April 1, 1924. 1,488,682

F. E. JONES

SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23, 1922 6 Sheets-Sheet 1

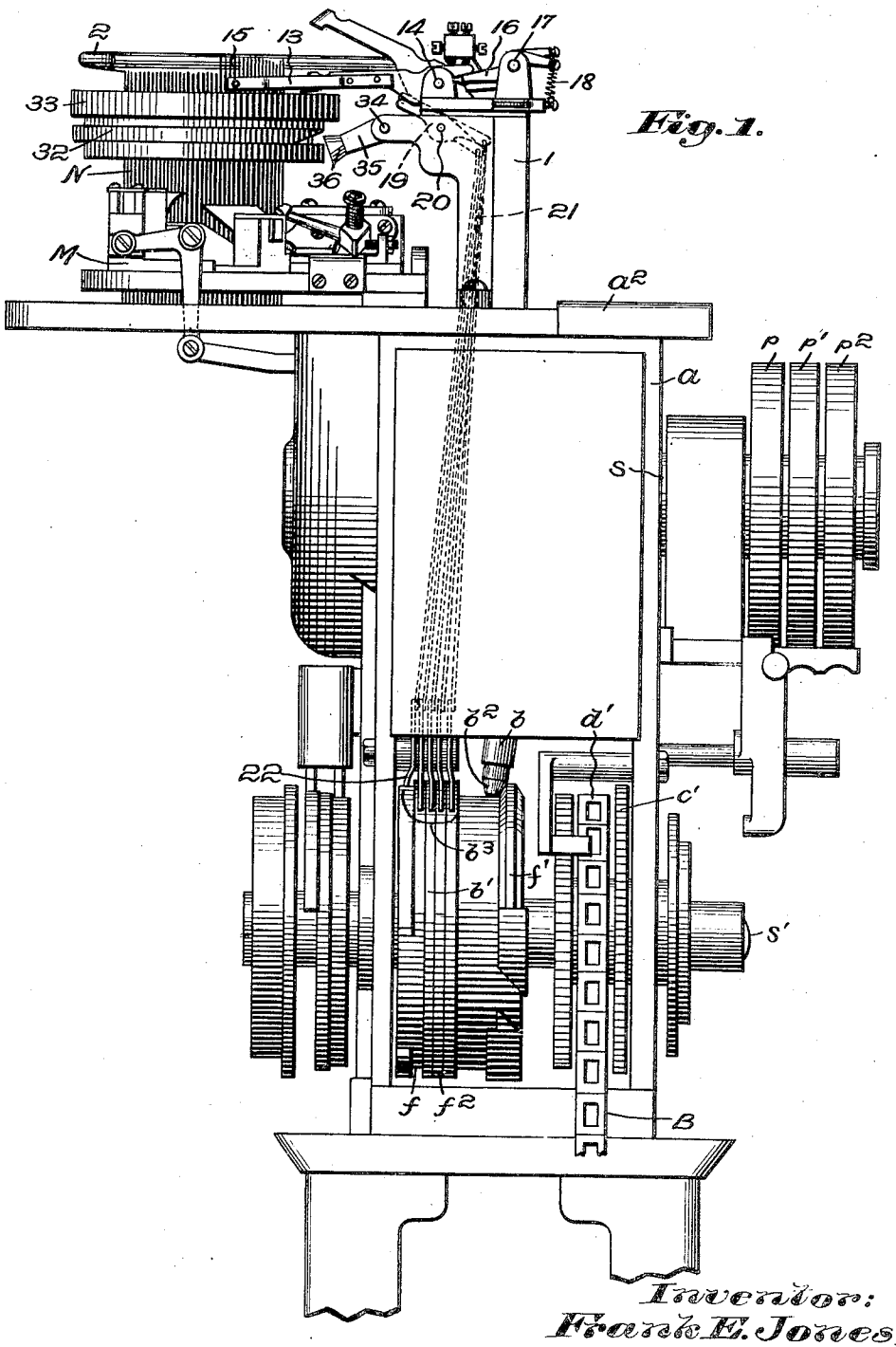


Fig. 1.

