Oct. 13, 1942. S. C. MACK 2,298,302

METHOD OF WIDENING FABRIC ON FLAT KNITTING MACHINES

Filed Sept. 13, 1941 4 Sheets-Sheet 1

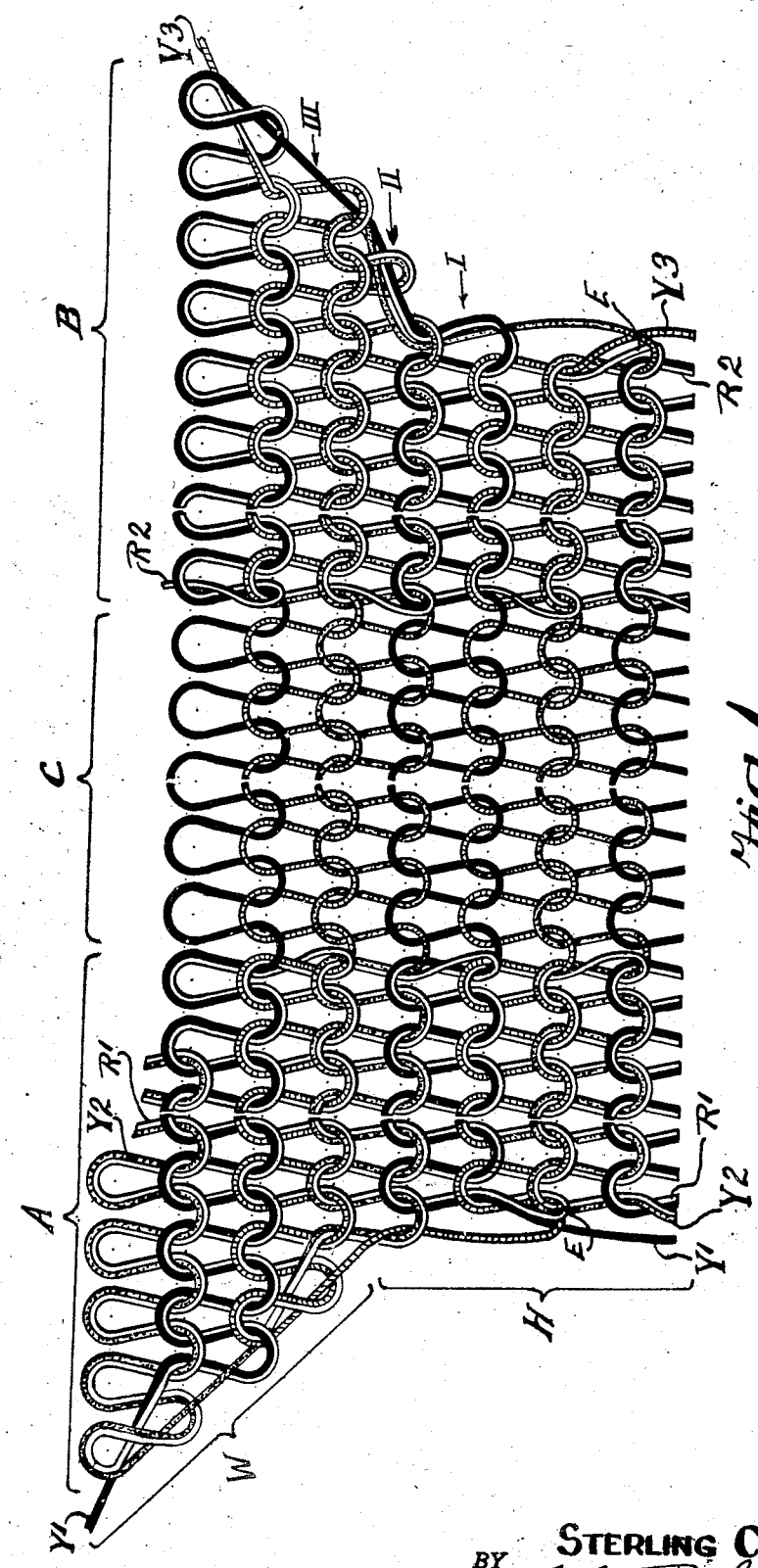


Fig. 1.

