Jan. 28, 1964 N. MAYER 3,119,360

MACHINE FOR JOINING KNITTED FABRICS

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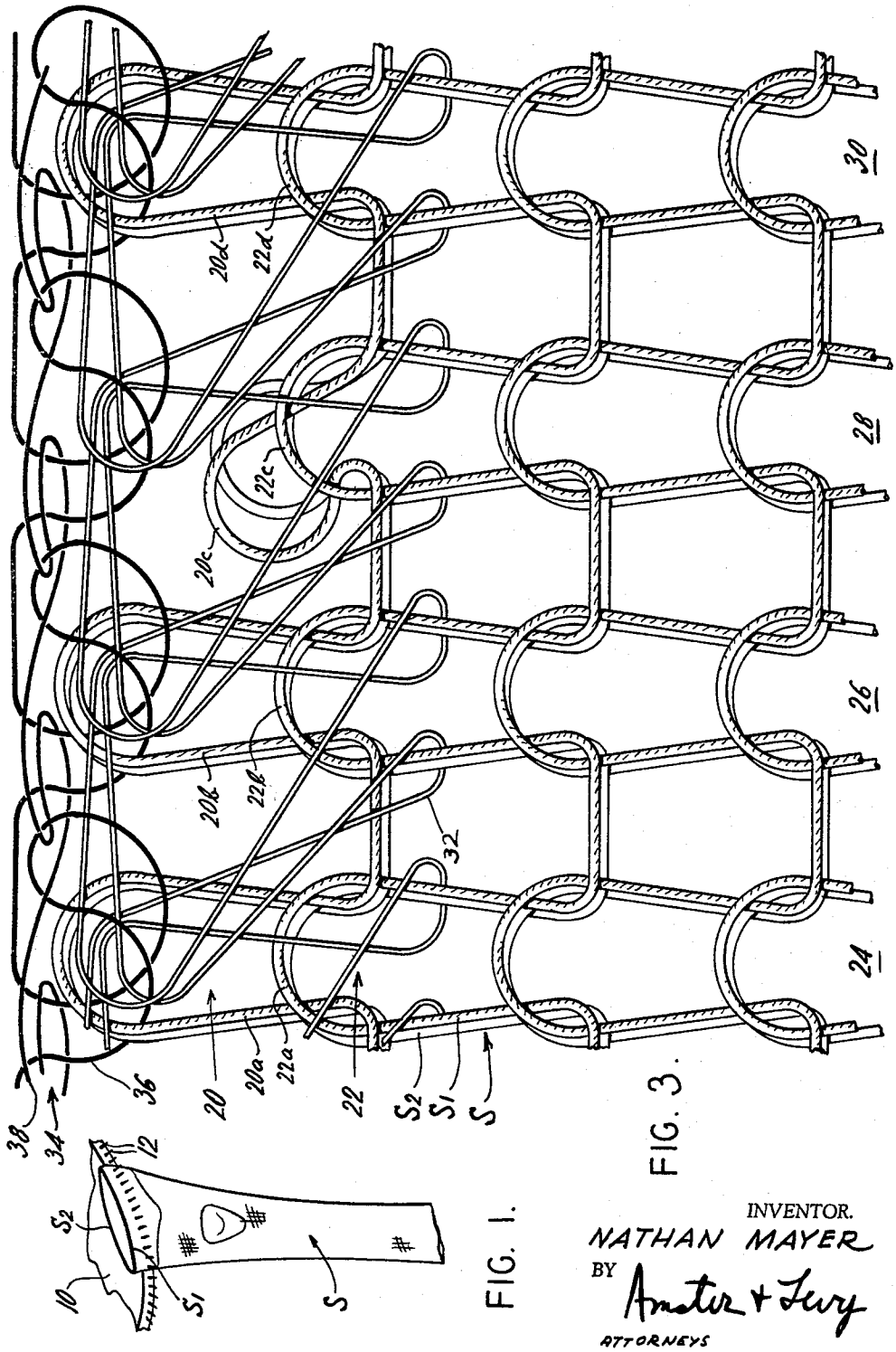


FIG. 3.

FIG. 1.

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MACHINE FOR JOINING KNITTED FABRICS

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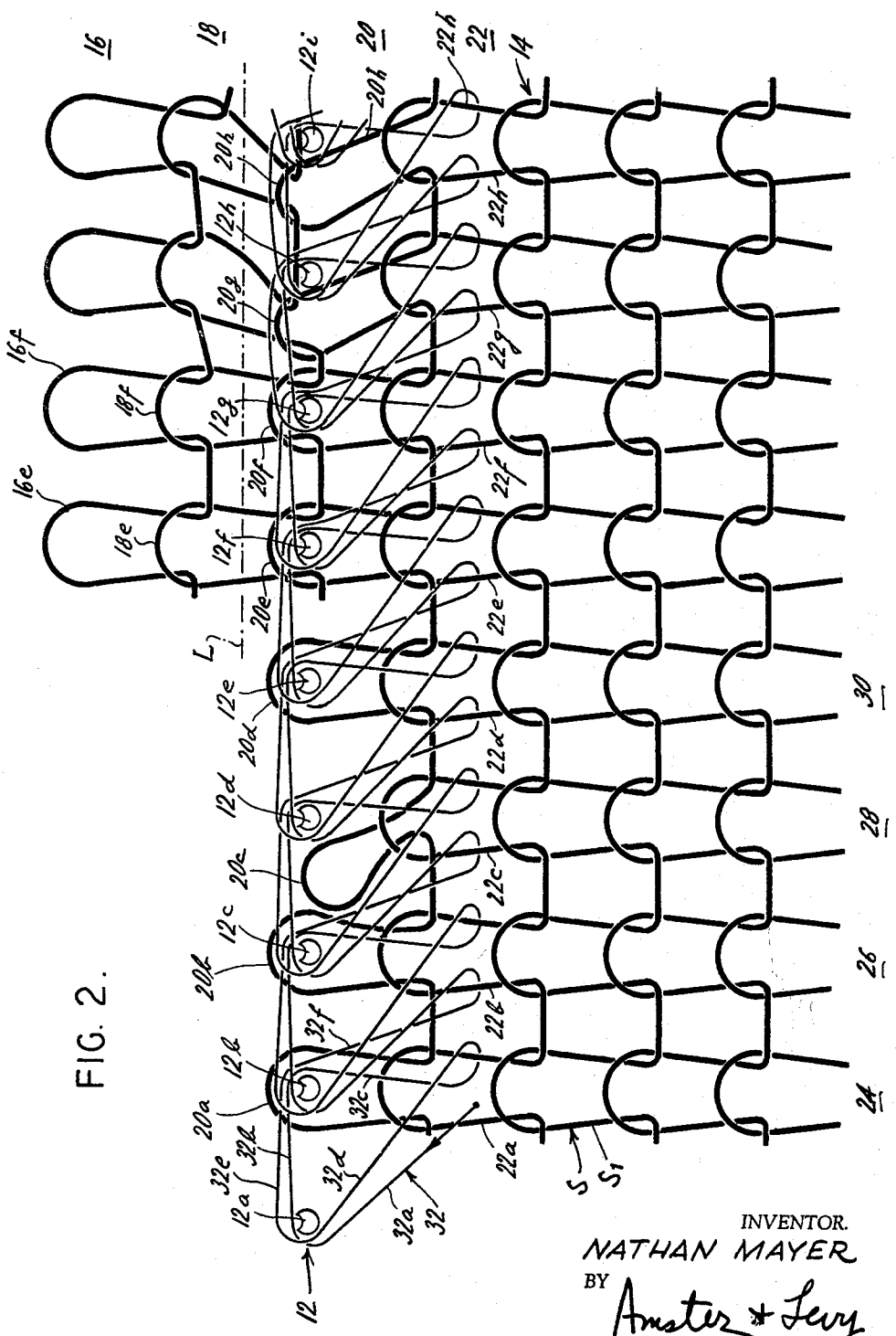


FIG. 2.

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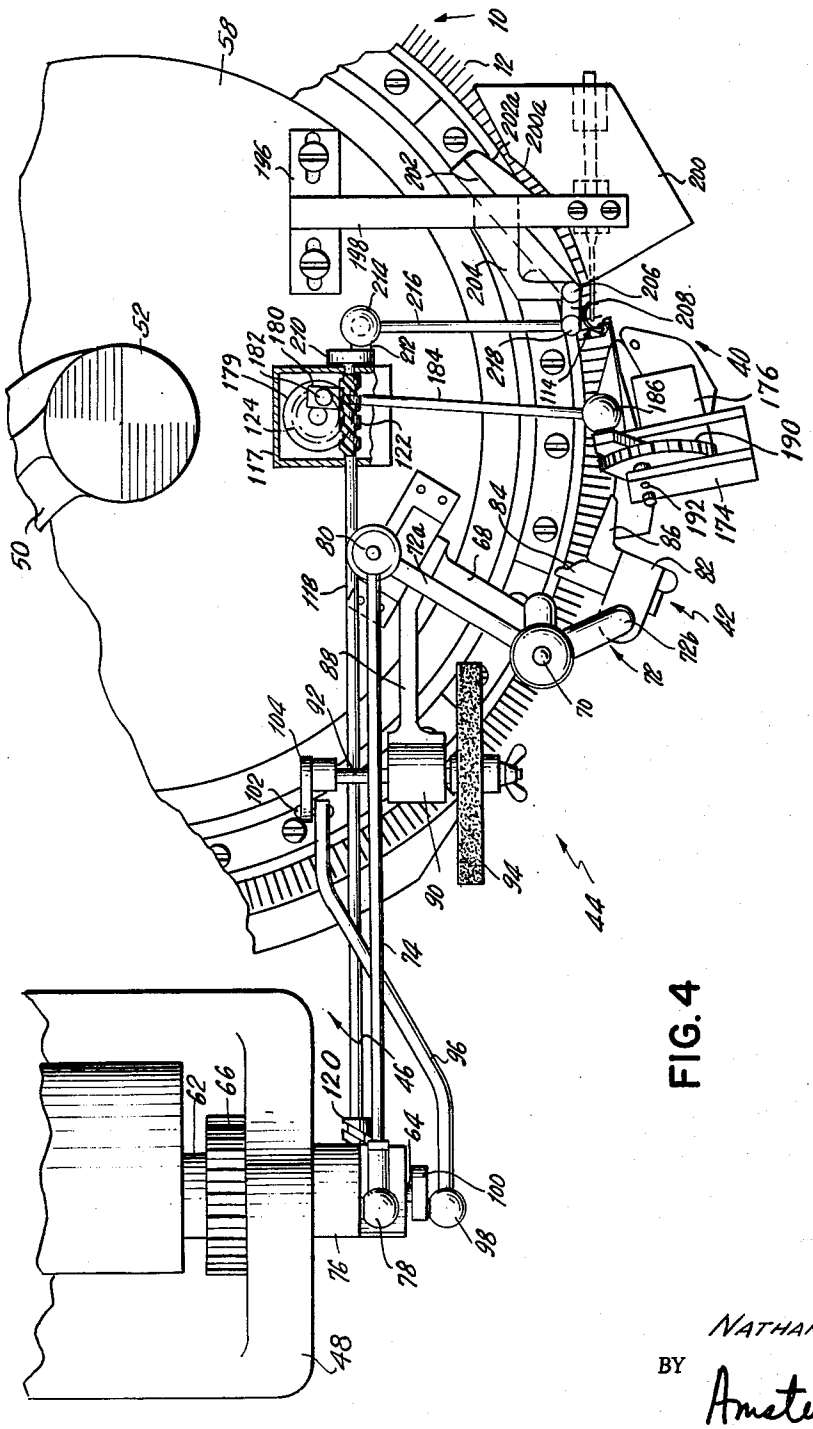