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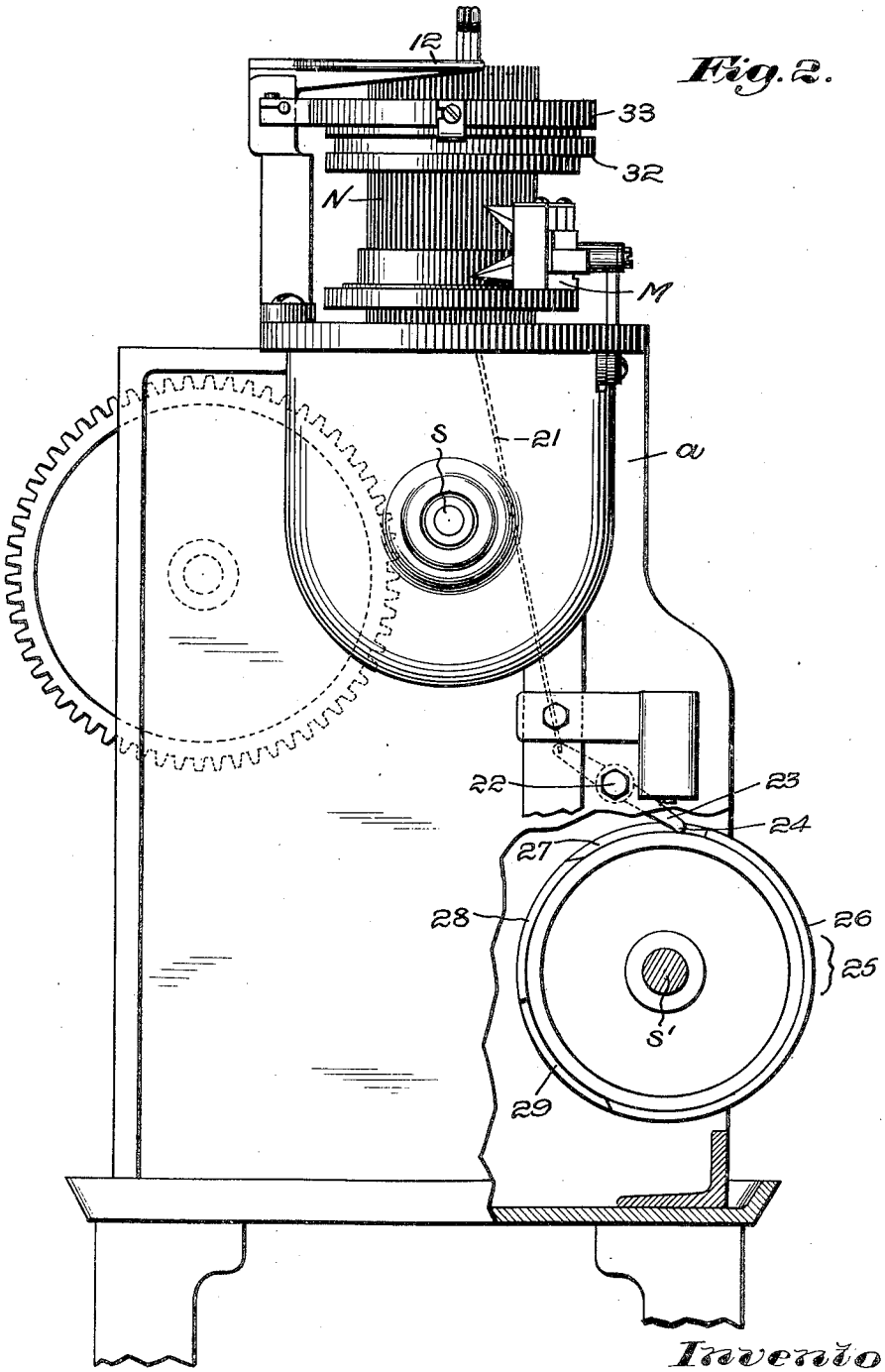
April 1, 1924. 1,488,682

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SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23, 1922 6 Sheets-Sheet 2

Fig. 2.



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SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23, 1922 6 Sheets-Sheet 3