INVENTOR
STERLING C. MACK
BY Wm. R. Smith
ATTORNEY

Oct. 13, 1942. S. C. MACK 2,298,302

METHOD OF WIDENING FABRIC ON FLAT KNITTING MACHINES

Filed Sept. 13, 1941 4 Sheets-Sheet 2

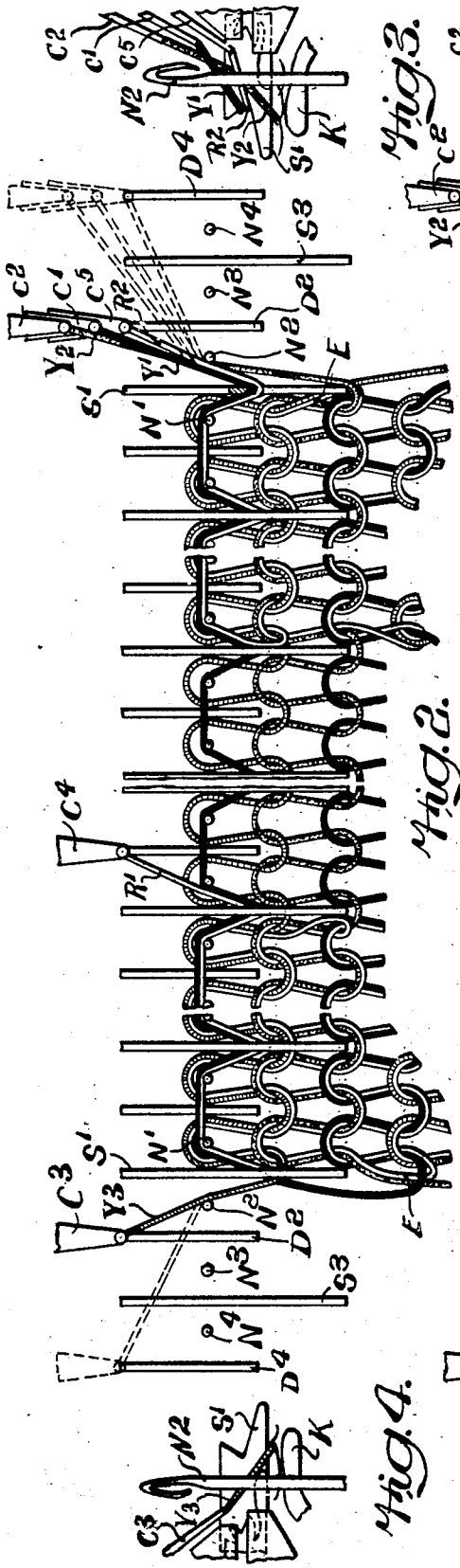


Fig. 3.

Fig. 2.

Fig. 4.

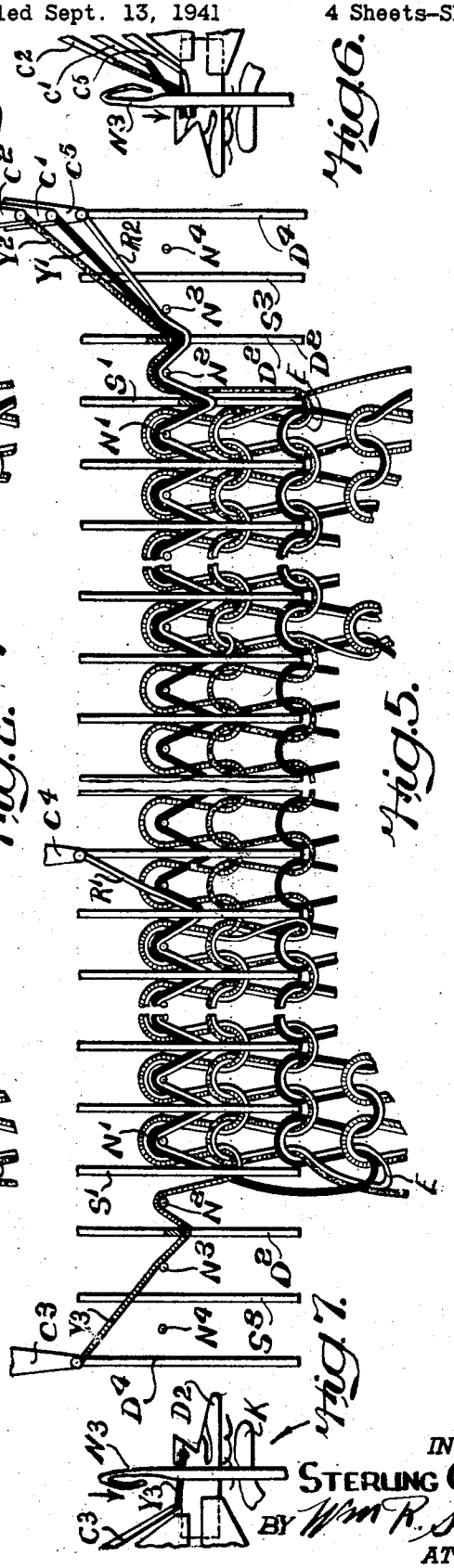


Fig. 6.

Fig. 5.

