left is arrested by means of a fixedly mounted stopper 87. At the left-hand end of the machine the control rod 76 is connected with a piston 88 of a pneumatic cylinder 90. The piston 88 and rod 76 are arranged to move through a limited distance between two adjustable stops shown for purposes of illustration as stop screws 92, 94 which engage opposite sides of piston 88 and thus define the two alternative stop positions for each of the stoppers 80, 82 attached to the control rod 76.

The operation of the cylinder 90 to shift said selected stoppers 80, 82 from one to the other position is controlled automatically from the pattern mechanism of the machine in timed relation with such other changes in machine operation as may be required for the knitting of a particular fabric pattern. The mechanism for actuating the pneumatic cylinder comprises a compressed air line 96 and a reversing valve 98 consisting of a rotary valve member 100 which is shifted from one to the other of two alternative positions by means of a lever arm 101 and a solenoid 102 pivotally connected thereto, the parts being arranged so that the energizing of the solenoid will shift the lever arm 101 and valve member 100 in a clockwise direction and the piston 88 to the left as view in FIGS. 1 and 13. Air now flows from inlet 96 through pipe line 103 to the right hand end of the cylinder 90 and outwardly to an exhaust line 105 through a pipe line 107 from the left hand end of the cylinder 90. The de-energizing of the solenoid 102 will permit return of the plunger 100 and piston 88 in a counter-clockwise direction under the influence of a return spring 104 causing the piston 88 to move to the right as the flow is reversed through pipe lines 103 and 107. The energizing and de-energizing of the solenoid is effected by means of an electrical circuit which includes a microswitch 106 (see FIG. 3). The switch comprises an actuating pin 108 and a rotary switch member 110 which is given a stepped advance shifting the switch from one to the other of two alternative positions with each successive actuation of the pin 108. The microswitch 106 is arranged to be controlled from the pattern mechanism of the machine by means of a rocker arm 112 secured to a rock shaft 114 extending along the length of the machine. The switch is positioned with relation to the rocker arm so that a rocking movement of the shaft 114 and arm 112 downwardly in a clockwise direction will have the affect of actuating the switch. The shaft 114 and rocker arm 112 form part of a mechanism provided for indicating the stitch setting of the needle cams. In the present instance the stitch setting function of the rocker arm has been disconnected and movement of the rocker arm to a low position by an appropriate setting of the pattern mechanism is in the present instance employed to actuate the microswitch 106 and thereby to shift the cylinder piston 88 from one to the other of its alternate positions. Inasmuch as the pattern mechanism is well known in the Stoll machine and forms specifically no part of the invention, a limited reference only is made

thereto, hereafter, in connection with FIGS. 9 and 10 of the drawings.

The illustrated machine is provided also with automatic means for causing the yarn carrier drivers 52, 54, 56, and 58 to be selectively moved into and out of operative position in accordance with the requirements of the pattern. This mechanism which is well known in the art, and forms an integral part of the Stoll machine above referred to, will be referred to only briefly as follows: The position of each of the yarn carrier drivers is controlled by means of a corresponding one of four pins 120 which are mounted for axial movement in the block 60, said pins being arranged at right angles to the drivers and projecting rearwardly from the block to be engaged by operating cams 122 (see FIGS. 1 and 10) which are mounted on a bracket 124 carried on the machine frame. As shown by way of example in FIG. 11, driver 52 is biased downwardly by a spring 115 and is connected by cam surfaces 116 with a pin 120 which is normally retracted by a spring 117 which holds the pin 120 and driver connected thereto retracted. The pin 120, when advanced by engagement with a cam 122 permits the driver 52 to drop into operative position. The pin is held by a latch 118 which may be released to permit the return of the pin 120 and driver 52 to inoperative position by the advance of another pin 120, or by the advance of a similar release pin 119 which will raise the latch 118 under the pressure of a return spring 121. The latch 118 takes the form of a plate vertically slidable on the end surface of the block 60 in a guideway provided by two vertically disposed edge plates 118a. The cams 122 have sloping slot and pin connections with the bracket 124 and are adapted to be shifted diagonally between advanced pin engaging and retracted inoperative positions by means of cables 126 and pattern actuated levers not shown which act against the spring resistance provided by springs 127 attached to the cams 122.