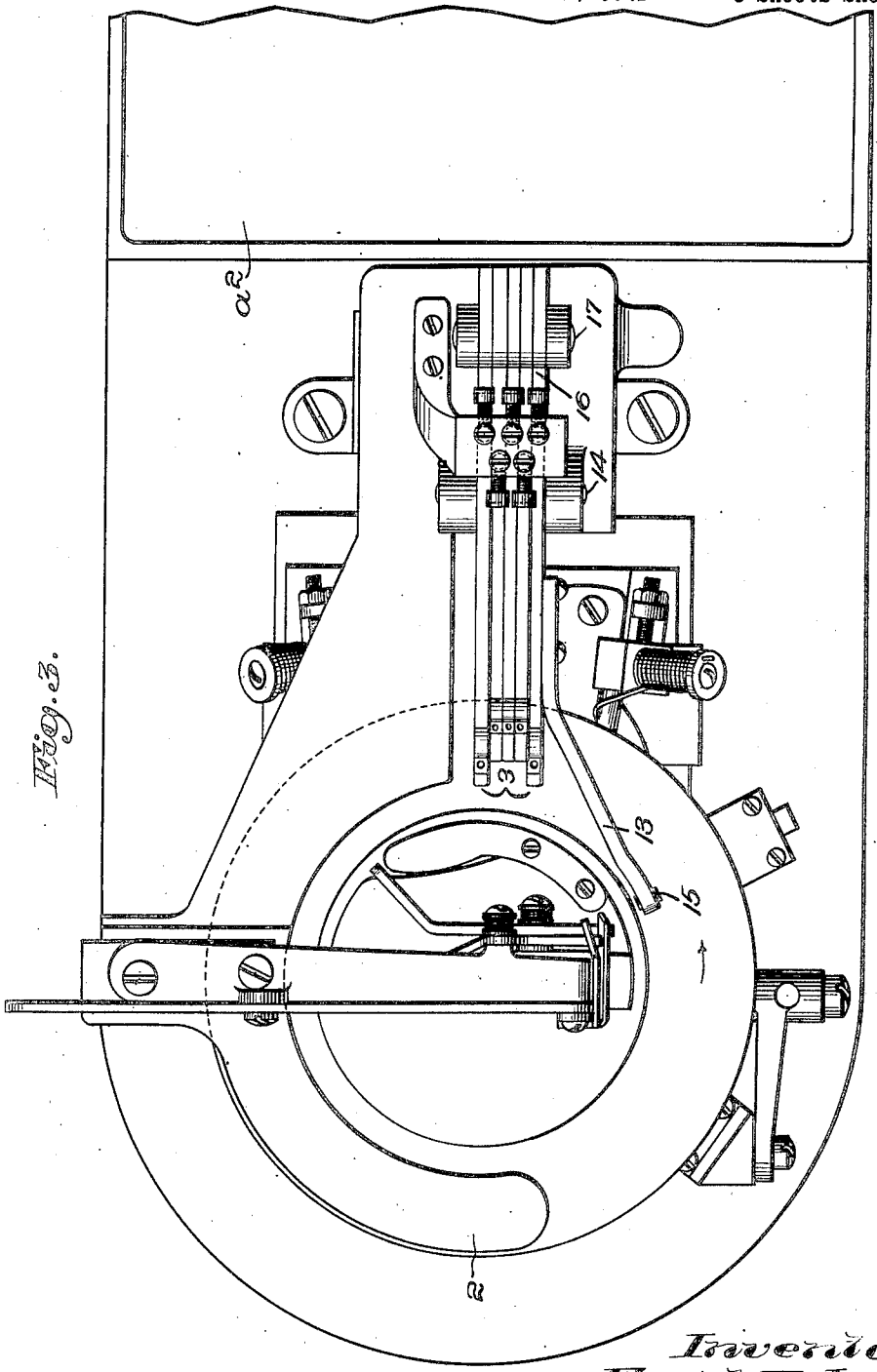


Fig. 3.

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April 1, 1924. 1,488,682

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SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23, 1922 6 Sheets-Sheet 4