FIG. 4

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MACHINE FOR JOINING KNITTED FABRICS

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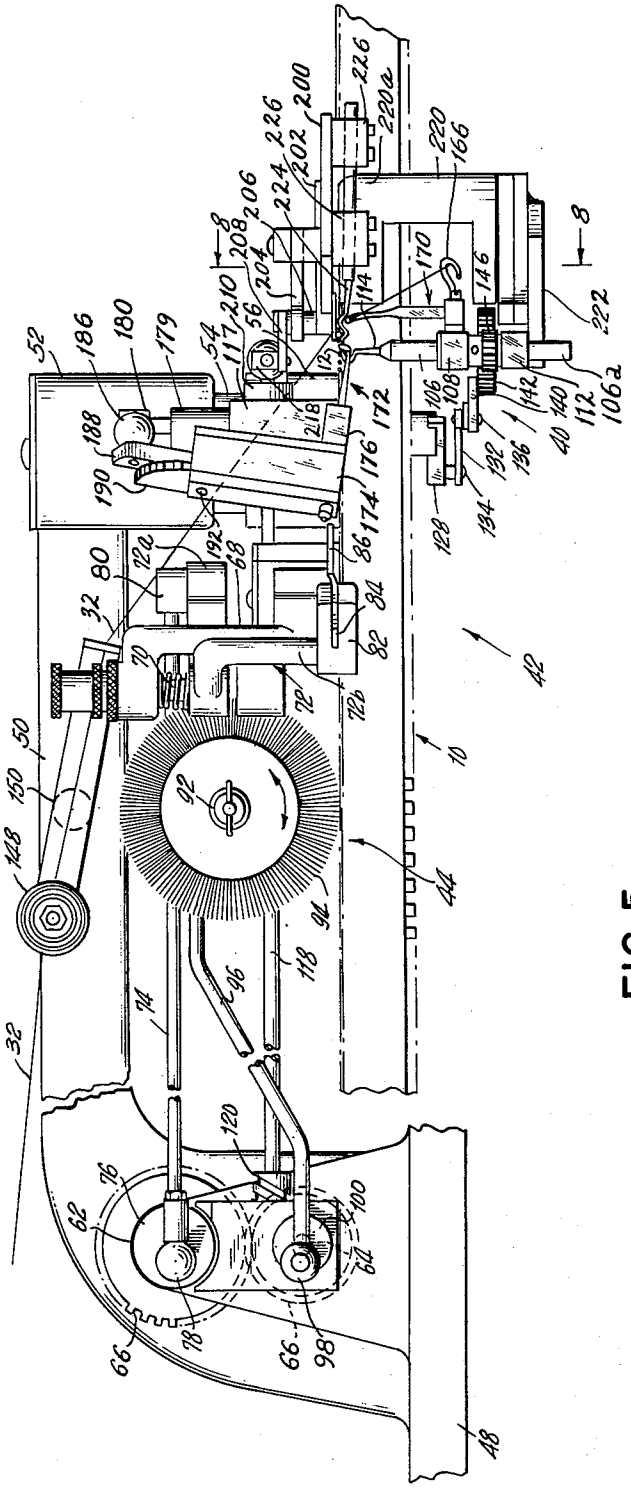


FIG. 5

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Jan. 28, 1964 N. MAYER 3,119,360

MACHINE FOR JOINING KNITTED FABRICS

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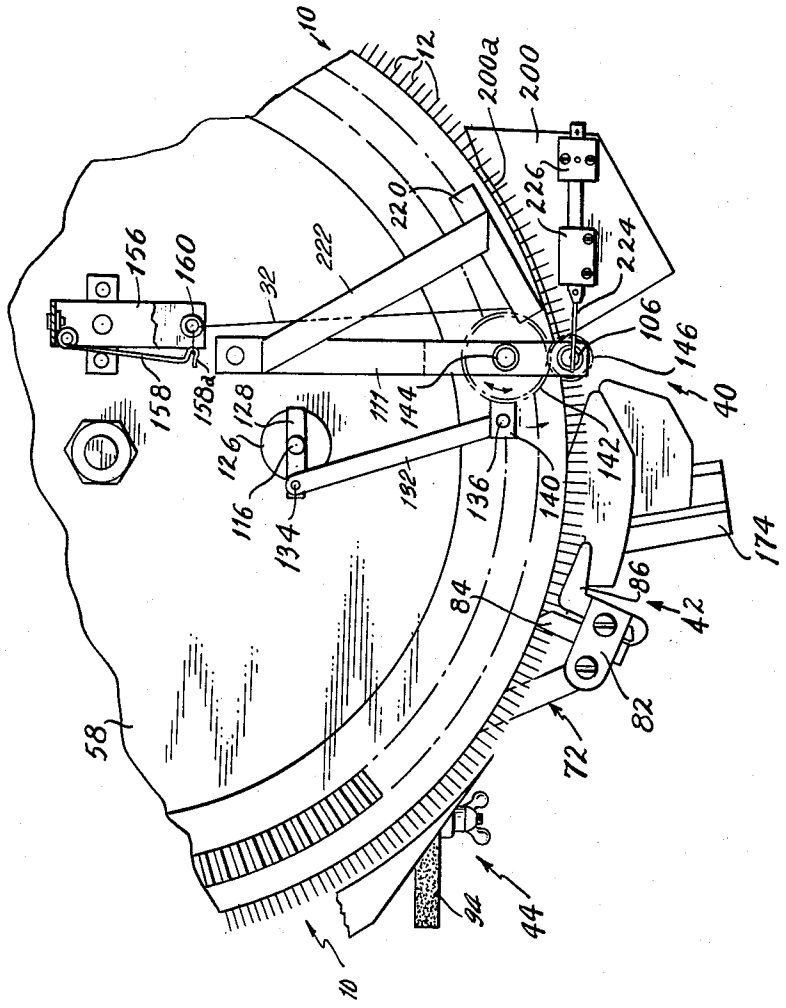


FIG. 6

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MACHINE FOR JOINING KNITTED FABRICS

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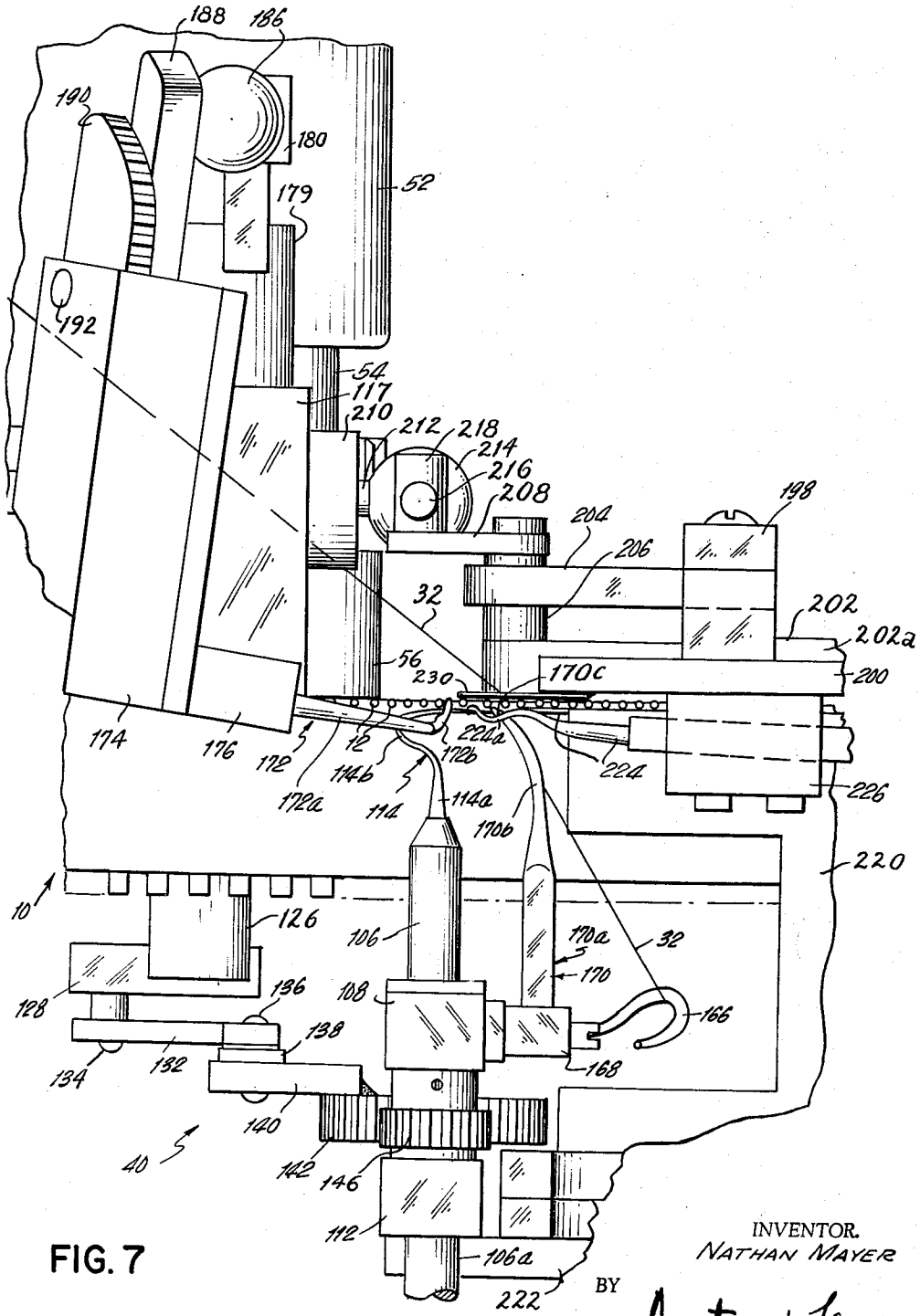