The carrier control mechanism above described is here employed for the knitting of a narrow fabric design comprising two closely adjacent narrow tapes formed with a rib stitch, said tapes being attached to one another at intervals by means of ties made up of a small number of successive courses extending across the width of both tapes. The carrier stopper control mechanism above described permits this fabric pattern to be knitted with two carriers only which are mounted on separate guide tracks; for example, on the knitting set illustrated in FIG. 8 which comprises the carrier 30 adapted for a traverse of fixed extent between the stationary stoppers 62, 64 on guide track 32 knitting the right-hand tape of a pair, and a carrier 84 reciprocating on guide track 34 between the fixed stopper 85 and the stopper 80 which is shiftable between a position to the left in which carrier 84 is restricted to the knitting of the left hand tape of the pair, and a position to the right in which the carrier 84 is knitting across the width of both tapes. During the knitting of the wide tie forming courses the carrier utilized for the knitting of the right-hand tape is rendered inoperative by the automatic shift of the driver 52 to the raised inoperative position.

In order that knitting sets knitting the connecting tape pattern above described may be located more closely adjacent one another along the length of the needle series for the most efficient use of the machine alternate knitting sets consisting of the first, third, and so on, sets of the series are set up with carriers on the guide tracks 32 and 34, whereas all of the intervening intermediate knitting sets consisting of the second, fourth, and so on, sets of the series are set up with carriers mounted on guide tracks 36 and 38, thus allowing the component parts of said alternate and intermediate knitting sets including the stoppers to overlap one another by a substantial amount. As shown in the drawings the arrangement of each rear knitting set is similar to that of each front knitting set above described, except that the carrier 129 of each inter-

mediate set knitting the right hand tape is supported on the rearmost guide track 38 while the carrier 86 which is employed for knitting the left-hand tape and also for knitting the tie courses upon shifting of the adjustable stopper 82, is mounted on the more forwardly located guide track 36. As previously pointed out, the shifting of the piston 88 and control rod 76 to the right will shift the adjustable stops 80 and 82 associated with the respective alternate and intermediate knitting sets to the right for the knitting of the tying courses while at the same time drivers 52 and 53 associated with the carriers knitting the right hand tapes are raised thereby rendering inoperative those carriers employed in knitting the right-hand tapes.

In the example shown the stoppers are set so that the carriers knitting each tape will traverse fourteen needles. During the knitting of successive courses between each tie the rear needle bed is stepped laterally three needles to the right at the rate of one needle in each of three designated following courses, and thereafter three needles to the left to produce the separated tapes of the pattern. The number of inactive needles between the two active groups during such knitting thus varies from one to three needles.

To facilitate the simultaneous stopping and starting of the carriers knitting the two tapes in the very narrow area provided between the active groups of needles as one carrier is brought to its rest position and the other carrier is simultaneously put in operation by the continued advance of carriage 46 to feed yarn to the other group of needles, an improved carrier is provided which is particularly adapted for the simultaneous feeding of two plating yarns to the needles. The carrier 30 as shown in FIGS. 6 and 7 is provided with an upper shank portion of ordinary construction. Both feeding yarns are guided through a single yarn tube 130 formed in the lower portion of said shank, one yarn being fed from the lower end of the tube and the other yarn being fed outwardly through a transverse slot 132 formed in the forward side of the tube slightly above the bottom end thereof. The yarn carrier 30 is further provided with dart-shaped guides 134 to insure the free passage of the carriers past one another along the line of feed.

The improved carrier shown differs from those of the prior art in that the carrier tube 130 is extended downwardly approximately $\frac{3}{8}$ " below the edges of the dart-shaped guides 134. The tube at its lower end tapers to a very small external diameter which in the illustrated embodiment of the invention is approximately $\frac{1}{16}$ " thus permitting the accurate stopping of both carriers simultaneously within the very narrow starting and stopping area provided between the two active groups of needles. This condition is shown in FIG. 4 in which both carriers are located at the intermediate position in overlapping relation as the one carrier finishes its stroke and before the other carrier is started by the continued movement of the carriage along the needle series.