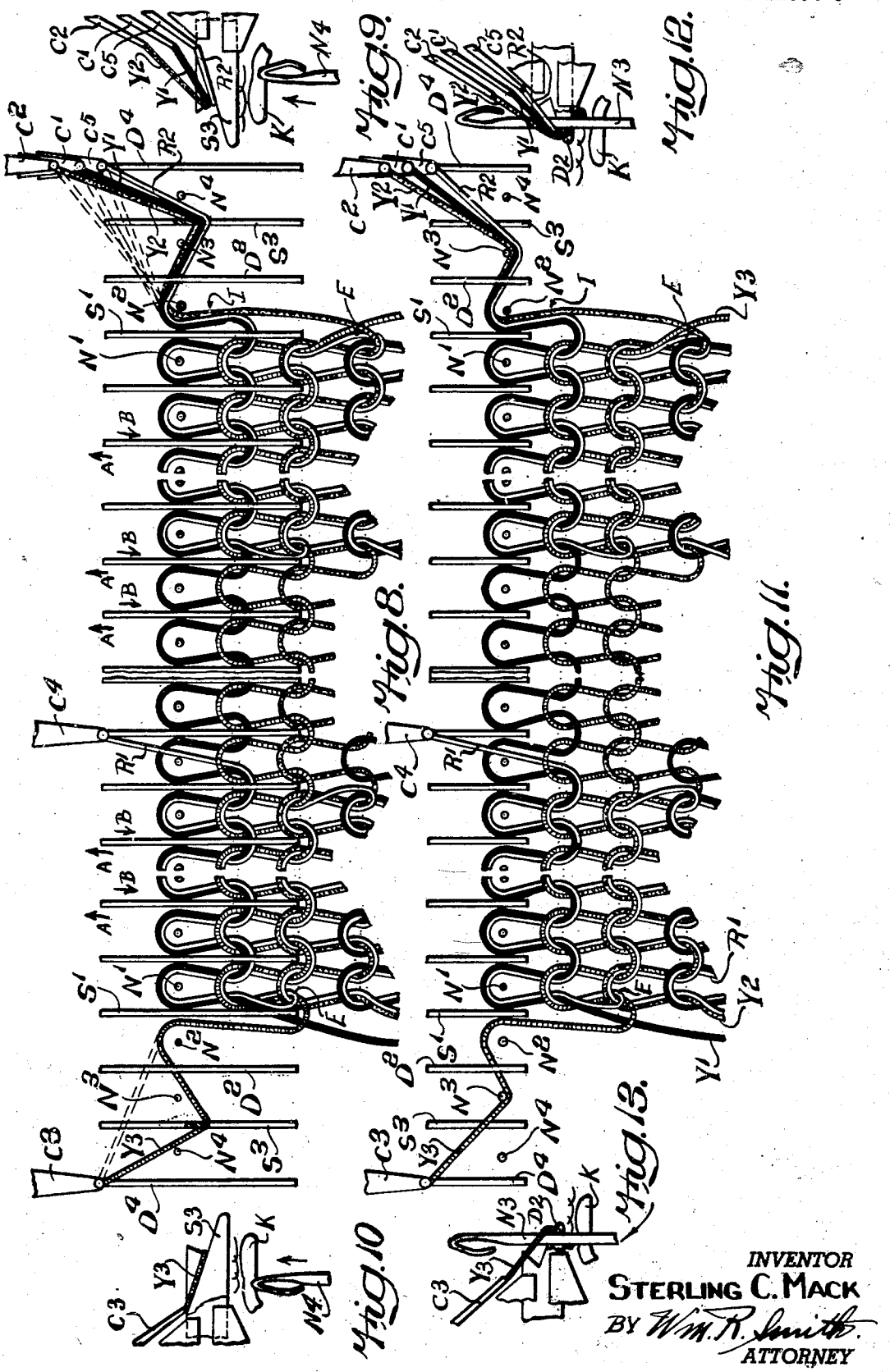
Fig. 7.