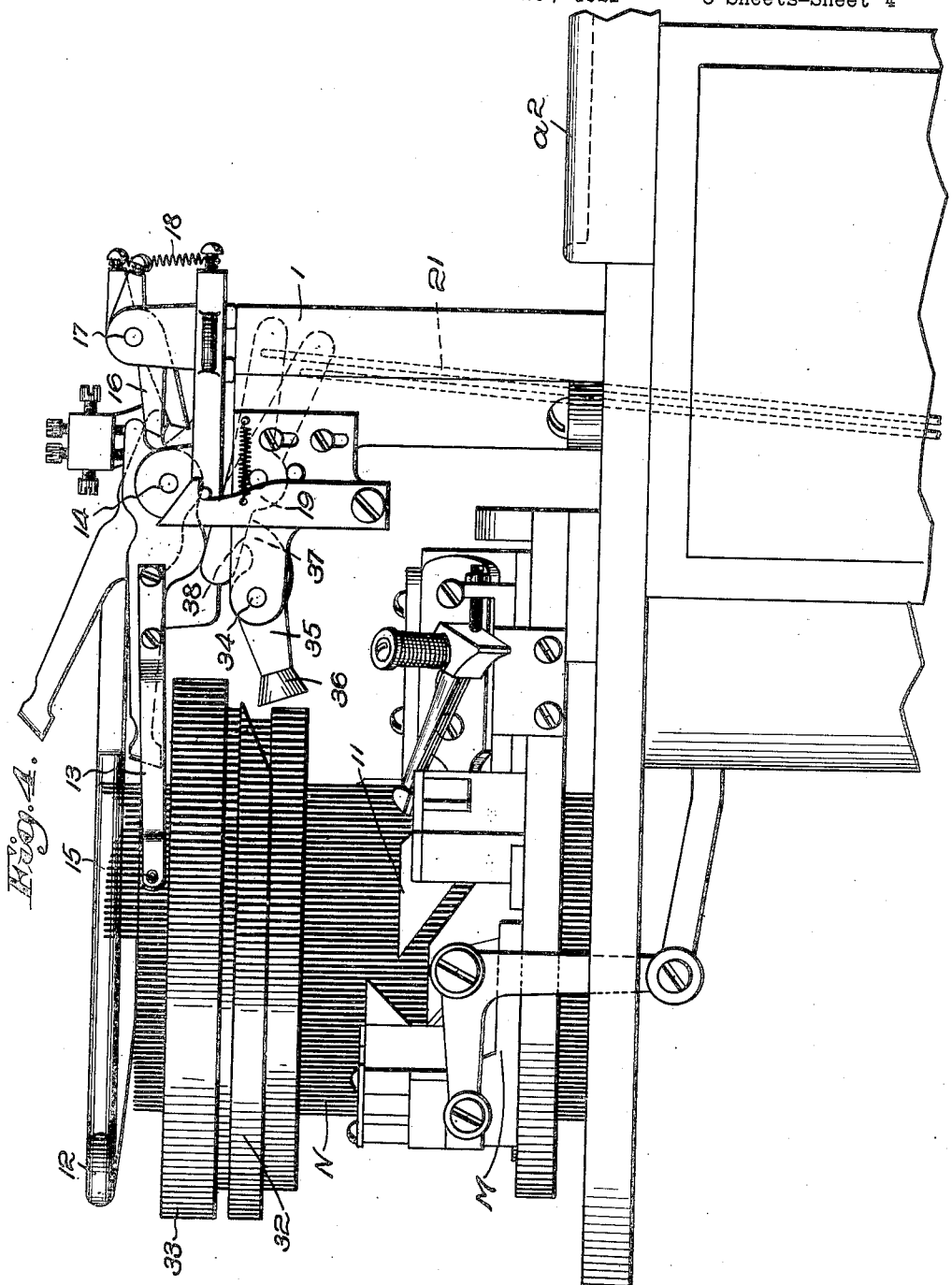


Fig. 4.

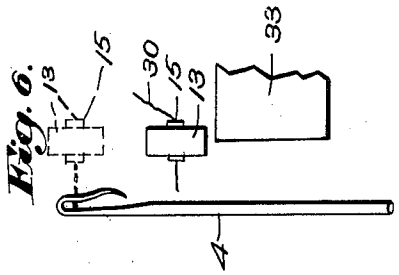
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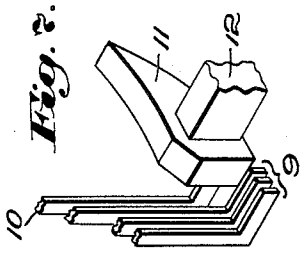
April 1, 1924. 1,488,682

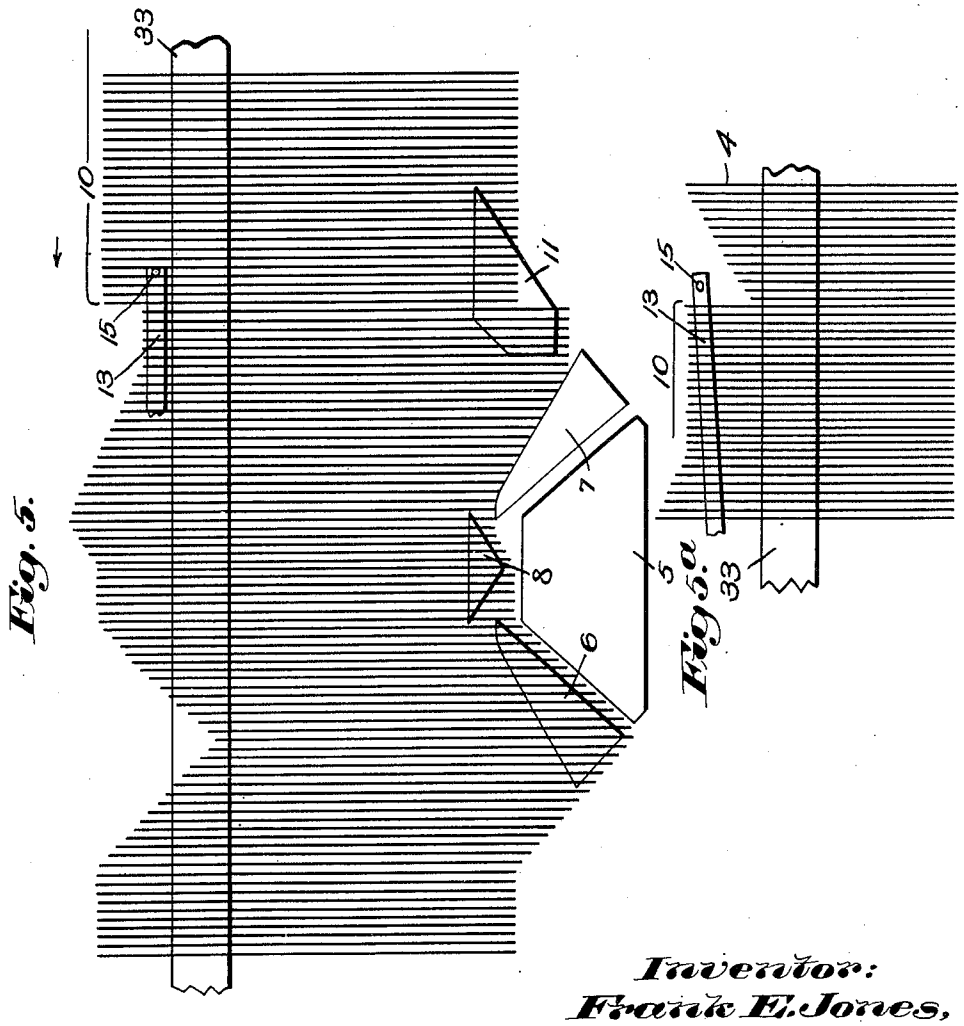
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SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23, 1922 6 Sheets-Sheet 5







Inventor:
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April 1, 1924. 1,488,682

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SPLICING MEANS FOR KNITTING MACHINES

Filed Nov. 23 1922 6 Sheets-Sheet 6

Fig. 8.