The illustrated construction and arrangement of the yarn carrier tube, particularly the lower end thereof including the transverse slot 132 for the plating yarn has the effect of positioning the two yarns relatively to one another so that a satisfactory plating of said yarns is achieved for both directions of travel of each carrier in either direction from the very small intermediate starting area illustrated in FIG. 4.

FIGS. 9 and 10 of the drawings show in detail portions of the pattern jacquard assembly 70 of the illustrated Stoll machine which are employed to control the operation of the yarn carrier drivers, and in the present instance, to shift the cylinder 90, control rod 76 and attached stoppers 80 and 82 from one to the other alternate position. The pattern mechanism comprises a chain of jacquard plates 140 which pass successively over a square sided drum 142 which is rotated in steps of 90° to move the plates 140 successively into position, and is moved

bodily along a supporting guideway 143 to effect desired pattern changes. During this movement the selected jacquard plate 140 engages against and pushes axially a number of pattern rods 144 tensioned against the plate 140 by springs 146. Each rod 144 is connected by spaced pins 148 to swing the lower end of an actuating bar 150 to an inoperative position out of alignment with a cooperating pin 152 on a rocker arm 154 secured to a rock shaft 156 which is rocked periodically by connections which include a cam follower arm 158 on the rock shaft 156, a roll 160, and a cam 162 on a machine cam shaft 164. Any one of the actuating bars 150 may be rendered operative by locating a hole in the jacquard plate to receive the designated pattern rod 144, so that the actuating bar connected thereto is left in alignment with the associated pin 152 and is raised by the following rocking movement of the rock shaft 156 and rocker arm 154.

The upper end of each actuating bar 150 engages and rocks an associated pattern lever as, for example, the pattern lever 125 which acts through the attached cable 126 to raise a carrier activating cam 122. A second actuating bar 150 of the group acts when raised in this manner to rock a pattern lever 166 connected by a link 168 (see FIGS. 3 and 9) to a lever arm 170 on the adjacent end of the rock shaft 114 for controlling the micro switch 106 and the stopper shift cylinder 90.

The invention having been described, what is claimed is:

1. In a flat independent needle knitting machine having opposed linear needle beds, a reciprocating carriage supported to traverse said linear needle bed, and a carrier actuating driver mounted on said carriage, a carrier assembly comprising a carrier guide track fixedly located with relation to said needle bed, a yarn carrier slidably supported on said track to be driven by said driver in each direction, stoppers adjustably mounted on said guide track to arrest movement of said carrier under the influence of said driver in each direction, a control rod extending lengthwise of the needle bed, means connecting one of said stoppers for movement with said control rod, a fluid actuated cylinder connected with the control rod for shifting said rod and stopper attached thereto between alternative carrier stop positions, and pattern controlled means for actuating said cylinder to shift said stopper from one to the other of said positions.

2. In a flat independent needle knitting machine having opposed linear needle beds, a reciprocating carriage supported to traverse said linear needle bed, and a carrier actuating driver mounted on said carriage, a carrier assembly which comprises with a plurality of carriers carrier supporting means including a plurality of guide tracks on which said carriers are mounted to provide a plurality of knitting sets along the length of said linear needle bed for the simultaneous knitting of a plurality of narrow fabric patterns, each said knitting set comprising a plurality of carriers on said guide tracks for knitting portions of a said fabric pattern, and stoppers on said guide tracks at each side of the respective carriers to arrest movement of said carriers in each direction including a selected stopper shiftable to vary the traverse of the associated yarn carrier, and means for effecting a simultaneous shift of the selected one of each of said stoppers in each said set comprising a control rod extending longitudinally of the machine having an operative attachment with each said selected stopper, a fluid operated cylinder connected to shift said rod and attached stoppers from one to another carrier stop position, a reversing valve for said cylinder, and pattern controlled means for actuating said reversing valve.

