

April 21, 1953

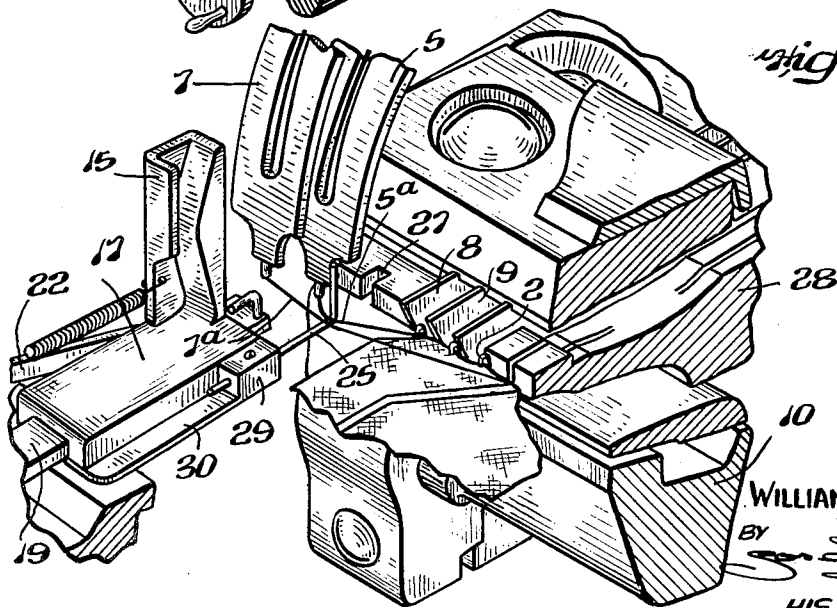
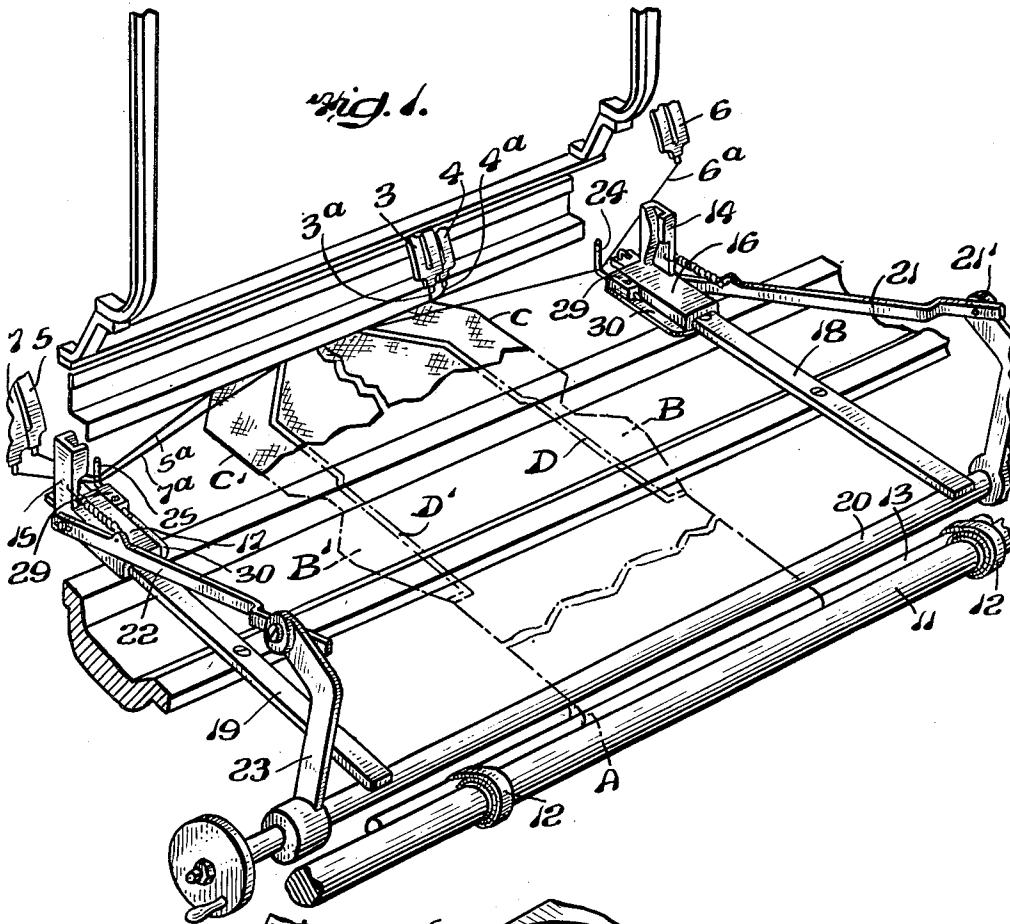
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2,635,442