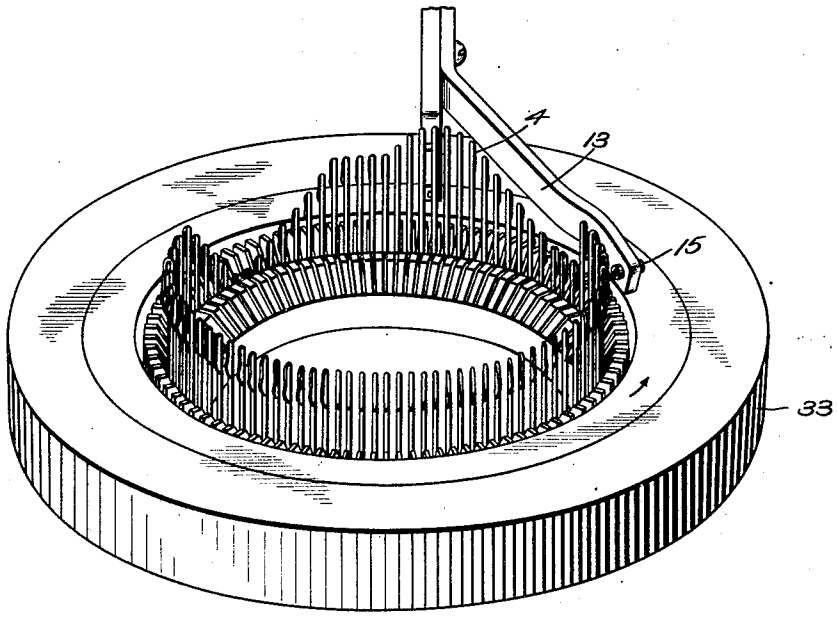
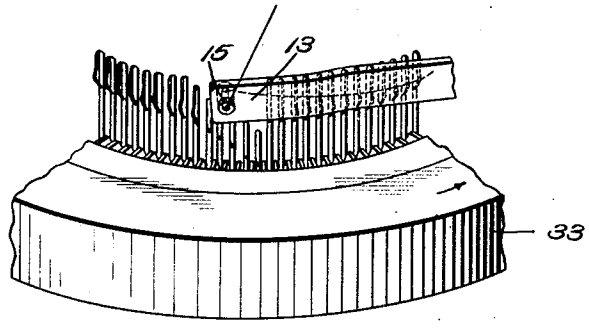


Fig. 9.



Inventor:
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Patented Apr. 1, 1924. 1,488,682

UNITED STATES PATENT OFFICE.

FRANK E. JONES, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO HEMPHILL COMPANY, OF PAWTUCKET, RHODE ISLAND, A CORPORATION OF MASSACHUSETTS.

SPLICING MEANS FOR KNITTING MACHINES.

Application filed November 23, 1922. Serial No. 602,748.

To all whom it may concern:

Be it known that I, FRANK E. JONES, a citizen of the United States, and a resident of Pawtucket, in the county of Providence and State of Rhode Island, have invented an Improvement in Splicing Means for Knitting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to splicing means for knitting machines and particularly to circular hosiery knitting machines. In order that the principle of the invention may be readily understood, I have disclosed a single embodiment thereof in the accompanying drawings, wherein—

Fig. 1 is a front elevation of a circular knitting machine having my invention applied thereto;

Fig. 2 is an end elevation of the mechanism shown in Fig. 1;

Fig. 3 is a plan view of the main parts of the mechanism shown in Figs. 1 and 2;

Fig. 4 is a front elevation on an enlarged scale of the upper part of the mechanism shown in Figs. 1 and 2;

Fig. 5 is a diagrammatic view illustrating the set of knitting cams and needles controlled thereby and also the special or needle positioning or dividing cam and certain of the needles controlled by it;

Fig. 5ª is a similar view, but with the needles differently positioned;

Fig. 6 is a detail in elevation and vertical section illustrating the manner in which the reinforcing yarn or thread is positioned within the beard of the last needle of the series taking said yarn or thread;

Fig. 7 is a detail view in perspective illustrating the manner in which the special cam divides or positions the needles;

Fig. 8 is a perspective view of certain parts of the head of the machine and illustrating the manner in which the reinforcing thread is fed to the needles; and

Fig. 9 is a similar view of a few only of the needles and representing the manner of ensuring the delivery of the reinforcing yarn or thread to the last needle of the active series of needles, and the avoidance of delivery of said yarn or thread to the following needles.