FIG. 7

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MACHINE FOR JOINING KNITTED FABRICS

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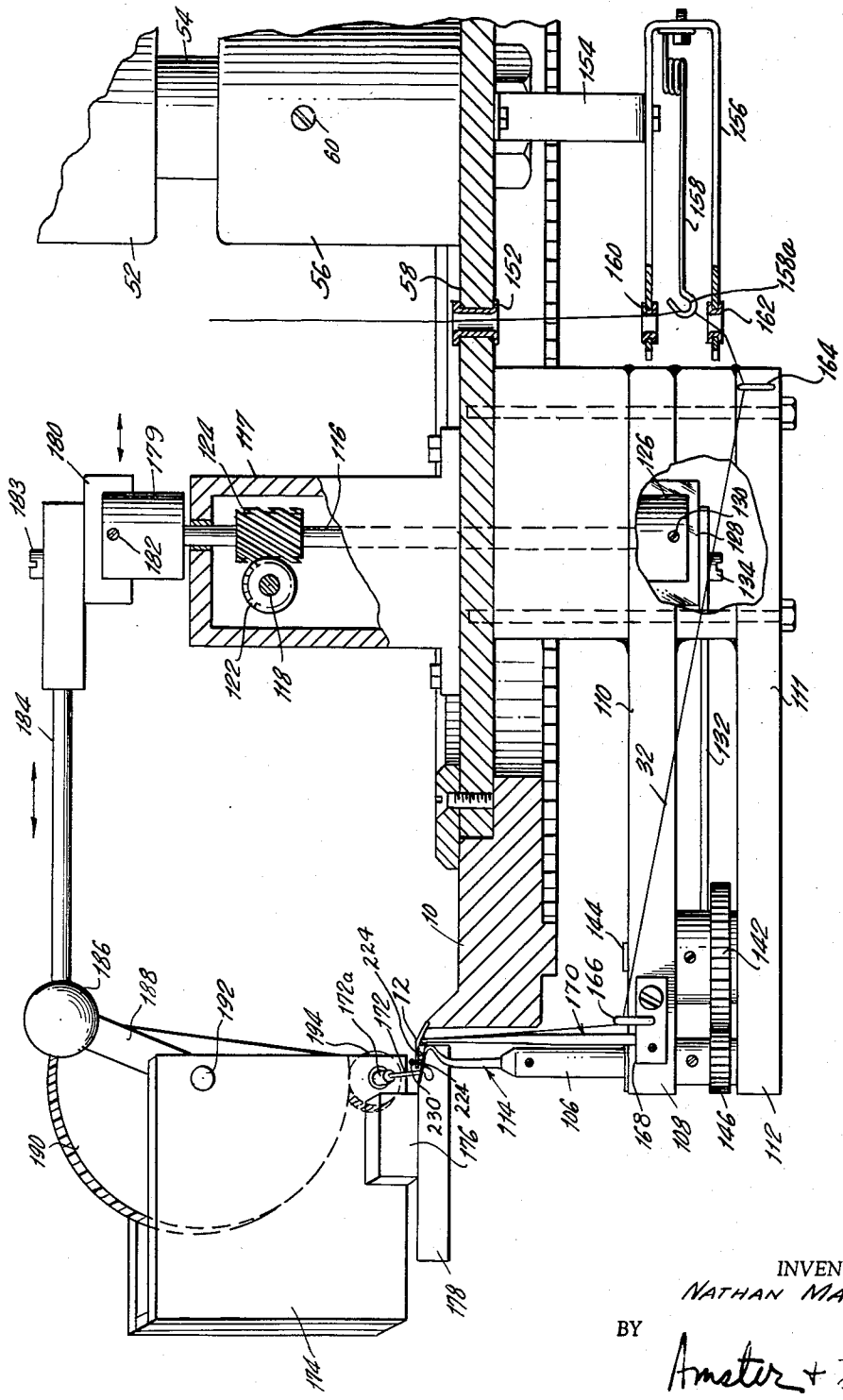


FIG. 8

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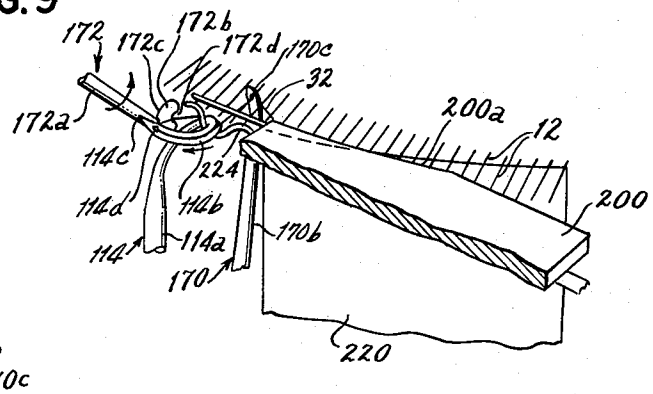
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FIG. 9



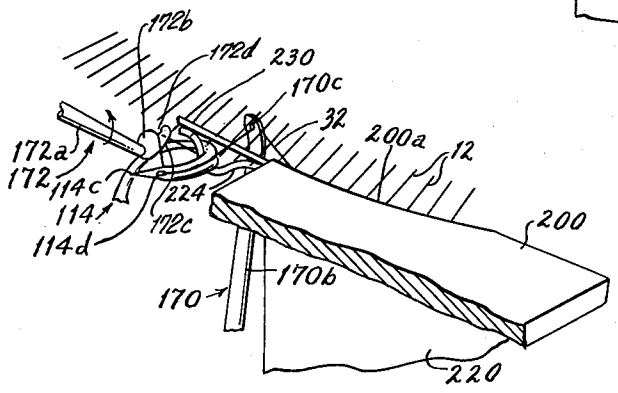


FIG. 10

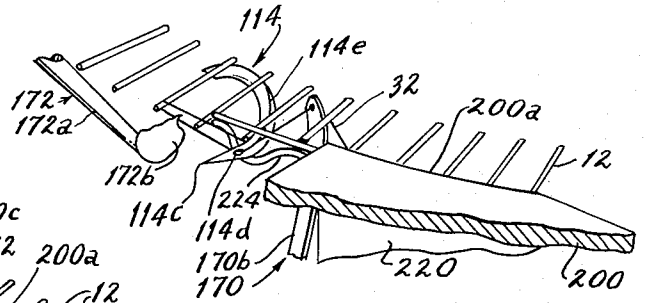


FIG. 12

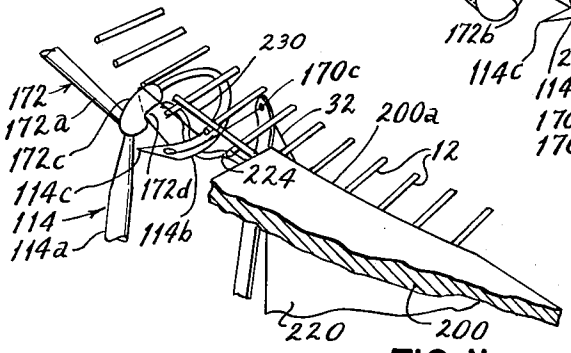


FIG. 11

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Jan. 28, 1964 N. MAYER 3,119,360

MACHINE FOR JOINING KNITTED FABRICS

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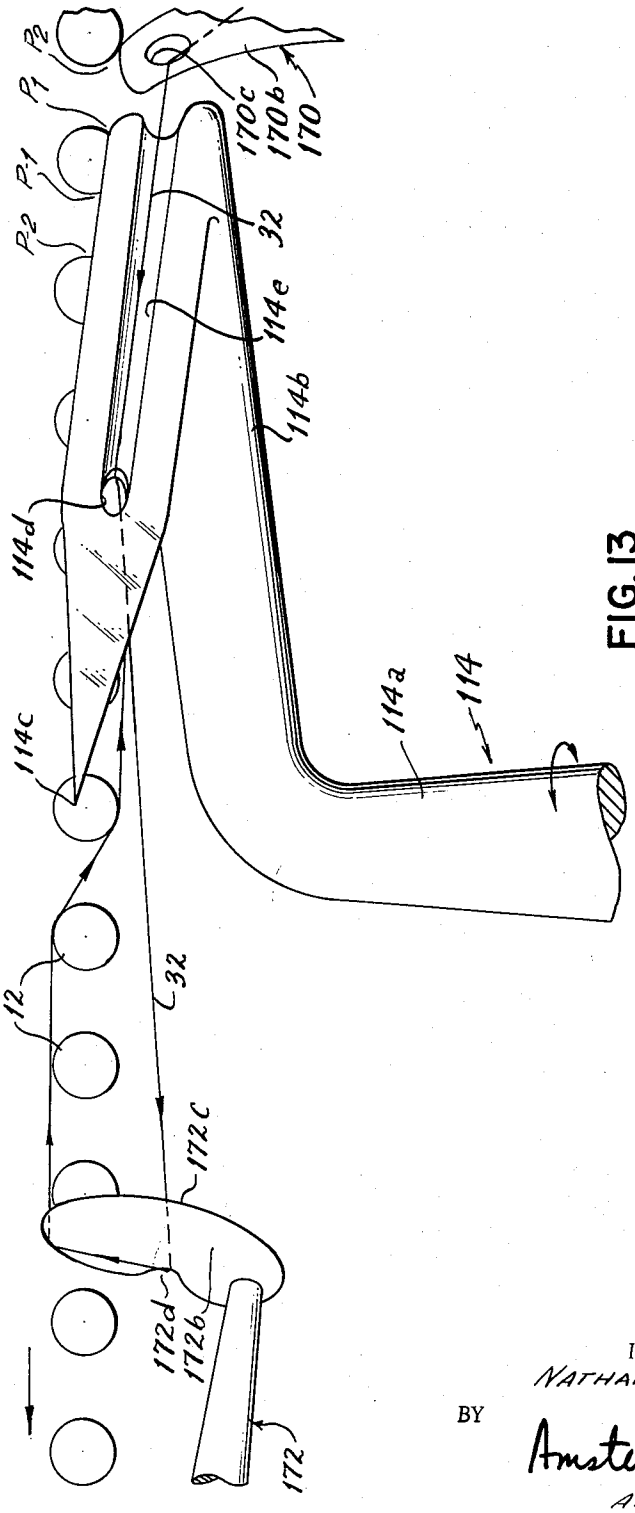


FIG. 13

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United States Patent Office 3,119,360
Patented Jan. 28, 1964

3,119,360
MACHINE FOR JOINING KNITTED FABRICS

Nathan Mayer, 5 Spring Road, Yonkers, N.Y.
Filed Oct. 2, 1961, Ser. No. 142,255
6 Claims. (Cl. 112—25)

The present invention relates generally to the joinder of circular knitted fabrics, and in particular to an improved method and means for hingedly interconnecting superposed marginal portions of a knitted fabric. My invention finds particularly useful application in the manufacture of seamless stockings of circular knit fabric. This is a continuation-in-part of application Serial No. 82,891, filed January 16, 1961.