KNITTING METHOD AND APPARATUS

Filed Nov. 21, 1950

2 SHEETS—SHEET 1



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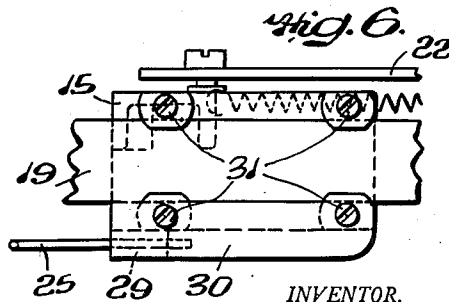
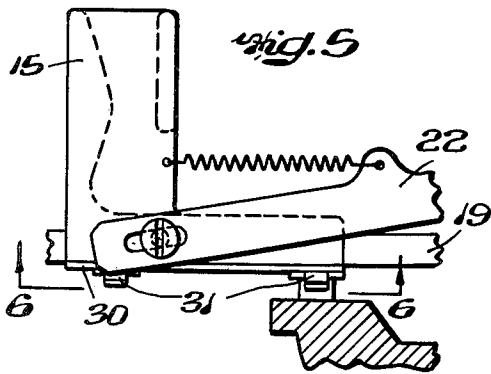
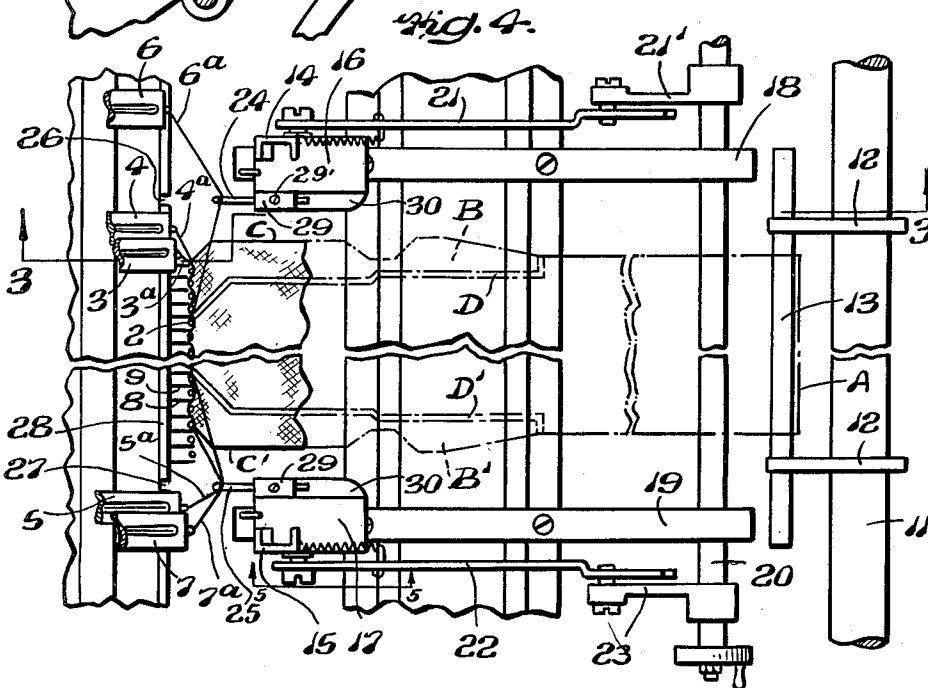
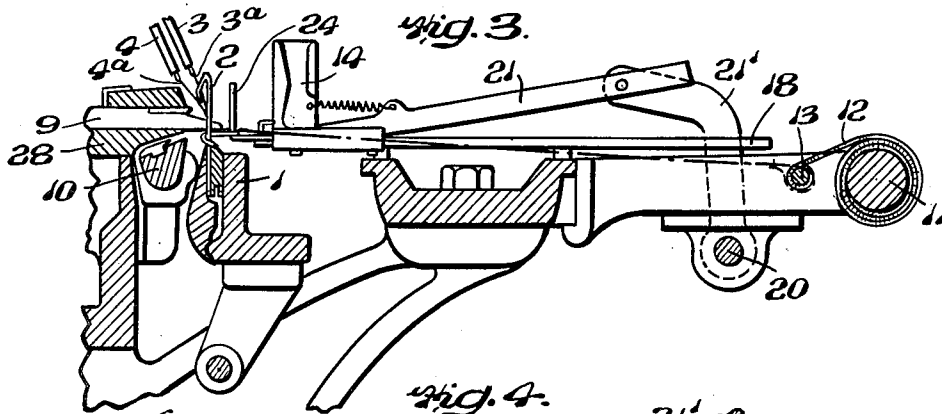
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2 SHEETS—SHEET 2