In accordance with my invention I provide for reinforcing certain areas of knitted fabric such, for example, as the high splice of a stocking and the sole of the foot thereof. Said reinforcements may be made by the same reinforcing thread introduced through a special thread guide or separate reinforcing threads may be used for the high splice and for the sole respectively, if desired. While other reinforcements may be made by the mechanism of my invention, I will describe an arrangement and manipulation of the needles and of said special thread guide resulting in the production of a stocking having reinforcements at the points indicated, without limiting my invention thereto except as expressly indicated.

My invention may be applied to knitting machines of various types. I have, however, chosen to represent it in connection with a circular knitting machine of the so-called Banner type disclosed in the patent to Joshua D. Hemphill, No. 933,443, dated September 7, 1909. I will describe my invention as applied to that type of machine, but without limiting my invention thereto.

The framing of the machine is indicated at *a*. It supports a needle cylinder N which is desirably rotatable, although obviously the needle cylinder may be stationary and the cam carrier may be rotatable. The main driving mechanism, as well as the instrumentalities operatively connected therewith for actuating the needle cylinder N and the mechanisms for controlling the action of the speed changing, yarn changing, and needle moving devices are mounted in the framing *a*. At the top of said frame is a flat table a^2 which directly supports the needle cylinder N, as well as the cam ring M and other parts arranged to cooperate with the needles in the knitting operation and in a manner which need not be more fully described.

The machine herein shown is a hosiery ma-

chine, and to that end it is provided with narrowing and widening pickers for throwing the needles out of and into action for the formation of heel and toe pockets and desirably but not necessarily in the manner disclosed in the said Hemphill patent.

The primary driving shaft is indicated at s, and the construction is such that the needle cylinder makes one revolution to a revolution of the driving shaft. The speed controlling and yarn changing cams are mounted upon a shaft s', and the said shaft makes one complete revolution during the production of each stocking or piece of knitted work. Upon said shaft s' is a ratchet or feed wheel c' and a sprocket wheel d' for carrying the endless pattern chain B, said wheels c' and d' moving in unison as they are secured to or integral with each other and are loosely revoluble upon the shaft s'. The pattern chain carried by the sprocket wheel d' is composed of a suitable number of connecting links and is provided with a predetermined number of properly positioned lugs. The wheel c' is desirably advanced one tooth for four revolutions of the shaft s, while twelve revolutions of the latter advance the chain one link.

The shaft s is provided with a gear for driving the needle cylinder and is also provided with a clutch hub mounted upon a key secured to the shaft in a manner not necessary more fully to describe. Upon the shaft s are the quick speed pulley p, the fast pulley p' and the loose or idle pulley p^2. Means are provided, not necessary more fully to describe, whereby the needle cylinder is continuously rotated during the knitting of the leg and foot and is reciprocated during the knitting of the heel and toe. Fast upon the shaft s' is a drum f provided with a plurality of suitably positioned interrupted peripheral cam grooves f^2 arranged side by side to act upon a series of swinging levers b^3 in a customary manner, except in so far as hereinafter stated, in connection with the reinforcing thread guide. The said drum f has a peripheral rib f' cut transversely at suitable intervals to cooperate with the lower end b^2 of the pivoted clutch shifting lever b for guiding and throwing the driving clutch hub into and out of action in customary manner.

At some suitable point the framing of the machine is provided with an upright post 1 adapted to receive and support upon its upper end when in functioning position a segmental or otherwise shaped guard member 2 which, as most clearly shown in Fig. 3, is substantially semi-circular in form, being pivoted upon a suitable transverse pivot upon a post or upstanding member desirably positioned about ninety degrees circumferentially with the cam ring with respect to the post 1. The guard member, when in working position, is preferably held down by a suitable manually controlled spring latch or catch, the construction preferably being such that when the latch is released, a spring (not shown) elevates the guard member 2 upon its pivot. Supported upon the guard member is a yarn cutter and binder operating lever for the thread or threads temporarily out of action. Such a guard member construction may be substantially that shown in the patent to John Lawson, No. 1,293,812, dated February 11, 1919.

The machine is provided with a series of usual thread or yarn guides indicated generally at 3 in Fig. 3 and certain of which are shown in side elevation in Figs. 1 and 4, by which, in conjunction with the special operating thread guide to be hereinafter described, the proper thread or threads may be introduced at the proper times for knitting the leg, the high splice, the heel, the foot and the toe in a manner not necessary more fully to describe so far as the usual thread guides are concerned, as the same is described in the said Hemphill Patent No. 933,443 and the other patents issued subsequent thereto upon the so-called Banner machine. The usual thread guides are controlled from the cams f^2 upon the cam shaft s'.