As is generally understood, seamless stockings and similar knitted fabrics in tubular form are manufactured on a circular knitting machine having a relatively large number of needles arranged about the circumference of the machine head. The resulting elemental tubular stocking includes many hundreds of circumferential courses of loops, with the loops being chained together longitudinally of the stocking along successive circumferentially spaced and longitudinally extending wales. The seamless stocking is then completed by closing the toe opening at one end of the stocking.

In order to close the toe opening, it is the practice to employ a looping machine of the type including a rotary dial or disc having a series of radially-projecting points about the periphery thereof onto which the raw-edged superposed marginal portions of the partially completed stocking about the toe opening are impaled for joinder. As the dial or disc is rotated, the superposed marginal portions impaled upon the points are carried to stitching mechanisms which are adapted to form a looping chain through the impaled loops of the stockings. The mechanisms which form the looping chain include a needle carrying a needle thread which cooperates with each successive point and a looper carrying a looper thread which steps through the needle thread and returns to the rear thereof such that the needle and looper threads are chained together to form the looping chain. Further means are provided in advance of the stitching mechanisms to cut off the excess material above the loops impaled on the points along the looping course which excess material is in the form of a number of selvage courses. Means may also be provided to remove the cut loops contiguous to the looping line.

In the use of this type of looping machine a relatively highly skilled operator is employed to place a single line of loops along a looping course or impaling line on the points of the dial such that each loop along the looping line is impaled on a single point, with successive loops being impaled on successive points in precise order so that none are missed and such that each point is covered by a loop. The impaling operation is continued so that each loop together with its mating loop on the overlying marginal portion is properly impaled over a single point in precise order. For example, if a stocking has four hundred loops along the looping course and about the circumference thereof, it is necessary for the operator to impale two hundred pairs of loops on the points, no more, no less, without missing a point. This rather tedious, time consuming and precise operation is somewhat facilitated by the knitting of a looping line into the stocking. The looping line or course is recognized in that it is composed of slightly larger loops which are formed by decreasing the interstices between adjacent loops such as to make the looping course or lines visible. Such looping line or course is provided approximately 12 to 15 courses before the end of the nylon fabric, with a number of lines or courses of cotton being provided thereafter such that the operator may handle the stocking with comparative

ease. It should be appreciated however that these courses outwardly of the looping line represent selvage and are ultimately removed. Needless to say a high order of accuracy and care is required in the impaling of the loops on the points. The process is inherently an expensive one in that it requires substantial time to train a looper and the employment turnover is often high due to eye fatigue and the necessity of using women with incident losses due to pregnancy, marriage and the like. The very critical nature of the work will be appreciated in that a loop which is not properly impaled upon a point along a prescribed wale of the stocking will ultimately represent a source of a run, unless corrective steps are taken in subsequent processing of the stocking to preclude the occurrence of such run.

It is broadly an object of the present invention to provide an improved machine for looping contiguous edges of knitted fabrics, such as the edges of a toe opening of a seamless stocking, which obviates one or more of the aforesaid difficulties.

It has been suggested that it may be possible to join together the superposed or doubled half-edge portions of a toe opening of a stocking without strict regard as to the seriatim impalement of loops on points along a prescribed looping course, and yet be able to provide a useful joinder. To this end, the prior art teaches the joinder of the half-edged portions of the toe opening of the stocking by an auxiliary yarn which is stitched through the half-edged portions of the toe opening outwardly of and along the circumferential or transverse course which is impaled upon the points. The auxiliary thread stitched through the selvages course between the points and the rough edge of the superposed margins cooperates with the looping chain normally formed along the line of impaled loops to join together the superposed portions about the toe opening. Since such auxiliary thread occupies a number of courses outwardly of the looping or impaling line, which courses heretofore have been removed in that they represent selvage, it is no longer possible to remove those selvage courses through which the auxiliary thread passes without also removing the auxiliary thread. Normally the looping chain should join together superposed and registering loops along the looping line, with all material outwardly thereof removed, such that when the looping chain effectively serves as an unobstructed hinge, the optimum condition is that the fabric even along the line of joinder, should assume the character of a single knitted fabric wherein adjacent loops are joined together in a neat and precise manner, with virtually no bulk to interfere with the hinging action. Since in this prior art arrangement, the auxiliary thread occupies one or more selvage courses outwardly of the line of impalement, it is not possible to remove all of such selvage courses outwardly of the ultimate line of joinder and there results a somewhat bulky rolled seam. Even if the bulk of the rolled seam and its general unclean or fuzzy appearance due to entrapped cut threads rolled therein were not of themselves sufficient to preclude widespread commercial acceptance of this method of looping, there is still a further and perhaps more serious drawback in this prior art proposal. Specifically, the placement of the auxiliary thread along one or more selvage courses outwardly of the looping line does not effectively preclude the occurrence of runs. The location of the auxiliary thread does not preclude the possibility of a missed loop running along a particular wale of the stocking. Even though the possibility of running is somewhat reduced by the rolling in of missed loops along the line of joinder, this attempt at entrapment still does not give this proposal the necessary positive assurance for commercial acceptance.

It is a further object of the present invention to provide

an improved joinder apparatus for the superposed marginal portions of a knitted fabric which minimizes the possibility of runs incident to the less than perfect engagement of fabric loops on the points of a looping machine. Specifically, it is within the contemplation of the present invention to provide an improved means of joining margins of a toe opening in a seamless stocking which reduces the need of a high order of skill on the part of the operator, enables the manufacture of the joinder without perfect point by point engagement of fabric loops on points, virtually eliminates the possibility of a missed loop representing a source of a run, and substantially reduces the tedium incident to impaling the loops upon the points.

I have found that a barrier thread may be placed along a barrier course inwardly of the looping chain which joins the superposed marginal portions of the knitted fabric together. The barrier thread is picked up and locked into the looping chain and is located such that if reasonable care is exercised in impaling the loops on the points, a substantially run-free joinder is provided between the superposed marginal portions.

In accordance with an illustrative embodiment demonstrating objects and features of the present invention, there is provided a looping machine for hosiery of the type having superposed looping courses which are hingedly interconnected. The machine includes a rotary dial having radially extending and circumferentially disposed dial points over which said looping courses are adapted to be impaled manually. The rotary dial is mounted for rotary movement about a vertically extending dial axis. At a first circumferential location, means are provided for cutting the selvage of said hosiery above said looping course which is impaled on said dial points. A drive rotates said dial and operates the cutting means at said first location. The improvement in accordance with this invention comprises stitching mechanisms in advance of said first circumferential location for introducing a barrier thread along at least said superposed looping courses. Said stitching mechanisms include a needle having a stem and a curved body terminating in a needle point and means operatively connected to said stem and mounting said needle body for rocking movement about a needle-rocking axis to advance said needle point along a penetrating stroke disposed in relation to successive dial points to advance said barrier thread through said hosiery and into a pickup position outwardly thereof. A thread lifter is provided which has a lifter stem and a lifter body and means are operatively connected to said lifter stem and mount said lifter body for rocking movement about a lifter-rocking axis extending angularly of said needle rocking axis to advance said lifter body inwardly toward and between successive dial points. The lifter body engages said barrier thread in said pick-up position for impaling said barrier thread over said dial points. Respective actuating means are controlled from said drive for rocking said needle and said thread lifter in timed relation to each other and to the rotation of said dial.

The above brief description, as well as further objects and advantages of the present invention will be more fully appreciated by reference to the following detailed description of presently preferred, but none the less illustrative apparatus in accordance with the present invention, when taken in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view showing a small segment of the disc or dial of a typical looping machine having superposed marginal portions of a circular knitted fabric impaled on the points thereof;

FIG. 2 is a diagrammatic showing of a typical knitted fabric as it might be impaled along the looping course or line on the points of the disc or dial of the looping machine, with the path of the barrier thread being illustrated about a number of successive points;

FIG. 3 is an enlarged fragmentary plan view of the two superposed marginal portions of a knitted fabric joined together in accordance with apparatus aspects of the present invention;

FIG. 4 is a top plan view of a looping machine modified to include a barrier-stitching mechanism or station for introducing a barrier thread in accordance with the present invention;

FIG. 5 is an elevational view of the looping machine shown in FIG. 4, with parts broken away;

FIG. 6 is a bottom plan view, with parts omitted in the interest of clarity, of the looping machine showing in particular the details of the stitching mechanisms or station;

FIG. 7 is an enlarged elevational view of the circumferential location of the looping machine at which the barrier-stitching mechanisms or station is located;

FIG. 8 is a sectional view, on an enlarged scale, taken substantially along the line 8—8 of FIG. 5 and looking in the direction of the arrows;

FIG. 9 is a fragmentary perspective view showing the relationship of the dial points, the needle having the barrier thread, and the thread lifter at the beginning of a barrier-forming cycle;

FIG. 10 is a perspective view similar to FIG. 9, but showing the needle substantially at its fully penetrated position and illustrating the pick-up of the barrier thread by the thread lifter;

FIG. 11 is a perspective view similar to FIG. 10, but showing the needle at the start of its return or back stroke and the thread lifter in position to drop off the barrier thread onto several adjacent dial points;

FIG. 12 is a perspective view similar to FIG. 11 showing the barrier thread after engagement onto the dial points after drop-off by the thread lifter, with the needle being shown in its return or back stroke; and,

FIG. 13 is an enlarged fragmentary elevational view further showing the relationship between the needle, the thread guide, the dial points, and the thread lifter.