INVENTOR
STERLING C. MACK
BY Wm R. Smith
ATTORNEY

Oct. 13, 1942. S. C. MACK 2,298,302

METHOD OF WIDENING FABRIC ON FLAT KNITTING MACHINES

Filed Sept. 13, 1941 4 Sheets-Sheet 3



INVENTOR
STERLING C. MACK
BY Wm. R. Smith
ATTORNEY

Oct. 13, 1942. S. C. MACK 2,298,302

METHOD OF WIDENING FABRIC ON FLAT KNITTING MACHINES

Filed Sept. 13, 1941 4 Sheets-Sheet 4

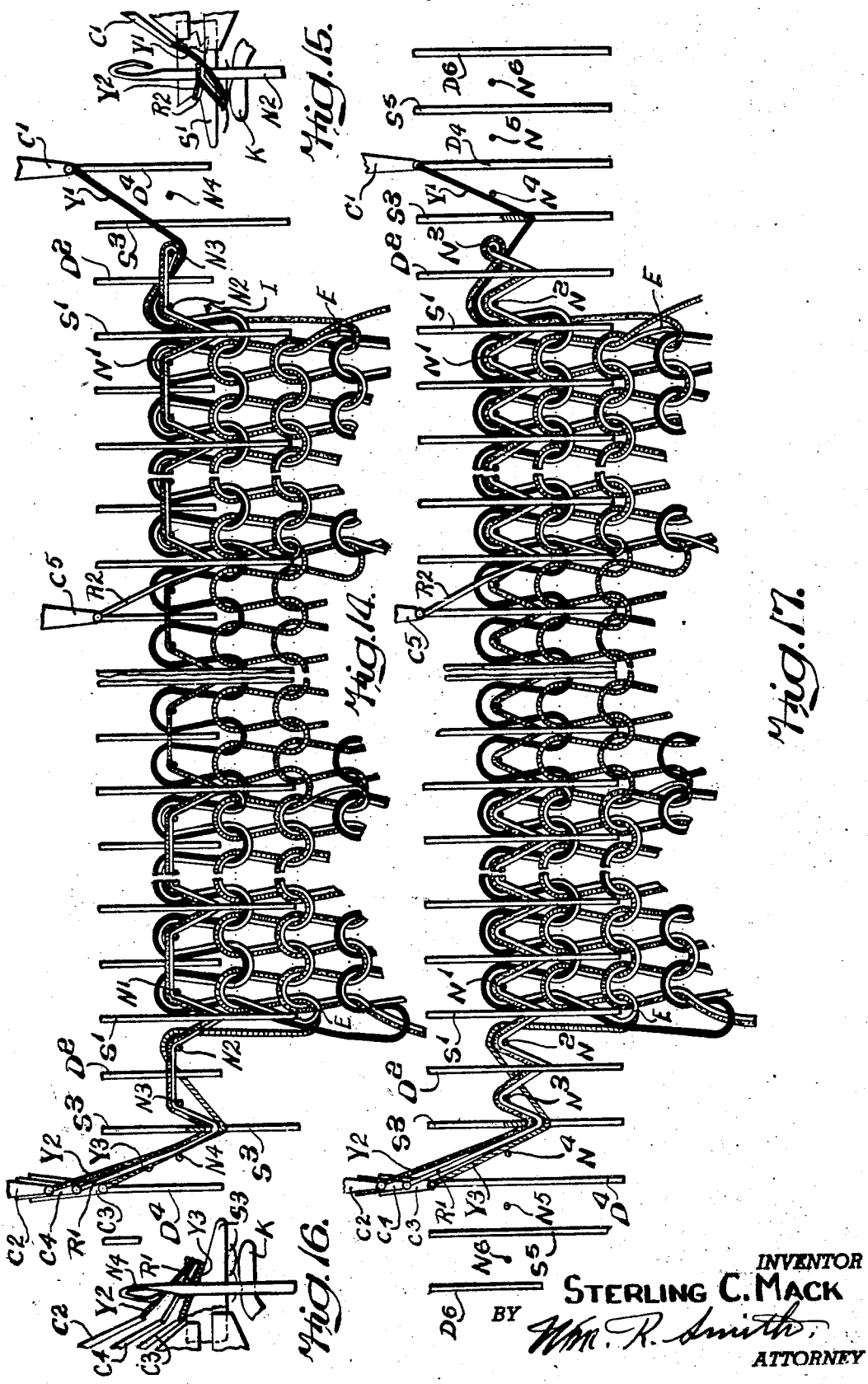


Fig. 15.

Fig. 14.

Fig. 17.

Fig. 16.

INVENTOR
STERLING C. MACK
BY Wm. R. Smith
ATTORNEY

Patented Oct. 13, 1942

2,298,302

UNITED STATES PATENT OFFICE

2,298,302

METHOD OF WIDENING FABRIC ON FLAT KNITTING MACHINES

Sterling C. Mack, Bangor, Pa., assignor to Julius Kayser & Co., Brooklyn, N. Y.

Application September 13, 1941, Serial No. 410,705

18 Claims. (Cl. 66—89)

The present invention generally relates to the art of widening fabrics on flat knitting machines and, more particularly, pertains to the formation of widened sections, especially heel sections, of full-ashioned hosiery knitted in one operation on a single machine, this application being a continuation in part of my copending application, Serial Number 401,112, filed July 5, 1941.

The invention is particularly concerned with that type of widening wherein loops are added onto the ends of courses, as distinguished from that type of widening wherein loops at the selvedge portions of the fabric are transferred outwardly, and has for its main object the provision of a method of producing widened portions in hosiery fabric of the "ringless" construction whereby the separate yarns utilized in successive sequence for the knitting of said portions in such fabric become tied in the selvedge edges thereof, thus constituting strong and tight selvedges without any detrimental "floats" running along said selvedges between the series of courses.

Other important objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

In order that the invention and its mode of operation may be readily understood by those skilled in the art, I have, in the accompanying drawings and in the detailed description based thereupon, set out a possible embodiment of the invention.

In these drawings:

Figure 1 diagrammatically represents a fabric portion constructed in accordance with this invention;

Figures 2 to 17 inclusive illustrate in a more or less diagrammatic manner the various stages of the widening method followed in producing the fabric shown in Figure 1.

Referring more particularly to the drawings, wherein like characters of reference will designate corresponding parts throughout, Figure 1 illustrates a portion of knitted stocking fabric of "ringless" construction, that is, a stocking fabric knitted from a plurality of separate yarns each yarn being laid in repeated successive sequence throughout the knitting process. As shown in said Figure 1, the stocking fabric is preferably knitted according to the well known alternating three-carrier system which allows the use of three body yarns Y1, Y2, and Y3, in the knitting of the stocking, alternating from one to the other at the completion of each course, thereby causing an individual body yarn to be used for every third course only throughout the knitting process.

In said Figure 1, there is represented a plurality of successive courses taking in the vicinity of the stocking heel to include a portion H of the high splice heel sections and a portion W of the widened heel sections. As is customary in the art, the high splice heel sections and the widened heel sections are reinforced and, for that purpose, two separate reinforcing yarns R1 and R2 are utilized. For convenience herein, the reinforcing yarns R1 and R2 are shown unshaded, the body yarn Y1 is shaded solid black, the body yarn Y2 is lined, and the body yarn Y3 is stippled.