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2,635,442

KNITTING METHOD AND APPARATUS

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My invention is an improved method of and apparatus for knitting selvaged weft fabric in which certain of the courses of loops contain a greater number of yarns than subsequent courses of loops, and the leading objects of my invention are to obviate the impairment of fabrics and the retardation of production that have hitherto been incident to the reduction in the number of yarns used in certain courses of a fabric, and particularly full-fashioned hosiery blanks made on machines having a large number of knitting heads each having a bank of aligned needles, such as the Cotton type full-fashioned knitting machines.

In the knitting of full-fashioned hosiery blanks on standard types of full-fashioned knitting machines having a series of banks of en masse movable bearded needles, single or multiple yarns are laid along each bank of needles by a set of yarn carries complementary to the bank of needles and individually reciprocable along the beard side thereof. The respective carriers are mounted on carrier rods which may be selectively connected with friction boxes to place a given group of carriers in action and which when disconnected from the friction boxes may be shifted longitudinally to move the yarn carriers connected therewith laterally away from the respective knitting heads so that they are out of the way of the yarn carriers which are being reciprocated to lay yarns in a desired sequence and grouping along the needle banks.

Ordinarily one of the yarns fed by a main carrier is laid in substantially all the courses of a hosiery blank, and certain of the courses are reinforced by the laying of one or more auxiliary yarns so as to form foot reinforcements and clocks or borders. The auxiliary yarns may be laid wholly or partly across the width of a course and are knitted simultaneously with the knitting of the main yarn in such course.

When it is desired to provide a hosiery blank having heel and sole splicings having a border or other ornamental clock, and a reinforced toe, it is usual, in knitting the heel and foot section, to have in action a carrier for laying the main yarn, a pair of carriers for laying two supplementary yarns forming heel and sole reinforcements adjacent to the opposite selvages of the blank, and two additional carriers for laying two supplementary yarns for forming clocks or borders along or spaced from the respective heel and sole reinforcements. The reinforced toe is, however, usually knitted from the main yarn and one only of the supplementary yarns, and this necessitates shifting three of the supplementary yarn car-

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riers previously in action laterally away from each knitting head, thereby leaving leads extending from each such displaced carrier to the row or loops hanging on the needles. If the loops are knitted off the needles with the leads extending along the needle bank, the leads tend to become entangled with needles of the bank during their up-and-down-in-and-out motions, thereby pulling or breaking the yarns on the needles. On the other hand the stoppage of the machine while all the leads are cut between the selvages and carriers results in considerable loss of production. In accordance with my invention, as soon as the leads are laid by the lateral shifting of the carriers taken out of action they are simultaneously pulled forward in the form of a bight or loop extending away from the needle bank, and knitting may be immediately resumed and continued while the leads are so held and until they can be conveniently severed without any necessity for stoppage of the knitting machine.

The leads are simultaneously drawn away from the respective needle banks and held as bights or loops spaced therefrom by a series of hooks, which are mounted on slides or carriages movable on tracks transverse to the needle banks, and such slides or carriages are all connected with a shaft whose rotation simultaneously advances or retracts all of the slides with the hooks thereon. The slides and hooks are preferably advanced their maximum distance and seated in recesses in the press face of the sinker bed of the machine before the carriers are shifted out of action. Hence when the carriers are shifted laterally out of action the supplementary yarns fed thereby are laid in front of the hooks and the retraction of the hooks simultaneously draws the leads into bights extending outward from any position taken by the needles in their up-and-down-in-and-out movement in casting off the old and knitting a new course of loops.

The principles of my invention, and the best mode in which I have contemplated applying such principles will more fully appear from the following description and the accompanying drawings in illustration thereof.