Preliminary to a detailed description of the apparatus aspects of the present invention, it may be best to describe the construction of a typical piece of tubular or circular knitted fabric and the general operation of the looping machine as improved in accordance with the present invention. For the sake of convenience, one superposed marginal portion S_2 of the fabric S is removed in FIG. 2, leaving only the marginal portion S_1 which includes plural transversely or circumferentially extending courses of loops, four typical courses being designated by the reference numerals **16**, **18**, **20** and **22**. These circumferential courses of loops are linked together lengthwise of the circular or tubular knit fabric by longitudinally-extending wales, four typical wales being generally designated by the reference numerals **24**, **26**, **28**, **30**. Each of the wales includes longitudinally aligned loops of successive courses chained together along the length of the tubular fabric. It should be appreciated that there are many hundreds of loops about any one circumferential course and many thousands of loops along the wales of the tubular knitted fabric. Each loop (i.e. loop **16***e* along course **16**) includes opposed legs interconnected by a bight and is connected to the next adjacent loop (i.e. loop **16***f* along course **16**) to provide an interstice between the loops **16***e* and **16***f*. Of course the loops are chained together longitudinally (i.e. loop **16***e* being chained through the adjacent loop **18***e* of course **18**). Upon trimming the fabric (i.e. as represented by the cutting line L) for example incident to closing the toe opening of the seamless stocking S, the loops along the wales will be free to run unless positive provision is made to preclude disengagement of successive loops along a wale. This is accomplished by appropriately finishing the marginal edges to confine the loops against running through the provision of a joinder in the form of a looping chain which results in an articulated interconnection between the loops along such marginal

edges. For the sake of convenience, the circumferential courses of loops 16, 18 will be considered to be representative of the approximately five or more selvage courses which are to be removed before the linking together by the looping course 20. Such looping course will be identifiable in an actual stocking in that it includes loops that are somewhat larger than the loops of other courses. The looping course is usually located approximately five courses inwardly from the end of the nylon, there being other courses of cotton knitted into the fabric outwardly of these five selvages courses of nylon to facilitate handling.

Continuing reference will now be made to the diagrammatic showing of FIG. 2 for a description of a typical method of impaling loops on the points 12*a* to 12*i* inclusive of the looping dial 10 which points have been shown on a somewhat reduced scale as compared to the size of the loops (i.e. loops 20*a*) in order to more clearly disclose the invention. Normally however, it will be appreciated that the points (i.e. point 12*b*) are tightly engaged by the loops (i.e. loop 20*a*); and that on each one of the points there will be impaled a mating pair of loops, one behind the other in that the superposed marginal portions S_1, S_2 of the stocking S are concurrently impaled on successive points. Only one of the superposed marginal portions S_1 of the circular knitted fabric is shown in FIG. 2, although it is to be observed that both superposed marginal portions S_1, S_2, are shown in FIG. 3, with the rear marginal portion S_2 slightly offset to the left for the purposes of illustration. As seen in FIG. 2, there has been an attempt to impale the loops 20*a* to 20*h* along the looping course 20 on the points 12*b* to 12*i* of the dial-type looping machine. The condition shown in FIG. 2 may be considered to be illustrative of that which may be encountered with a fairly skilled operator using a reasonable measure of skill to impale the successive loops on the points. This illustrative condition is typical of what will occur in the less than perfect loop impalement and can be tolerated in accordance with apparatus aspects of the invention. However, it is to be noted that the operator cannot completely disregard the necessity of attempting to attain point by point impalement. If the operator takes reasonable precaution in stretching the fabric as the impalement is achieved to avoid the situation where a whole group of loops are forced between adjacent points, the impalement will be sufficiently accurate to achieve a useful end product in accordance with the invention. In this typical, but nonetheless illustrative example, the loop 20*c* along the looping course was not impaled on the point 12*d* of the dial 10 of the looping machine; and similarly, the loops 20*g*, 20*h* were not impaled on the points 12*h*, 12*i*. Normally, and in the absence of the positive barrier provided in accordance with the present invention, there would be a run along the wale 28 where the loop 20*c* was not impaled upon the point 12*d* and further runs along the wales containing loops 20*g*, 20*h*.

In accordance with the present invention, a barrier-inserting station 40 is provided at a first circumferential location at which a barrier thread 32 is introduced to join together the superposed margins S_1, S_2 along a barrier course 22 at the side of the looping course 20 remote from the rough edges and the several selvage courses 16, 18. The barrier thread 32 also is looped about the successive points 12*a* to 12*i* of the dial 10 of the looping machine. The barrier 32 is introduced by means of a curved needle, to be described, which penetrates the stocking S along the barrier course 22 (one course below the line of impalement or looping course 20) and is dropped over the points 12. The barrier thread 32 penetrates the stocking or other knit fabric at least two times for each loop along the looping course 20. In that the barrier thread 32 penetrates the knitted fabric below the points 12*a* to 12*i*, it must of necessity lock a missed loop (i.e. loops 20*c*, 20*g*, 20*h*) from running below the level of the barrier course 22 which is immediately contiguous to the looping course 20. Any missed loops along successive longitudinally extending wales (i.e. wale 28) have the barrier thread 32 running through the same. The barrier thread is looped around the points and accordingly is locked along the looping course 20 by the looping chain 34 which is stitched in along the looping course 20 at a loop-chaining station 46, as is generally understood and as will subsequently be described in conjunction with FIG. 3. The barrier thread 32 traverses the point by pairs (i.e. points 12*a*, 12*b* as a first pair, points 12*b*, 12*c* as a second pair, etc.). There is sufficient slack in the barrier thread after removal from the points such that excellent hinging of the superposed marginal portions or sections S_1, S_2 may be realized when the stocking or tubular knitted fabric is removed from the points and allowed to be restored to a flattened condition wherein the superposed margins are substantially coplanar in the region of the line of joinder.

A typical course for the barrier thread 32 in relation to several points 12*a* to 12*c* and several loops 20*a* to 20*h* will now be described in detail to further facilitate an understanding of its function and purpose. Specifically, the barrier thread 32 (insofar as the loop 22*a* along the barrier course 22 is concerned) penetrates the loop 22*a* inwardly of the left leg thereof and includes a first pass or segment 32*a* which passes upwardly and to the left about the point 12*a*. The thread 32 then has a further pass or segment 32*b* which passes from the point 12*a* to the point 12*b* in the next adjacent loop 20*a* along the looping course 20. The barrier thread then has a pass or segment 32*c* which passes downwardly and over the bight of the loops 22*a*, re-enters the loop 22*a*, and is wrapped around the right leg thereof. The barrier thread 32 after it passes around the right leg of the loop 22*a* includes a further pass or segment 32*d* which passes upwardly towards the point 12*a*, in the same general direction as the pass 32*a*, and about the point 12*a*. The barrier thread 32 then has a segment 32*e* which passes from the points 12*a* about the point 12*b* along a path substantially coextensive with the segment 32*b*. After passing about the point 12*b*, the barrier thread includes a pass or segment 32*f* which crosses the interstice between the loops 20*a*, 20*b* along the looping course 20 and crosses the interstice between the loops 22*a*, 22*b* where it is wrapped about the left leg of the next adjacent loop 22*b* along the barrier course 22. This completes the traverse of the barrier thread 32 in relation to the first pair of points 12*a*, 12*b* and thereupon the barrier thread provides two similar turns in relation to the points 12*b*, 12*c* and the corresponding fabric loops. In this fashion, the continuous barrier thread 32 is worked into successive loops 22*a*, 22*h* along the barrier course 22 and is impaled over the successive points 12*a*, 12*i*, with two passes or turns of the barrier thread over each pair of the points as described.

The dial 12 slowly rotates to remove the impaled stockings from the location or station 40 where the automatic mechanisms are provided to engage the barrier thread 32, as will be described. Thereupon, the superposed marginal portions S_1, S_2 of the stocking S with the barrier thread 32 engaged move on to a second circumferential location or selvage-trimming station 42 where, preliminary to forming the looping chain 34 along the looping course 20, the selvage portions outwardly of the looping course 20 are removed. The cutting away of such selvage portion is illustrated diagrammatically in FIG. 2 by the cutting line L, it being appreciated that the selvage rows 16, 18 are present at the location or station 40 where the barrier thread is engaged, although this impression may not be derived from the illustrative and diagrammatic showing of FIG. 2. If it be considered that the knitted fabric is moving from right to left in FIG. 2 and that the barrier thread 32 is engaged at a location or station somewhat to the right side of FIG. 2, the removal of the

selvage courses 16, 18 at the selvage-trimming station 42 will be better understood.

After the selvage courses are removed by cutting along the line L across the legs of the loops along the selvage course 18, the cut portions of the loops which remain between the impaled loops on the points are brushed away, at a third circumferential location or brushing station 44, leaving the fabric loops along the looping course 20 impaled upon the points, and of course, the associated barrier thread loops. For example, it will be appreciated that when the loops 18*e*, 18*f* are cut across, a part of the right leg of the loop 18*e* and the left leg of the loop 18*f* and the interconnecting portion thereof will be still engaged between the loops 20*e*, 20*f* impaled respectively on the points 12*f*, 12*g*. It is such uncut loops that are brushed away at the brushing station 44 after cutting away of the selvage portions.