In accordance with the usual practice in the art, and as represented in Figure 1, one reinforcing yarn R1 is used in conjunction with the three body yarns Y1, Y2, and Y3 in forming the desired number of reinforced loops to constitute the reinforced heel area A at one side of the stocking fabric, and the other reinforcing yarn R2 is used in conjunction with the three body yarns Y1, Y2, and Y3 in forming the desired number of reinforced loops to constitute the reinforced heel area B at the other side of the stocking fabric, said three body yarns Y1, Y2, and Y3 being used alone, that is, without either reinforcing yarn R1 or R2 to form the desired number of non-reinforced loops intermediate the reinforced loops within the heel area A and the reinforced loops within the heel area B to constitute the sheer instep area C.

It will be understood that the desired number of reinforced loops within the reinforced heel areas A and B may be obtained by predetermined adjustment of any suitable fabric widening attachment (preferably such as that shown and described in my copending application aforesaid) and of the well known "pointex" attachment usually provided on full-fashioned knitting machines, the widening attachment controlling the feeding of the body and reinforcing yarns at the outer selvedge edges of the reinforced areas A and B of the fabric and the "pointex" attachment controlling the feeding of the reinforcing yarns at the inner selvedge edges of said areas.

The construction of the hosiery fabric in accordance with the invention will be better understood from Figures 2 to 17 inclusive, which illustrate various stages of the method for producing said fabric.

In order to fully and clearly understand the present invention, the association, actuation, and timed function of the various knitting instrumentalities and associated parts as they occur in the usual operation of an ordinary full-fashioned knitting machine must be borne in mind.

As is well known in the art, the sinkers and dividers within each sinker head are arranged in alternating relationship, the knockover bits are so positioned that there is one knockover bit below and in the vertical plane of each sinker and divider, the needles are so disposed that one needle extends between every two adjacent knockover bits and between a sinker and an adjoining divider, and the carriers mounted on the carrier bars are so positioned that yarn is fed from three separate cones upon the nibs of the sinkers and dividers and to the front, that is, the bearded side, of the needles.

The carriers and sinkers are actuated through the so-called Coulier motion whereas the needles, dividers, and knockover bits are actuated through cams on the main cam shaft.

The Coulier motion includes a friction rod and a slur bar which are mounted to reciprocate in unison and in uniform strokes lengthwise of the knitting machine. The friction rod is associated with a suitable three-carrier attachment of known type for selectively moving the main carrier bars to impart yarn feeding movements to the body yarn carriers in alternating sequence, and carries friction boxes connectable to the secondary carrier bars to impart yarn feeding movements to the remaining yarn carriers, whereas the slur bar carries slur cocks engageable with jacks to actuate the same for successively and progressively advancing the sinkers.

Although the reciprocating strokes of the friction rod and slur bar are uniform, the outward reciprocating yarn laying strokes of the carrier bars are variably controlled by means of adjustable stops associated with the narrowing nuts of the carrier narrowing mechanism. The operation of the carrier narrowing mechanism is such that the carrier stops are adjusted to arrest the carrier bars in their outward strokes at a point where the carriers always come to rest over the divider outside the needle next to the desired end needle so that the sinker between said end and additional needles may function to sink yarn on the end needle for the formation of the selvedge loops.

While the carriers are arrested, the Coulier motion continues to the end of its stroke so that the slur cock continues in its movement to advance all the sinkers and, for that purpose, the location of the slur cock with respect to the sinker head and end of the Couliering motion is such that by the time the Couliering motion has reached the end of its stroke in either direction, the slur cock has passed the last sinker in the sinker head.

The dividers are advanced in gang by means of a catch bar which, at times, also acts to engage and simultaneously move the sinkers and the dividers. The knockover bits are given a slight up and down motion by means of levers attached to the knockover shaft. The needles receive movement in a general vertical direction, that is, at right angles to the sinkers and dividers and knockover bits by means of a lever and link arrangement. The catch bar, the knockover bit movement imparting levers, and the needle movement imparting lever and link arrangement are controlled by appropriate cams on the main cam shaft, as hereinbefore stated. These cams, however, are so shaped and corelated that the movements of the various knitting instrumentalities and associated parts take place in a definite timed relationship. Thus, at the beginning of a course, the needles are in their uppermost position, the sinkers and dividers are in their innermost position, and the knockover bits are in their lowermost position. Thereupon, the Coulier motion, going into operation, moves the selected carrier or carriers in one direction, which lay the yarn in said direction in the manner hereinbefore specified. The slur cock follows the carrier movement at a short distance, thus successively advancing the sinkers and, accordingly, kinking the yarn or yarns between alternate needles.

When all the sinkers have been advanced, and before the Couliering motion starts in the opposite direction, the catch bar is caused to move forwardly, thus forcing the dividers to advance in unison and, accordingly, the yarn or yarns already kinked between alternate needles now become kinked between each needle.

With the sinkers and dividers remaining in their advanced positions, the needles are caused to descend vertically so that the yarn or yarns kinked about the needle shanks become engaged with the needle beards to be drawn through loops of a previously formed course, whereupon pressing off of the loops of said previously formed course takes place in the usual manner.