In the drawings, Fig. 1 is a diagrammatic, fragmentary, perspective view of one of the knitting heads and adjacent parts of a full-fashioned hosiery knitting machine of the Cotton type having my improvements applied thereto; Fig. 2 is an enlarged diagrammatic, fragmentary perspective view illustrating one end of the knitting head shown in Fig. 1 with my improvements embodied therein; Fig. 3 is an irregular transverse sectional

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view taken along the line 3—3 of Fig. 4; Fig. 4 is a top plan view of the knitting machine head and adjacent members shown in Figs. 1, 2 and 3; Fig. 5 is a side elevation of a detail taken approximately on the line 5—5 of Fig. 4; and Fig. 6 is a bottom plan view of the detail shown in Fig. 5 and looking approximately in the direction of the line 6—6 thereof.

In the drawings there is illustrated a fragmentary portion of a usual type of full-fashioned hosiery knitting machine having the usual needle bar 1 carrying a bank of bearded needles 2. Carriers 3, 4, 5, 6 and 7 or more, are reciprocable when their carrier rods are connected with usual friction boxes to lay yarns 3a, 4a, 5a, 6a, 7a or more along all or any desired number of the needles 2. When the carrier rods are disconnected from the friction boxes they may be shifted rectilinearly to place the carriers connected therewith respectively at the sides of the knitting head.

As the yarns are laid they are kinked by the sinkers 8 and dividers 9 before being drawn through a previous course of loops by the movements of the needle bar 1 which is rocked in-and-out and moved up-and-down in the usual manner of knitting. The cast-offs loops are received by the usual knock-over bits carried by the pivoted bed 10.

A take-up roll 11 is journaled in the frame of the machine and is connected by straps 12 with a welt rod 13 over which the welt A of the stocking being knit is looped. The rotation of the take-up roll 11 draws the welt rod 13 and fabric connected therewith away from the bank of needles as the fabric is knit.

Brackets 14 and 15, projecting upwardly from slides or carriages 16 and 17 reciprocable on the rails or slideways 18 and 19 provide seats in which a welt bar (not shown) of an automatic welt turner may be seated and moved outward during the formation of the welt section. By rocking the journaled shaft 20 to which the slides are connected by the pivoted links 21, 21', 22 and 23, the carriages 16 and 17 may be advanced toward the needle bank after the welt bar has been removed.

In accordance with my invention, hooks 24 and 25 are connected with the respective slides 16 and 17 and are movable thereby forwardly into recesses 26 and 27 in the press face of the sinker bed 28, and may be retracted therefrom by the retraction of the slides so as to clear any possible position occupied by the needles 2 in their up-and-down-in-and-out movements.

The hooks 24 and 25 preferably consist of wire bent at right angles to provide vertical legs engageable in the recesses 26 and 27 and horizontal legs adjustably secured by set screws 29' in the bosses 29 of plates 30 secured by screws 31 to the bottom of the slides 16 and 17.

In the drawing there is shown a stocking knitted down to the beginning of the reinforced toe and in which the yarn 3a has been laid in the leg and foot, the supplementary yarns 4a and 5a have been laid along a number of needles at the opposite sides of the bank of needles 2 as to form the heel and sole reinforcements B, B' and C, C', and the yarns 6a and 7a have been respectively laid along a few needles at the opposite sides of the bank so as to form the clock borders D, D'.

Normally the slides 16 and 17 are positioned at the inner ends of the rails 18 and 19 with the vertical arms of the hooks 24, 25 seated in the recesses 26, 27 in the press face of the sinker

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head 28, and are moved forward at the beginning of a welt or at any time it is necessary to draw yarn ends away from the needles, pursuant to my invention. For example, upon completion of the last course which contains all of the yarns 3a, 4a, 5a, 6a, 7a and while the loops formed thereby are hanging on the needles, the rods on which the carriers 5, 6, 7 are mounted are disconnected from the friction boxes and shifted so as to position the carriers 5, 6, 7 at the sides of the knitting heads beyond the recesses 26 and 27 and spaced from the bank of needles. Such shifting lays the leads of the yarns 5a, 6a and 7a in front of the hooks 24 and 25 respectively. The shaft 20 is then rocked to move the slides 16 and 17 forward and cause the hooks 24 and 25 to leave the recesses 26 and 27 and engage the leads of the yarns, 5a, 6a, 7a and bend them into bights or loops lying well forward of any possible position where they might be engaged by needles. Knitting may be immediately resumed and continued while the leads of the yarns 5a, 6a and 7a are held by the hooks 24 and 25 and such leads may then be cut at convenience.

It will be understood that each knitting head of a multisection machine is provided with a pair of hooks and operating means therefor as above described and that all of the hooks are connected through slides and links as above described with the shaft 20, which extends the length of the machine so that the withdrawal of the leads may be effected simultaneously at all the knitting heads.