At the loop-chaining station 46 of the machine, the looping chain 34 is engaged along the looping course 20 to connect together the successive superposed loops and lock the turns of the barrier thread 32 along the looping course 20. The barrier thread 32 and the further stitching 34 together hingedly interconnect the loops along the looping course 20. The chained loop 34 includes a looper thread 36 and a needle or locking thread 38 which are interlocked by stitching mechanisms, as disclosed in detail in the aforesaid patents. When the confronting or aligned pairs of mating loops are impaled upon the points as shown in FIG. 3 at the first, second and fourth pairs of loops, the interlocking looper and needle thread 36, 38 hingedly interconnect such pairs of mating loops and at the same time lock the several turns of the barrier thread 32 together along the same course or line. When however, a pair of mating or registering loops are not impaled upon the points, as shown for the third pair of loops in FIG. 3, the looper and needle threads 36, 38 of the looping chain 34 will only lock the adjacent turns of the barrier thread 32 along the looping or impaling line. However, for such missed pair of fabric loops, the barrier thread 32 is wrapped around the opposite legs of the loop along the barrier course 22 in the very same longitudinal wale 28 and will be effective to block the running of the chain of loops and the creation of the corresponding imperfection in the stocking. Effectively the interconnected looper and needle threads 36, 38 at each pair of registering fabric loops provides individual hinges flexibly interconnecting such loops. When the superposed marginal portions S_1, S_2 are brought into substantially coplanar relation, the opposite half sections of the looping course 20 will provide a relatively flat, bulkless line of joinder in which the loops are well articulated with respect to each other. For all intents and purposes, the fabric at the line of joinder will assume the character of a single knitted fabric joined together, loop by loop, in a neat and precise manner, with missed loops being blocked against running by the barrier thread 32.

Referring now specifically to FIGS. 4 to 12 inclusive, there is shown a looping machine which is of a conventional and commercially available type and includes the rotatable dial or disc 10 having the plurality of spaced dial points 12 upon which are impaled successive pairs of loops of the doubled or superposed marginal portions S_1, S_2 of a length of tubular knit fabric, such as the seamless stocking S. The features of the machine will be described insofar as necessary for an understanding of the present invention and a typical operating environment therefor. For a detailed description of typical machines which may be modified and employed in accordance with the present invention, reference may be made to U.S. Patent Nos. 1,725,819 and 1,725,825 of August 27, 1929, and U.S. Patent No. 2,871,806 of February 3, 1959.

Referring now specifically to FIGS. 4 to 8 inclusive, the looping machine is seen to include a base 48 which is provided with a mounting arm or casting 50 which extends radially and inwardly of the rotatable dial 10 and terminates at its inner end in a mounting head 52 disposed axially of and above the rotatable dial 10. The mounting head 52 carries a depending mounting stud 54 (see FIGS. 5 and 8) upon which is mounted a vertically adjustable mounting sleeve 56 which carries at its lower end a horizontally extending stationary bed plate 58 upon which the dial 10 is rotatably mounted in any appropriate fashion. The mounting sleeve 56 for the bed plate 58 may be fixed in various adjusted positions relatively to the mounting stud by one or more mounting bolts 60. The dial 10 is rotated about the stationary bed plate 58 from the machine drive, to be described, in any convenient fashion such that the points 12 of the dial 10 advance in succession through the barrier-inserting station 40, the selvage-cutting station 42, the cut loop-brushing station 44, and the loop chaining station 46.

The drive for the mechanisms at the several stations 40, 42, 44 and 46 and for the rotatable dial 10 is derived from a main drive shaft 62 which is journalled in the casting 50 of the base 48 at a location outwardly of the dial 10 and coupled to any appropriate drive source, such as an electric motor (not shown). The main drive shaft 62 is coupled to an auxiliary drive shaft 64 by appropriate gearing, with the auxiliary drive shaft 64 being likewise journalled on the casting 48 of the machine. As will be described, the main drive shaft 62 provides the necessary drive to the mechanisms at the selvage-cutting station 42, while the auxiliary drive shaft 64, which is geared to rotate at twice the speed of the main drive shaft 62, provides the drive to the mechanisms at the barrier-inserting station 40 and the cut loop-brushing station 44.

Preliminary to a detailed description of the mechanisms at the barrier-inserting station 40 which are constructed in accordance with the present invention, the conventional mechanisms at the selvage-trimming station 42 and at the cut loop-brushing station 44 will be described, it being appreciated that these mechanisms are subject to a latitude of change and variation. Specifically, at the selvage-cutting station 42 (seen best in FIGS. 4 and 5) there is provided a knife-shaft mounting bracket 68 which is fixed to the stationary bed plate 58 and projects rearwardly thereof to provide a support for an upstanding stationary knife-mounting shaft 70. The knife-mounting shaft 70 carries a double-armed knife-mounting lever 72 which includes a driver arm 72*a* and a driven arm 72*b*. The driver arm 72*a* projects radially and inwardly of the rotatable dial 10 and is coupled to the main drive shaft 62 by a coupling rod 74. The end of the coupling rod 74 adjacent the main shaft 62 is connected to a knife-driving eccentric 76 on the main drive shaft 62 by a universal joint or connection 78, while the opposite end of the coupling rod 74 is connected by a universal joint or connection 80 to the driver arm 72*a* of the lever 72. The driven arm 72*b* of the double-arm lever 72 extends downwardly (see FIG. 5) and carries a mounting block 82 on which there is adjustably mounted a movable cutter blade or knife 84. Cooperating with the movable cutter knife 84 is a stationary knife 86 which is mounted in a fixed position relative to the rotatable dial 10. In response to the rotation of the main drive shaft 76 and the reciprocation of the coupling rod 74, it will be appreciated that a rocking motion is imparted to the mounting block 82 and to the movable knife 84. By proper adjustment of the position of the movable knife 84 in relation to the stationary knife 86 and to the dial points 12, selvage portions of the circular knit fabric will be cut away, as is illustrated diagrammatically in FIG. 2 by the cutting line L.

The mechanisms at the cut loop-brushing station 44, which are effective to brush away those cut loops which are not carried away by severing of the selvage portions, include a brush-mounting bracket 88 (see FIG. 4) which is mounted on the stationary bed plate 58. The brush-mounting bracket 88 projects at an angle with respect to the knife-shaft mounting bracket 68 and terminates at its outer end in a bearing 90 in which is journalled a brush

shaft 92. The brush shaft 92 extends substantially chordwise of the rotatable dial 10 to appropriately position a brush 94 thereon for contact with the cut loops which are to be removed from the impaled looping course as the knitted fabric passes therebeneath. Rocking motion is imparted to the brush shaft 92 from the auxiliary drive shaft 64 by a coupling rod 96 which is connected at one end by a universal joint or connection 98 to a brush-driving eccentric 100 and coupled at its other end via a pin 102 to a rocker arm 104 which is fixed or otherwise secured to the end of the brush shaft 92 remote from the brush 94 (see FIG. 4).

In accordance with the present invention, the barrier-inserting station 46 is provided at a circumferential location in advance of the selvage-trimming station 42 and following the location at which the operator manually impales the circular knit fabric onto the points 12 of the rotatable dial 10. The barrier-inserting station 40 includes a vertically-extending needle bar 106 which is disposed radially outwardly of the rotatable dial below the path of traverse of the successive dial points 12. The needle bar 106 is mounted for oscillation about its vertical axis on a bearing 108 which is supported at the end of an upper needle-mounting bracket 110 which is fixed to the under-surface of the stationary bed plate 58 in any appropriate fashion and extends generally radially thereof (see FIG. 6). The needle bar 106 includes a depending integral extension 106*a* (see FIG. 7) which projects through a bearing 112 on a lower needle-mounting bracket 111 and permits vertical adjustment of the needle bar 106. At its upper end, the needle bar 106 carries a needle 114 including a vertical stem 114*a* and an upwardly curved needle body 114*b* terminating in a needle point 114*c* and having a needle eye 114*d* contiguous thereto. The needle body 114*b* is provided with a thread channel 114*e* on the exterior curved portion thereof.

Provision is made for rocking the needle bar 106 and needle stem 114*a* about their coincident vertical axes in timed relation to the operation of the further mechanisms at this station, as will be subsequently described. The rocking motion for the needle bar 106 is derived from the auxiliary drive shaft 64 by an appropriate coupling arrangement which includes a vertically-extending station drive shaft 116 which is journalled on an auxiliary housing 117 fixed to the stationary bed plate 58 (see FIG. 8). The drive shaft 116 is coupled intermediate its ends to the auxiliary drive shaft 64 by a coupling rod 118 which carries a helical gear (not shown) in engagement with a helical gear (not shown) on the auxiliary drive shaft 64 at the end removed from the station drive shaft 116. At its other end, the coupling rod 118 carries a further helical gear 122 which is in meshing engagement with a helical gear 124 on the station drive shaft 116. At its lower end, the station shaft 116 carries a needle-driving cam 126 formed with a radially extending slot or guideway which receives a radially adjustable drive block 128 secured to the needle-driving cam 126, as by bolts 130 or the like. The assembly of the needle-driving cam 126 and the drive block 128 provide an adjustable stroke or throw eccentric on the lower end of the station drive shaft 116 to which is connected a needle-coupling link or rod 132. As seen best in FIGS. 6 and 8, the needle-coupling rod 132 extends in a horizontal plane between the upper and lower needle-mounting brackets 110, 112 and has its inner end secured to the drive block 128 by a pin 134. The other end of the needle-coupling rod 132 is connected by a pin 136 and spacer washer 138 to a rocker arm 140 which is operatively connected to a needle drive gear 142 disposed between the upper and lower needle mounting brackets 110, 111 (see FIG. 7). The needle drive gear 142 is connected to a stud shaft 144 which is journalled in appropriate bearings on the upper and lower needle-mounting brackets 110, 111 and is in meshing engagement with a needle driven gear 146 which is operatively connected to the extension 106*a* of the needle bar 106. Accordingly, in response to rotation of the auxiliary drive shaft 64 and rotary motion of the station drive shaft 116, the eccentric drive 126, 128, 134 is operative via the needle-coupling rod 132 and the rocker arm 140 to impart a rocking motion to the needle bar 106 and a corresponding movement of the needle 114 through its forward and return strokes in the barrier-inserting cycle.

The barrier thread 32 is delivered to the needle eye 114*d* from an appropriate source via a thread-tensioning device 148 (see FIG. 5) which is mounted on the overhanging arm 50 of the machine base or frame 48 by a mounting or supporting bracket 150. The barrier thread passes from the thread-tensioning device 148 downwardly through a guiding eyelet 152 (see FIG. 8) in the bed plate 58. Mounted below the bed plate 58 on a mounting bracket 154 is a U-shaped thread guide member 156 which carries between the opposed legs thereof a thread-tensioning spring 158. The thread-tensioning spring 158 terminates in a hooked end 158*a* which is located between upper and lower thread-guiding eyelets 160, 162 on the opposed legs of the U-shaped thread guide member 156 and provides a further control over the tension on the barrier thread 32. After passing through the lower eyelet 162, the barrier thread 32 passes through a guide 164 on the lower needle mounting bracket 111 and through a further eyelet 166 on a mounting block 168 which is fixed to the outer end of the upper needle mounting bracket 110 (see FIG. 8). The mounting block 168 supports a vertically-extending thread guide 170 which includes a vertical stem 170*a* supported on the mounting block 168 for vertical adjustment and a curved tongue 170*b* which terminates at its upper end in a guide eye 170*c* through which the barrier thread 32 passes to the eye 114*d* of the needle 114. The rearward or inner surface of the curved tongue 170*b* of the thread guide 170 is of concave cross-section to provide a shallow guideway or groove along which the barrier thread 32 moves the needle guide eye 170*c*.