As is known, during the press-off, the sinkers and dividers are drawn back simultaneously by the catch bar while the knockover bits are being moved upwardly. In this manner, the newly sunk loops, due to the downward movements of the needles, are caused to slip off the nibs of the sinkers and dividers onto the knockover bits, whereupon the sinkers and dividers are advanced simultaneously by the catch bar, thereby holding the fabric in place as the subsequent raising of the needles takes place.

Following the press-off, and after the needles are returned to the uppermost position, the sinkers and dividers are withdrawn en masse to their innermost position by the catch bar, whereupon the laying of another course begins.

In accordance with the method of the present invention, when a widening course is to be made, the yarn feeding is done in the ordinary manner as above described, the selected carriers being arrested as usual over the dividers outside the needle next to the ultimate knitting needle in operation while the sinkers beyond said needle are being advanced, but between the time when all the sinkers have been advanced and the time when the dividers are to be advanced, the active as well as the idle carriers, except the idle reinforcing carrier, are displaced preferably a distance of two needles passing over the extended sinker therebetween and coming to rest over the succeeding divider so that, with the advance of the dividers, that divider at either end of the knitting field over which the carriers were originally arrested engages the yarns and firmly holds the same against the needle between said divider and the immediately preceding sinker whereupon, during the subsequent operation of the knitting instrumentalities, there are formed a loop on said needle next to the original ultimate needle and a firm selvedge loop on the first added needle.

Referring more particularly to Figures 2 to 17 inclusive, there are shown certain knitting needles of a needle bar and knitting elements associated therewith. The needle at each of the opposite ends of the series on which the last fabric course before the knitting of a widening course takes place is indicated at N1, whereas the first three needles in the widening area over

which added loops are extended or widening courses are formed, are indicated at N2, N3, and N4. Corelated with the needles in the order mentioned are sinkers S1, dividers D2, sinkers S3, and dividers D4, with each of which are associated the knockover bits K. Carriers C1, C2, and C3 respectively intended to feed the body yarns Y1, Y2, and Y3, and carriers C4 and C5 respectively intended to feed the reinforcing yarns R1 and R2, are shown in their relative positions.

It will be understood that in the laying of the yarns for the formation of regular courses, that is, courses of uniform width, the carriers are arrested over the dividers D2 so that the sinkers S1 may cooperate in forming the selvedge loops E.

In accordance with the present invention, as represented in Figures 2, 3, and 4, as the widening operation commences, the carrier C1, threaded with the body yarn Y1 which has just been used to lay the course I, and the carrier C5, threaded with the reinforcing yarn R2 which has just been used to reinforce certain loops of said course I, are arrested in their movement towards one end of the needle series over the divider D2 at that end of the machine and over which lies idle the carrier C2 threaded with the body yarn Y2 which is to be used for laying the next succeeding course II, whereas the carrier C3, threaded with the body yarn Y3 which is to be used for laying the third course, lies idle over the divider D2 at the other end of the needle series. These carriers are held in that position until all the sinkers have reached their advanced position.

In the interval after the sinkers in the widening portion of the knitting head have moved outwardly, and before the dividers are moved forwardly, the carriers C1, C2, and C5 at one end of the needle series, and the carrier C3 at the other end of the needle series are relatively displaced outwardly over a distance of two needles, that is, said carriers pass over the respective needles N3, over the respective extended sinkers S3, and come to rest over the respective dividers D4 so that a portion of each of the yarns Y1, Y3, R1, and Y3 is laid across the nib of the respective dividers D2, as indicated in dotted lines in Figure 2.

The dividers are then advanced simultaneously to sink the yarns between each needle, thus forming the loops of the new laid course I, as represented in Figure 5. In so doing, as illustrated in Figures 5, 6, and 7, the dividers D2 engage that portion of each of the yarns Y1, Y2, R2, and Y2 which were laid across the nibs of the dividers D2 by the movement of the carrier bars to locate the carriers over the dividers D4 and thus firmly hold the yarns against the needles N2.

At this particular moment, the needles, in their usual sequence of movement, descend, as indicated by the arrow in Figures 6 and 7, for the purpose of drawing the newly formed loops of the widened course being made through the previously formed loops of the preceding course.

It will be understood that in this descending movement of the needles, the yarn portions held against the needles N2 become engaged within the beards thereof, but that the yarn portions passing over the needles N3 are not engaged thereby because of the angle at which said yarn portions are drawn.

As the needles continue to descend, the sinkers and dividers, as is customary for the press-off operation, are withdrawn en masse, as indicated by arrow A (Figure 8) and then advanced en masse, as indicated by arrow B (Figure 8), for the purpose of holding down the newly drawn loops while the needles are raised to their uppermost position. It is to be noted that the yarns being engaged within the beards of the needles N2 will be drawn downwardly as the needles descend and, accordingly, upon withdrawal and subsequent advance of the sinkers and dividers, said yarns are permitted to be caught under the dividers D2 which place the portions of the yarns leading from the needles N2 to the main carriers C1, C2, and C3 and reinforcing carrier C5 at such an angular position (dotted lines, Figure 8) that, upon the advancing movement of the sinkers and dividers, the sinkers S3 engage the yarns, as indicated in full lines in Figure 8. Since this advance of the sinkers and dividers takes place prior to the raising of the needles, as indicated by the arrow in Figure 9, the yarns leading from the carriers, as above specified, become located forwardly of the needles N3 in the manner clearly shown in Figures 11, 12, and 13 when the needles reach their uppermost position and the sinkers and dividers are withdrawn in unison in their innermost position preparatory to the laying of yarn for the next course.