While my method is most effectively practiced by the utilization of the mechanism above described, it is possible to otherwise practice my method of welt knitting a selvaged fabric having reinforced areas on a bank of aligned needles by laying a plurality of yarns selectively along selected needles, knitting a course of loops therefrom, moving leads of certain of the yarns included in the course laterally away from the edges of the fabric or from the edges of the reinforced areas thereof, bending such leads into loops projecting outward away from the bank of needles and in the direction of take-up of the fabric, and immediately knitting further courses of the fabric from the remaining yarns while the looped leads are bent as loops which provide sufficient slack to permit considerable movement of the course to which the leads are connected toward the take-up roll without imposing any stress on the loops of such course. The loops formed in the leads may be sufficiently large to provide slack allowing sufficient take-up movement of the course to which the leads are connected to permit the completion of the toe of the stocking so that these leads, as well as the yarns 3a and 4a, may be cut after the knitting of the stocking blank has been completed, or at any convenient time theretofore.

Having described my invention, I claim:

1. In a knitting machine, the combination with a bank of knitting needles, yarn carriers movable along said needles for selectively laying a plurality of yarns along needles aforesaid, said yarn carriers being displaceable beyond the ends of said bank of needles, of hooks movable between the respective ends of said bank of needles and yarn carriers displaced therefrom, and means for simultaneously moving said hooks outwardly in a direction normal to the bank of needles to loop leads of yarn between said needles and displaced carriers.

2. In a knitting machine, the combination with

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a bank of needles, a sinker bed adjacent to said bank of needles, sinkers movable in said bed and between said needles, yarn carriers movable along said needles and sinkers to lay yarns selectively along needles aforesaid, said yarn carriers being displaceable beyond the ends of said bank of needles, hooks movable into juxtaposition to and away from said sinker bed between the last sinkers therein and displaced yarn carriers aforesaid, and means for moving said hooks in a substantially horizontal plane toward and away from the edge of said sinker bed.

3. In a knitting machine, the combination with a bank of needles, a sinker bed adjacent to said needles, sinkers movable in said bed and between said needles, said bed having recesses spaced from said sinkers, yarn carriers movable along said needles and sinkers to feed a plurality of yarns selectively to needles aforesaid, said yarn carriers being displaceable beyond the ends of said bank of needles, hooks movable toward and from said sinker bed and into the recesses therein, and means for moving said hooks toward and from said sinker bed.

4. In a knitting machine, the combination of a bank of needles, a sinker bed adjacent to said bank of needles, sinkers movable in said bed and between said needles, yarn carriers movable along said needles for laying multiple yarns selectively along needles aforesaid, said yarn carriers being displaceable beyond the ends of said bank of needles, rails extending transversely to said bank of needles, carriages reciprocable on said rails transversely to the length of said bank of needles, hooks carried by said carriages and movable thereby into juxtaposition to said sinker bed between the respective ends of the needle bank and yarn carriers displaced beyond the ends thereof, a rocking shaft, and links pivotally connecting said carriages with said rocking shaft to reciprocate said carriages.

5. In a knitting machine, a plurality of knitting heads each having a bank of needles and carriers movable along the respective banks for selectively laying yarns along certain needles of each bank, said carriers being displaceable beyond the ends

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of the respective banks of needles with which they are respectively associated, a hook movable toward and from the forward edge of each head and transversely to each needle bank and between an end thereof and a yarn carrier displaced beyond such end, and means for reciprocating said hooks in substantially parallel paths and substantially simultaneously.

6. A method of weft knitting a selvaged fabric having reinforced areas on a bank of aligned needles which comprises laying a plurality of yarns selectively along selected needles of said bank and knitting a course of loops therefrom, moving leads of certain yarns of said course laterally away from the edges of said fabric, bending said leads into loops projecting outward away from said bank of needles and out of the paths thereof, and knitting further courses of said fabric while said leads are bent as loops aforesaid.

7. A method of weft knitting a selvaged fabric having reinforced areas on a bank of aligned needles which comprises laying a plurality of yarns selectively along selected needles of said bank, some of said yarns being laid only along needles inward from the selvage, knitting a course of loops from said plurality of yarns, moving leads of the yarns laid along said inward needles only over the portion of the fabric between such needles and the selvage and away from such selvage, bending said leads into bights partly overlying said fabric and extending outward from said bank of needles, and knitting further courses from other of said first named yarns while said leads are bent as bights as aforesaid.

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