3. In a flat independent needle knitting machine having opposed linear needle beds, a reciprocating carriage supported to traverse said linear needle bed, and a carrier actuating driver mounted on said carriage, a car-

rier assembly which comprises with a plurality of carriers, a pair of carrier bars mounted on said machine each providing two carrier guide tracks on which said carriers are slidably supported in a plurality of knitting sets, each alternate set of said plurality of sets along the length of the needle beds comprising two carriers mounted respectively on the carrier guide tracks of one carrier bar, each intermediate set of said plurality of sets comprising two carriers mounted respectively on the carrier guide tracks of the second carrier bar, stoppers for said carriers including a pair of adjustably fixed stoppers for each said carrier including a selected stopper for arresting movement of one carrier from each set in one direction shiftable between two alternative carrier stop positions, an axially shiftable control rod interposed between said carrier bars having an operative attachment with each said selected stopper, and a fluid operated cylinder connected with said control rod for shifting said rod and carriers operatively connected therewith between said alternative carrier stop positions.

4. In a flat independent needle knitting machine having opposed linear needle beds, a group of yarn carrier guide tracks overlying said linear needle beds, a reciprocating carriage supported to traverse said linear needle beds, and yarn carrier actuating drivers mounted on said carriage, the combination of knitting sets for the knitting of a series of knitted articles along the length of said opposed linear needle beds, each said knitting set comprising at least one yarn carrier slidable along a said guide track, and stoppers mounted along the said guide track at each side of the said yarn carrier, and means for shifting a selected stopper of each set in accordance with a knitting pattern, which comprises a control rod extending longitudinally of the machine having an operative attachment with the selected stopper of each said set, and a fluid operated cylinder connected to shift said rod and attached stoppers from one to another carrier stop position.

5. In a flat independent needle knitting machine having opposed linear needle beds, a reciprocating carriage supported to traverse said linear needle beds, a group of two pairs of carrier guide tracks overlying said opposed linear needle beds, and yarn carrier actuating drivers mounted on said carriage, a series of knitting sets for the knitting of a series of knitted articles along the length of said opposed linear needle beds, each said set comprising a carrier slideable on each carrier guide track of a said pair of stoppers adjustably mounted along said guide tracks at each side of each said yarn carrier, the knitting sets of said series being mounted in alternation on one pair of yarn carrier guide tracks and on the remaining pair of guide tracks along the length of said opposed needle beds, and means for shifting a selected stopper of each set in accordance with a knitting pattern, which comprises a control rod extending longitudinally of the machine having an operative attachment with each said selected stopper, and a fluid operated cylinder connected to shift said rod and attached stoppers from one to another carrier stop position.

6. A flat independent needle knitting machine according to claim 5 in which said knitting sets are arranged for the knitting of narrow fabrics consisting each of two narrow strips joined at intervals by tying courses, each said set comprising a carrier on one said guide track for knitting one of said strips, a carrier on a second guide track for knitting the other of said strips, stoppers adjustably mounted along said guide tracks at each side of each said yarn carrier, means to render one of said carriers inoperative, and means connecting a selected stopper for the other said carrier with said control rod for movement to an extended carrier stop position for knitting tying courses across the width of both said strips.

9

References Cited by the Examiner

UNITED STATES PATENTS

1,867,704	7/1932	Lieberknecht	66—129
1,893,808	1/1933	Spector	66—126
1,990,440	2/1935	Steinhart	66—128
2,442,822	6/1948	Monk	66—127 X
2,775,109	12/1956	Scarborough	66—126
3,059,457	10/1962	Payne	66—129

5

10

FOREIGN PATENTS

854,392	11/1960	Great Britain.
448,394	3/1949	Italy.
519,479	3/1955	Italy.

ROBERT R. MACKEY, *Acting Primary Examiner.*

RUSSELL C. MADER, *Examiner.*

W. C. REYNOLDS, *Assistant Examiner.*