In laying yarn for the formation of the next course, the carrier C2 threaded with the body yarn Y2, and the carrier C5 threaded with the reinforcing yarn R2, are moved in the reverse direction, wrapping said yarns Y2 and R2 about the needles N3 (Figures 14 and 15), while the carrier C1 remains idle. As more clearly shown in Figure 14, the carriers C2 and C5 travel together for that distance necessary to form the desired number of reinforced loops of heel area B, whereupon the carrier C5 is arrested while the carrier C2 continues to travel alone for that distance necessary to form the desired number of nonreinforced loops of instep area C, when the carrier C4 threaded with the reinforced yarn R1 joins the movement of the carrier C2 to form the desired number of reinforced loops in heel area A, said carriers C2 and C4 travelling together, as illustrated in Figures 14 and 16, to the end of the yarn laying movement for the formation of course II, the yarns being sunk between alternate needles by the usual function of the sinkers. As represented in Figure 17, after the laying of the yarns has been completed, the dividers are advanced en masse so that the yarns become sunk between each needle, whereupon the needles operate in their usual manner to knit in the course II.

In forming course III, the carrier C4 threaded with the body yarn Y3, and the carrier C4 threaded with the reinforcing yarn R1, move together in the opposite direction for the required distance to form the reinforced loops in portion A, whereupon carrier C4 is stopped while carrier C1 continues to move alone for the formation of the reinforced loops in area C. Then carrier C5 threaded with the reinforcing yarn R2 joins in the movement of the carrier C1 to the end of the yarn laying stroke which brings said carriers C1 and C5 to a stop over divider D4. After all the sinkers have been advanced, the carriers C1 and C5 are moved the distance of two additional needles so that said carriers come to rest over the divider D6 for widening the course in the same manner as hereinbefore described.

It is to be understood that succeeding widened courses are formed in the same manner as hereinbefore described. It is also to be understood that instead of widening the succeeding courses as represented in Figure 1, one or more courses of a width identical to the immediately preceding course may be knitted before the knitting of another widened course. Moreover, it is to be understood that the embodiment of the invention as herein shown and described is capable of certain modifications and, therefore, those modifications coming within the scope of the subjoined claims are to be considered within the spirit of the invention.

What I claim is:

1. The method of making selvedge widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of yarns are utilized in repeated sequence for the formation of successive courses, by adding loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier to feed its yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; and widening the heel sections at the sides of the blank by moving said carriers over a number of additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers.

2. The method of making selvedge widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of yarns are utilized in repeated sequence for the formation of successive courses, by adding loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier to feed its yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; and widening the heel sections at the sides of the blank by moving said carriers over two additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers.

3. The method of making selvedge widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of yarns are utilized in repeated sequence for the formation of successive courses, by adding loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier to feed its yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; and widening the heel sections at the sides of the blank by moving over a number of additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers, the carrier which has fed its yarn for the formation of a first course, the idle carrier at one side of the blank and which is to feed its yarn for the formation of a second course, and the idle carrier at the other side of the blank and which is to feed its body yarn for the formation of a third course.

4. The method of making selvedge widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of yarns are utilized in repeated sequence for the formation of successive courses, by adding loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier to feed its yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; and widening the heel sections at the sides of the blank by moving over two additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers the carrier which has fed its yarn for the formation of a first course, the idle carrier at one side of the blank and which is to feed its yarn for the formation of a second course, and the idle carrier at the other side of the blank and which is to feed its body yarn for the formation of a third course.

5. The method of making selvedge reinforced widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of body yarns are utilized in repeated sequence for the formation of successive courses, and a plurality of reinforcing yarns are used to reinforce a series of loops at the end portions of said courses, by adding reinforced loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier threaded with a body yarn to feed its body yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; selectively moving each carrier threaded with a reinforcing yarn in conjunction with the body yarns over a restricted number of said series of needles; and widening the heel sections at the sides of the blank my moving over a number of additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers the carrier which has fed its body yarn for the formation of a first course, the carrier which has fed its reinforcing yarn to reinforce loops of said course, the idle carrier at one side of the blank and which is to feed its body yarn for the formation of a second course, and the idle carrier at the other side of the blank and which is to feed its body yarn for the formation of a third course.

6. The method of making selvedge reinforced widened heel sections at the sides of a hosiery blank on a flat knitting machine wherein a plurality of body yarns are utilized in repeated sequence for the formation of successive courses, and a plurality of reinforcing yarns are used to reinforce a series of loops at the end portions of said courses, by adding reinforced loops onto the sides of said blank, which comprises the steps of: selectively moving each carrier threaded with a body yarn to feed its body yarn in repeated sequence to a series of needles equal in number to the number of wale loops in the preceding course; selectively moving each carrier threaded with a reinforcing yarn to feed its yarn in conjunction with the body yarns over a restricted number of said series of needles; and widening the heel sections at the sides of the blank by moving over two additional needles subsequent to the operation of the sinkers but prior to the operation of the dividers the carrier which has fed its body yarn for the formation of a first course, the carrier which has fed its reinforcing yarn to reinforce loops of said course, the idle carrier at one side of the blank and which is to feed its body yarn for the formation of a second course, and the idle carrier at the other side of the blank and which is to feed its body yarn for the formation of a third course.

7. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric, and the other of said remaining yarns is held idle at the other selvedge of the fabric, the

fed yarn being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the step of: moving the fed yarn and idle yarns over a number of additional needles outside the fabric selvedges between the time when the sinkers have been operated and the time when the dividers are to be operated.

8. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric, and the other of said remaining yarns is held idle at the other selvedge of the fabric, the fed yarn being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the steps of: moving the fed yarn and idle yarns over two additional needles outside the fabric selvedges between the time when the sinkers have been operated and the time when the dividers are to be operated.

9. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric, while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjuction with the three body yarns to reinforce a series of loops at the other selvedge of the fabric, the fed yarns being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the step of: moving the fed body and reinforcing yarns and idle body yarns over a number of additional needles outside the fabric selvedges between the time when the sinkers have been operated and the time when the dividers are to be operated.

10. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric, while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at the other selvedge of the fabric, the fed yarns being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the step of: moving the fed body and reinforcing yarns and idle body yarns over two additional needles outside the fabric selvedges between the time when the sinkers have been operated and the time when the dividers are to be operated.

11. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric and the other of said remaining yarns is held idle at the other selvedge of the fabric, the loops of a course being shaped by sinking the fed yarn between the needles by means of sinkers and dividers, the operation of the dividers taking place subsequently to the operation of the sinkers, the step of: extending the feed of the fed yarn and simultaneously moving the idle yarns over a number of needles outside the selvedges of the fabric after the operation of the sinkers but prior to the operation of the dividers.

12. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric and the other of said remaining yarns is held idle at the other selvedge of the fabric, the loops of a course being shaped by sinking the fed yarn between the needles by means of sinkers and dividers, the operation of the dividers taking place subsequently to the operation of the sinkers, the step of: extending the feed of the fed yarn and simultaneously moving the idle yarns over two needles outside the selvedges of the fabric after the operation of the sinkers but prior to the operation of the dividers.

13. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at the other selvedge of the fabric, the loops of a course being shaped by sinking the fed yarns between the needles by means of sinkers and dividers, the operation of the dividers taking place subsequently to the operation of the sinkers, the step of: extending the feed of the fed body and reinforcing yarns and simultaneously moving the idle body yarns over a number of needles outside the selvedges of the fabric after the operation of the sinkers but prior to the operation of the dividers.

14. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn bing fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at

the other selvedge of the fabric, the loops of a course being shaped by sinking the fed yarns between the needles by means of sinkers and dividers, the operation of the dividers taking place subsequently to the operation of the sinkers, the step of: extending the feed of the fed body and reinforcing yarns and simultaneously moving the idle body yarns over two needles outside the selvedges of the fabric after the operation of the sinkers but prior to the operation of the dividers.

15. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric, and the other of said remaining yarns is held idle at the other selvedge of the fabric, the fed yarn being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the steps of: arresting the feed of the fed yarn while the operation of the sinkers continues to completion, and then extending the feed of the fed yarn and simultaneously moving the idle yarns over a number of additional needles before the operation of the dividers commences.

16. In a method of widening selvedge fabric on flat knitting machines wherein at least three yarns are utilized for the formation of successive courses, each yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric while one of the remaining yarns is held idle at one selvedge of the fabric, and the other of said remaining yarns is held idle at the other selvedge of the fabric, the fed yarn being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the steps of: arresting the feed of the fed yarn while the operation of the sinkers continues to completion, and then extending the feed of the fed yarn and simultaneously moving the idle yarns over two additional needles before the operation of the dividers commences.

17. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric, while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at the other selvedge of the fabric, the fed yarns being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the steps of: arresting the feed of the fed body and reinforcing yarns while the operation of the sinkers continues to completion, and then extending the feed of the fed body and reinforcing yarns and simultaneously moving the idle body yarns over a number of additional needles before the operation of the dividers commences.

18. In a method of widening reinforced selvedge fabric on flat knitting machines wherein at least three body yarns and two reinforcing yarns are utilized in the formation of successive courses, each body yarn being fed in repeated sequence to needles from one selvedge to the other selvedge of the fabric, while one of the remaining body yarns is held idle at one selvedge of the fabric and the other of said remaining body yarns is held idle at the other selvedge of the fabric, one reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at one selvedge of the fabric, and the other reinforcing yarn being fed in conjunction with the three body yarns to reinforce a series of loops at the other selvedge of the fabric, the fed yarns being sunk by means of sinkers and dividers, the dividers operating subsequently to the operation of the sinkers, the steps of: arresting the feed of the fed body and reinforcing yarns while the operation of the sinkers continues to completion, and then extending the feed of the fed body and reinforcing yarns and simultaneously moving the idle body yarns over two additional needles before the operation of the dividers commences.

STERLING C. MACK.