Disposed adjacent to the needle 114 is a thread lifter 172 which includes a lifter stem 172*a* and a lifter body 172*b*. As seen best in FIGS. 9 through 12 inclusive, the lifter body 172*b* is of generally oval configuration and is formed along one surface thereof with a camming surface or nose 172*c* and at the opposite surface thereof with a thread-engaging notch 172*d* (see FIG. 13). Means are operatively connected to the lifter stem 172*a* to mount the lifter body 172*b* for rocking movement about a lifter-rocking axis extending angularly of the needle-rocking axis such that the lifter body 172*b* may be advanced inwardly toward and between successive dial points 12. As will be subsequently described in detail, the lifter body 172*b* engages the barrier thread 32 in a pick-up position in relation to the needle 114 for impaling the barrier thread 32 over at least successive pairs of dial points 12. The lifter stem 172*a* extends substantially chordwise of the rotary dial 10 at an obtuse angle with respect to the stem 114*a* of the needle 114 and is slightly tilted downwardly from the horizontal toward the lifter body 172*b*, as seen best in FIGS. 5 and 7. The lifter stem 172*a* is mounted for rocking motion about the lifter-rocking axis by an appropriate bearing in a gear box 174 which is fixed via an arm 176 to an intermediate guide plate 178 which extends from a location in advance of the selvage-trimming station 42 about the periphery or circumference of the rotary dial 10 (see FIGS. 7 and 8). The lifter body 172*b* is designed to enter between the dial points 12 in a vertical position at one end of its movement and to extend at an angle of approximately 60° at the other end of its movement to facilitate thread pickup.

The thread lifter 172 is rocked about the axis of the stem 172*a* in timed relation to rocking of the needle 114 by an appropriate driving connection to the station drive shaft 116. Specifically, and as seen best in FIG. 8, the upper end of the station drive shaft 116 is provided with a lifter-driving cam 179 which is transversely slotted and carries an adjustable drive block 180 which is fixed in

various adjusted positions as by machine bolts 182. The drive block 180 is connected via an eccentrically disposed pin 183 to a coupling rod 184 which in turn is connected via a universal joint 186 to a rocker arm 188 operatively connected to a lifter drive gear 190 journalled on a gear shaft 192 within the gear housing 174. The drive gear 190 is in meshing engagement with a lifter driven gear 194 which is operatively connected to the mounting stem or shaft 172*a* of the thread lifter 172. Accordingly, in response to rotation of the station drive shaft 116, the coupling rod 184 is reciprocated and via the meshing gears 190, 194 a rocking motion is imparted to the thread lifter 174 in timed relation to the rocking of the needle 114.

Provision is made in advance of the barrier-inserting station 40 and above and below the dial 10 for guiding the circular knitted fabric into a radially adjusted position on the dial points 12 after manual loading thereon to properly orient the same for the introduction of the barrier thread 32 along the looping course by the coacting needle 114, thread guide 170, and the thread lifter 172. In this illustrative embodiment, and as seen best in FIGS. 4 and 7, an adjustable guide-mounting bracket 196 is secured to the bed plate 58 and carries an outwardly projecting mounting arm 198. Adjacent its outer end, the mounting arm 198 carries a stationary front fabric guide 200 which extends horizontally at a location above the plane of the movable dial points 12. The inner side of the stationary front fabric guide 200 is formed with a guiding surface 200*a* which is on a curvature approximately corresponding to that of the rotary dial 10 and is radially disposed in relation to the dial points 12 to provide a reference surface against which the circular knit fabric (i.e. stocking) is to be oriented preliminary to passing into the barrier-inserting station or location 40. Disposed inwardly and rearwardly of the stationary front fabric guide 200 is a movable rear fabric guide 202 which has a curved guiding surface 202*a* confronting the curved guiding surface 200*a* of the stationary front fabric guide 200. The movable rear fabric guide 202 is mounted at its end closest to the barrier-inserting station 40 for rocking motion in a horizontal plane and about a vertical axis toward and away from the stationary front fabric guide 200. In this illustrative embodiment, the mounting arm 198 carries a laterally projecting auxiliary mounting arm 204 on which is journalled a vertically extending guide shaft 206 which mounts the movable rear guide 202 for rocking movement. Fixed to and projecting from the rear guide shaft 206 is a rocker arm 208 which may be reciprocated in any appropriate fashion and through an adjustable stroke such as to impart the necessary motion to the movable rear guide 202 for continuously orienting the circular knit fabric against the reference or guiding surface 200*a*. In this illustrative embodiment, and as seen best in FIG. 4, the coupling shaft 118 carries an eccentric 210 which has a pin 212 coupled via a universal joint 214 and a coupling rod 216 to a further universal joint 218 on the rocker arm 208. Accordingly, in response to rotary movement of the shaft 118 and the corresponding movement of the eccentric 210 and the eccentric pin 212, rocking motion is imparted via the coupling rod 216 to the rocker arm 208 and to the rear fabric guide 202.

Further fabric guides are provided at the underside of the rotary dial 10 and along the circumferential course traversed by successive dial points 12 which further fabric guides cooperate with the guides 200, 202 in orienting the circular knit fabric preliminary to advancing into the barrier-inserting station 40. As seen in FIG. 5, the guides at the underside of the dial points 12 include a stationary curved bottom rear guide 220 which is disposed to project upwardly toward and terminate below the level of the dial points 12. The curved bottom rear guide 220 is mounted in any appropriate fashion. For example and as shown in FIG. 6, the needle-mounting bracket 111 may be provided with a further mounting bracket 222 which projects radially and outwardly of the rotary dial 10 and carries the upwardly directed stationary curved rear guide 220. The guide segment 220*a* of the guide 220 is along a curvature corresponding approximately to that of the reference or guiding surface 200*a* of the stationary top front fabric guide 200, but at a location slightly radially inwardly thereof in an amount sufficient to permit the circular knit fabric to travel along a well defined course toward the barrier-inserting station 40, with the blade or movable guide 202 being effective to continuously orient the circular knit fabric along such course.

The guiding arrangement at the underside further includes a pair of bottom front and rear guide fingers 224 (see FIG. 7) which are adjustably mounted on appropriate mounting blocks 226 secured to the undersurface of the stationary top front fabric guide 200. The guide fingers 224 terminate in somewhat hooked guide segments 224*a* which may be oriented in relation to the fabric, the thread guiding tongue 170*b*, the dial points 12, and the cooperating needle 114 and thread lifter 172 to assure perfect orientation of the work as it advances to the barrier-inserting location. It will be appreciated that a high order of accuracy is required in the guiding of the circular knit fabric to the work location because of the exceptionally small size of the loops through and about which the barrier thread 32 must be engaged by the comparably small needle 114 and associated parts.

Disposed in the same vertical plane as the front guide finger 224, is a resilient gating or hold down finger 230. The finger 230 is arranged in relation to the hook 224*a* of the guide finger 224 to provide a guideway through which the curved body 114*b* of the needle 114 penetrates during operation of the machine, as will subsequently be described. The cooperating fingers 224, 230 orient the fabric in relation to the points 12 and preclude outward radial movement of the fabric and consequent escape of the loops from the points, it being appreciated that the fabric is urged against the fingers 224, 230 by the movable rear guide 202.

In order to facilitate a more thorough understanding of the present invention, progressive reference will be made to the diagrammatic and perspective showings of FIGS. 9 to 13 inclusive for a typical sequence of operations:

In these views, the fabric is not shown in the interest of clarity, and portions of the barrier thread 32 are likewise deleted. However, it should be understood that the barrier thread emanates from the supply source through the thread guide 170 at one end and is engaged about the points 12 and through the fabric at its opposite end in previous loop-inserting cycles.

Referring first to FIG. 9, the needle 114 which reciprocates about the vertical needle axis defined by the stem or shank 114*a* of the needle, is shown in its position of maximum penetration in relation to the fabric, with the point 114*c* being disposed approximately at its foremost location in the cyclic movement of the needle body 114*b*. In this position, the segment of the thread 32 which emerges from the fabric at the previously formed barrier loop and terminates at the needle eye 114*b*, provides a chordwise segment of barrier thread in position for pick-up by the thread lifter 172 in the next loop-forming cycle. By way of review, and by reference to FIG. 2, it will be recalled that as each barrier loop is formed, the barrier thread is wrapped about one leg of the superposed loops along the looping course and is effectively trapped in the fabric (see, for example, the loops of the barrier thread wrapped about the legs 22*b*, 22*c*, 22*d*, etc., in FIG. 2). The thread lifter 172 is illustrated in FIG. 9 at the start of a lifting stroke or cycle, with the notch 172*d* in the lifter body 172*c* just beginning to engage the chordwise segment of the barrier thread for lifting and drop-off in response to turning movement of the thread lifter 172 about the lifter axis defined by the shank 172*a*.

Referring now to FIG. 10, the point 114*c* of the needle 114, has begun to retract from the maximum penetration position illustrated in FIG. 9 and the thread lifter 172 has turned in the direction of the arrow to engage the chordwise segment of the barrier thread 32 in the notch 172*d*. The thread has been drawn into a substantially triangular configuration extending generally in a horizontal plane, with the apex of the triangle wrapped about the lifter body 172*b* through the notch 172*d* being advanced toward a dropoff location relative to the dial points 12. Considering the relative position of the barrier thread 32 with respect to the dial points 12 in the progressive showings of FIGS. 9 and 10, it should be observed that the needle 114 advances along successive fabric-penetrating strokes below the plane of the points and the lifter body 172*b* also picks up the chordwise segment of the barrier thread at a location below the dial points 12. This permits unobstructed advance of the fabric through the station 40 in timed relation to the operation of the needle 114 and the thread lifter 172. For the purpose of this description, it may be assumed that the dial points 12 are stationary. However, the movement of the dial points 12 is at a rate to provide for two needle penetrations in each space between successive pairs of points. Such needle penetrations occur in a relatively small space since in a typical machine, there are approximately forty points 12 to the inch on the dial 10 which results in an interpoint spacing, from center to center, of the order of eight thousandths (.008).