With the exception of the needle controlling cam now to be described and the operating means therefor and the grouping of the needles for action or non-action with respect thereto, the arrangement of the knitting or needle controlling cams herein disclosed may be and desirably is substantially the same as that disclosed in the said Hemphill Patent No. 933,443.

While, within certain aspects of my invention, the needles may be either latch needles or spring beard needles, my invention is more particularly related to spring beard needles for reasons hereinafter more fully set forth. The needles, preferably of the spring beard type, are independently mounted in the grooves of the needle cylinder for reciprocation therein in the usual manner, one of said needles being represented at 4 in Fig. 6. The said needles are controlled by the set of knitting cams indicated at 5, 6, 7 and 8 in Fig. 5. If desired the needles may be provided with separate jacks to control the operations, such jacks being of the general type shown in the patent to Landry, No. 1,415,583, dated May 9, 1922, and they may have the butts hereinafter described, but herein I have represented the needles as having integral butts for co-action with the knitting cams and the special cam to be hereinafter referred to.

A complete circle of needles which, for purposes of illustration, may be assumed to be 220 or 240 in number, but which may be any other suitable number, is

made up of long butt needles, certain of which are indicated at 9 in Fig. 7, constituting desirably one half the entire circle of needles, being the so-called instep needles, and a series of short butt needles, certain of which are indicated at 10 in Fig. 7 and which make up all of the remaining needles. Said long butt needles 9 are adapted to be thrown out of action during the knitting of the heel and toe, but are restored to action immediately after the formation of the heel and the formation of the toe respectively, in the customary manner.

In order to cause the needles to make reinforcements, I provide special means for dividing or controlling the needles for that purpose. Obviously the reinforcements may be at any desired parts of the stocking, but in the specific example of my invention I have disclosed them as formed at the high splice and at the sole of the foot, but, as stated, it is evident that the reinforcement may be at any desired part or parts of the stocking or other fabric, my invention not being limited to the provision of the reinforcement at any particular part of the stocking or other fabric.

Referring, however, to the reinforcements herein disclosed, viz, the high splice and the sole of the foot, I provide a special cam 11 shown most clearly in Figs. 4, 5 and 7. While said cam is shown as stationary, obviously my invention is not restricted to such character or structure or mounting of said cam. Said cam 11 acts during the knitting of the high splice or of such other reinforcements as are contemplated to act upon and divide the needles. So long, however, as said cam 11 is in its active position, it operates to move downwardly the entire series of long butt needles 9, so that none of said needles can take the reinforcing yarn or thread, such reinforcing yarn or thread being supplied to the entire series of short butt needles and for the purpose, in the specific embodiment herein disclosed, of making the high splice and the reinforced sole of the foot.

In the event that the cam 11 is given an inactive outer radial position, this is effected by providing a suitable link or other connection from the stem 12 of the cam to a lever adapted to ride upon a disk cam fast upon the shaft s' so that at proper times said cam 11 may be moved into its outer inactive position.

The special or reinforcing thread guide is indicated at 13 in the several figures. It is mounted upon the same pivot 14 whereon all the other thread guides are mounted, but it is provided with a prolongation as clearly indicated in Figs. 1 and 3, so that the eye or opening 15 for the yarn or thread is just above the special or guiding cam 11. Each of the thread guides is provided beyond its pivot with a short arm adapted to be acted upon by its lever 16 pivoted at 17 upon the post or standard 1 and having co-acting therewith a coil spring 18. Each spring 18 tends to move its thread guide into feeding position, and connections are provided for moving each of said levers into elevated or inactive position. For that purpose, a series of levers 19 are provided pivoted at 20 upon the standard 1 and having links 21 connected to their outer ends. The said reinforcing thread guide 13 is acted upon by the inner end of its lever 19 and is connected by its link 21 to a lever 23, being one of the series of levers b^3. Said lever 23 is pivoted at 22 where are also pivoted the other levers of the series b^3. The opposite end 24 of said lever rests upon the edge or periphery of a cam indicated generally at 25, and which is mounted upon the shaft s', being a part of the cam drum carried by the said shaft, but having a special cam formation now to be described.

The said cam 25 is provided with a peripheral formation 26 which, so long as the toe 24 of the lever 23 rests thereon holds the special thread guide 13 out of action during the knitting of the toe of one stocking and the leg of the next stocking. Contraclockwise beyond the cam formation 26 is a lower cam formation 27 which while the lever end 24 rides thereon causes the splicing thread guide to be maintained in its lower or functioning position so that the splicing thread or yarn may be introduced to the needles for the high splice.

Succeeding the cam formation 27 is a cam formation 28 of greater radial height or extent, being of the same radial height as the cam formation 26 and whereon the end 24 of the lever 23 rides, during the formation of the heel and during which time the splicing thread guide 13 is maintained out of action. Succeeding the cam formation 28 is a cam formation 29 of the said radial height as the cam formation 27 and which controls the position of the reinforcing thread guide 13 during the knitting of the foot, and so that the reinforcing thread is supplied to the bottom of the foot so as to make the thickened sole.