Referring now to FIG. 11, the relationship of the needle 114 and of the thread lifter 172 is shown at a time somewhat later in the loop-forming cycle, with the point 114*c* of the needle 114 having been further retracted and the body 172*b* of the thread lifter 172 having been further rotated to a position wherein the barrier thread 32 is wrapped over the camming surface or nose 172*c* of the lifter body 172*b*. In this condition, the lifter body 172*b* is effective to form the barrier thread 32 into an upstanding loop for dropoff on to the adjacent point at the appropriate time in the machine cycle. Specifically, the portion of the barrier thread extending through the notch 172*d* is now located at the underside of the lifter body 172*b* and is disposed generally below the level of the points 12, while the portion of the thread wrapped about the camming surface or nose 172*c* is at a location above the dial points 12, approximately corresponding to the position illustrated in FIG. 13. Concurrently, the lifter body 172*b* has advanced into a position intermediate an adjacent pair of dial points 12. Thus, the barrier thread is effectively trapped and oriented in relation to the dial points to assure proper dropoff on to the dial points. It will be appreciated that substantially perfect dropoff is essential to the proper operation of the instant machine and the provision of a corresponding trapping loop along the looping course. It is also noteworthy to observe that the drawings are on a greatly exaggerated scale for the purposes of illustration and that the critical interrelationship of the several parts and the dial points must be achieved within exceptionally small dimensional tolerances.

The contour of the nose or camming surface 172*c* is such as to permit the thus confined loop to drop or snap off on to the adjacent point, with the barrier thread being confined at the opposite ends of this loop by the rearwardly moving needle and the fabric. The gating or holddown finger 230 is arranged in relation to the dial points 12 and to the lifter body 172*b* to flex as the lifter body is advanced to the position in which the barrier thread is dropped off on to the point; when the thus formed loop drops behind the hold-down finger 230 it is maintained against radial outward displacement by the hold down finger as the latter restores to its position of engagement with the underlying dial points.

Reference to FIG. 12 shows the barrier thread dropped on to at least a pair of adjacent points just prior to movement into the locked position on the dial points behind the holddown or gating finger 230, it being appreciated that a portion of the lifter body 172 has been broken away to reveal the position of the thread in relation to the dial points. Dropoff of the thread from the camming surface or nose 172*c* between the position illustrated in FIG. 11 and the position illustrated in FIG. 12 is aided by virtue of the fact that the needle 114 is retracting through the fabric and pulls the barrier thread off of the lifter body and on to the dial points behind the gating finger 230.

After dropoff of the barrier thread on to at least one pair of points, the needle retracts to its rearward limit position at the back of the fabric and once against penetrates the fabric, either between the same pair of points, or between the next successive pair of points, depending upon the relative position of the dial points 12 to the needle 114 and to the thread lifter 172. In the illustrative construction, the successive penetrations of the needle occur at the opposite faces of each point, as shown in FIG. 13 and designated by the characters P_1, P_2, and P_{-1} and P_{-2}. As shown in this figure, the two previous barrier insertion cycles or strokes occurred at the locations P_1 and P_2, the illustrated penetration occurs at the opposite face of the dial point at the location P_1, and the next successive penetration will occur in the same interspace, but adjacent the next point at the location P_2. Penetrations at the locations P_1 and P_{-2} will cause the barrier thread to be dropped over three dial points, while penetrations at the locations P_2 and P_{-1} will cause the barrier thread to drop over two points. This is not critical in the machine, however it is preferred that each successive dial point of the machine have at least two loops thereon to assure flexibility along the looping line and good interchaining between the opposed faces of the knitted fabric which are joined together along the looping line.

When the knitted fabric leaves the loop-forming station 40, the fabric is advanced to the selvage-cutting station 42, wherein the selvage courses outwardly of the looping course 20 are cut away, as indicated diagrammatically in FIG. 2 by the cutting line L. Thereupon, the impaled superposed portions of the knitted fabric, with the selvage cut away, advance through the brushing station 44 wherein cut loops which are not removed incident to the cutting operation are brushed away, leaving only those portions of the knitted fabric which are ultimately hinged together in the chain-forming station 46. Since the mechanisms at this latter station are conventional and are disclosed and described in numerous prior art patents, including those hereinbefore referred to, a description of these conventional mechanisms will be dispensed with in the interests of brevity.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What I claim is:

1. In a looping machine for hosiery having superposed looping courses which are to be hingedly interconnected and including a rotary dial having radially extending and circumferentially disposed dial points over which said looping courses are adapted to be impaled manually, means mounting said rotary dial for rotary movement about a vertically extending dial axis, means at a first circumferential location for cutting the selvage of said hosiery above said looping course which is impaled on said dial points, and a drive for rotating said dial and for operating the means at said first location, the improvement comprising stitching mechanisms in advance of said first circumferential location for introducing a barrier thread along at least said superposed looping courses, said stitching mechanisms including a needle having a stem and a curved body terminating in a needle

point, means operatively connected to said stem and mounting said needle body for rocking movement about a needle-rocking axis to advance said needle point along a penetrating stroke disposed in relation to successive dial points to advance said barrier thread through said hosiery and into a pickup position outwardly thereof, a thread lifter having a lifter stem and a lifter body, means operatively connected to said lifter stem and mounting said lifter body for rocking movement about a lifter-rocking axis extending angularly of said needle-rocking axis to advance said lifter body inwardly toward and between successive dial points, said lifter body engaging said barrier thread in said pick-up position for impaling said barrier thread over said dial points, and respective actuating means controlled from said drive for rocking said needle and said thread lifter in timed relation to each other and to the rotation of said dial.

2. In a looping machine according to claim 1, said lifter body having a notch on the leading edge thereof which engages said barrier thread in said pickup position and a camming surface on the trailing edge thereof which rises above the level of said dial points as said lifter body advances toward and between said dial points for dropping said barrier thread over at least successive pairs of dial points.

3. In a looping machine for hosiery having superposed looping courses which are to be hingedly interconnected and including a rotary dial having radially extending and circumferentially disposed dial points over which said looping courses are adapted to be impaled manually, means mounting said rotary dial for rotary movement about a vertically extending dial axis, means at a first circumferential location for cutting the selvage of said hosiery above said looping course which is impaled on said dial points, means at a second circumferential location following said first location for brushing away said selvage, and a drive for rotating said dial and for operating the respective means at said first and second locations, the improvement comprising stitching mechanisms for introducing a barrier thread along at least said superposed looping courses and at further courses therebelow, said stitching mechanisms including a needle having a vertical stem and an upwardly curved body terminating in a needle point, means operatively connected to said vertical stem and mounting said needle body for rocking movement about a vertical needle-rocking axis to advance said needle point along an upwardly and outwardly extending penetrating stroke, said penetrating stroke being disposed in relation to successive dial points to advance said barrier thread outwardly along successive dial points, through said hosiery and into a pickup position outwardly thereof wherein a segment of said barrier thread extends chordwise of said needle body, a thread lifter having a lifter stem and a lifter body, means operatively connected to said lifter stem and mounting said lifter body for rocking movement about a lifter-rocking axis extending angularly of said needle-rocking axis to advance said lifter body inwardly toward and between successive dial points, said lifter body engaging said barrier thread in said pick-up position for impaling said barrier thread over at least successive pairs of dial points, and respective actuating means controlled from said drive for rocking said needle and said thread lifter in timed relation to each other and to the rotation of said dial.

4. In a looping machine according to claim 3, said lifter body having a notch on the leading edge thereof which engages said barrier thread in said pickup position and a camming surface on the trailing edge thereof which rises above the level of said dial points as said lifter body advances toward and between said dial points for dropping said barrier thread over at least successive pairs of dial points.

5. In a looping machine for hosiery having superposed looping courses which are to be hingedly interconnected and including a rotary dial having dial points over which a looping course is adapted to be impaled manually, means mounting said rotary dial for rotary movement about a dial axis, means at a first circumferential location for cutting the selvage of said hosiery above said looping course which is impaled on said dial points, and a drive for rotating said dial and for operating the means at said first location, the improvement comprising stitching mechanisms in advance of said first circumferential location for introducing a barrier thread along at least said superposed looping courses, said stitching mechanisms including a needle terminating in a needle point, means operatively connected to and mounting said needle for rocking movement about a needle-rocking axis to advance said needle point along a penetrating stroke disposed in relation to successive dial points to advance said barrier thread through said hosiery and into a pickup position outwardly thereof, a thread lifter, means operatively connected to and mounting said lifter for rocking movement about a lifter-rocking axis extending angularly of said needle-rocking axis to advance said lifter inwardly toward and between successive dial points, said lifter engaging said barrier thread in said pick-up position for impaling said barrier thread over said dial points, and respective actuating means controlled from said drive for rocking said needle and said lifter in timed relation to each other and to the rotation of said dial.

6. In a looping machine for hosiery having superposed looping courses which are to be hingedly interconnected and including a rotary dial having circumferentially displaced dial points over which a looping course is adapted to be impaled manually, means mounting said rotary dial for rotary movement about a dial axis, means at a first circumferential location for cutting the selvage of said hosiery above said looping course which is impaled on said dial points, means at a second circumferential location following said first location for brushing away said selvage, and a drive for rotating said dial and for operating the respective means at said first and second locations, the improvement comprising stitching mechanisms for introducing a barrier thread along at least said superposed looping courses and at further courses therebelow, said stitching mechanisms including a needle and means operatively connected to and mounting said needle for movement to advance said needle point along an upwardly and outwardly extending penetrating stroke, said penetrating stroke being disposed in relation to successive dial points to advance said barrier thread outwardly along successive dial points, through said hosiery and into a pickup position outwardly thereof wherein a segment of said barrier thread extends chordwise of said needle body, a thread lifter, means operatively connected to said lifter and mounting said lifter for movement to advance said lifter inwardly toward and between successive dial points, said lifter engaging said barrier thread in said pick-up position for impaling said barrier thread over at least successive pairs of dial points, and respective actuating means for rocking said needle and said thread lifter in timed relation to each other and to the rotation of said dial.

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