Fig. 2 shows, in somewhat diagrammatic manner, but not necessarily with accuracy, the relative locations of the cam formations controlling respectively the position of the special thread guide 13, and by which said thread guide is thrown either into its uppermost inactive position or to its lowermost or feeding position. Said uppermost or inactive position is occupied by said special thread guide 13 (in the specific embodiment of my invention herein disclosed) throughout the formation of the leg down to the top of the high splice, and also during the knitting of the heel and the toe. At other times

the cam formations just described are such as to permit the special thread guide 13 to be in its lowermost or feeding position. Nevertheless said special thread guide 13 does not remain in its lowermost or feeding position at all times during the formation of the high splice and the foot, but only for a half or other suitable part of each course knitted during the formation of that part of the ankle within which is comprehended the high spice and during the knitting of the foot.

The said special thread guide 13 is intended to introduce its thread, in the present disclosure, only to the back half series of needles, that is, to the short butt series which are not moved down or guided by the special cam 11. Notwithstanding the fact that the long butt needles 9 are depressed temporarily by the special cam 11, as indicated by the diagram, Fig. 5, said long butt needles 9 are almost immediately re-elevated by the knitting cams, and it is at the immediate point where a slight depression occurs in the needle wave that the reinforcing yarn is introduced to the short butt needles 10.

It will be observed, viewing Fig. 3, that the special thread guide 13 is positioned upon the right hand side of the head of the machine, the needles passing the same in circular knitting in a contraclockwise manner characteristic of the Banner knitting machine and as indicated at the arrow in Figs. 8 and 9. Therefore the reinforcing yarn or thread lies against a comparatively short arc or series of said needles, before the leading end of the series of short butt needles that are to receive the reenforcing yarn reaches the knitting point, and much shorter than is the case where a so-called silent finger of the so-called Pigeon machine has its feeding point positioned substantially diametrically across the circle of needles from the knitting point, and thereby to wrap or draw the thread about the last needle of the series. It is important that the said reinforcing thread be introduced with perfect accuracy beneath the beard of the last needle of said short butt series, so as to cause the reinforce always to terminate on the same needle and in the disclosed construction the yarn guide 13 is not so located as to wrap its thread about the last needle of the short butt series.

For these reasons and to prevent the feeding of the reinforcing thread to any of the instep or long butt needles, I provide means to elevate the reinforcing thread guide 13 during each course of the formation of the high splice and of the sole of the foot, into an intermediate position which is indicated in dotted lines in Fig. 6, and is shown in Figs. 5a and 9. The effect of this is to introduce the reinforcing yarn indicated at 30 in Fig. 6, directly under the beard 31 of the last needle of the short butt series 10, so that said reinforcing yarn is accurately presented always to the same needle at each of the succeeding courses of the reinforcement, and so that said yarn cannot be seized by any of the leading needles of the long butt or instep series, as is clearly evident from Fig. 5a and 9. This avoids the necessity of wrapping or drawing the reenforcing yarn about the last needle of the series of short butt needles, and therefore permits the positioning of the reenforcing yarn guide 13 in the location indicated and yet insures the accurate and unvarying presentation of the reenforcing yarn to the last needle of the short butt series. Thus the lines at the edges of the high splice and along the edges of the sole are straight and accurate.

In order to impart the said vibratory movement to the special thread guide 13 so as to force or lift the thread within the beard 31 of the last needle of the short butt series, any suitable means may be provided, but desirably I provide a cam 32 upon the under side of the sinker cam ring 33 as most clearly shown in Fig. 4. Said cam is preferably of one half the circumferential extent of the sinker cam ring, so that it holds thread up in the intermediate position, whereby the thread will be taken accurately by the last needle of the short butt series, and the yarn guide is retained up during the passage of all the instep or long butt needles, but within the scope of my invention said cam may be made of less extent since after the safe introduction of the thread under the beard of the last needle of the short butt series, and the leading needles of the long butt series have passed by without taking the same there is little or no liability that the yarn will be taken by the remaining long butt needles. The guide 13 is, however, lowered into lowest or normal feeding position before or substantially as the leading needle of the short butt series reaches said guide, so that said leading needle will always seize the reinforcing yarn.

Upon the standard 1, I mount at 34 a lever having an arm 35 upon the inner end of which may be a roll 36 to be acted upon by the cam 32. The other arm 37 of said lever takes at its end 38 beneath the lever 19 pertaining to the special thread guide 13 and therefore at the proper time elevates said special thread guide into its said intermediate position and supports it for the proper length of time. Any other suitable means may be provided for the purpose of moving the said special thread guide into an intermediate position during a part of each course in the knitting of the reinforcement, herein the high splice and the sole of the foot. Those needles which take a reinforcing yarn, I herein at times term the reinforcing needles or reinforcing group, and

the other needles I term the non-reinforcing needles or non-reinforcing group.

Having thus described one illustrative embodiment of my invention, I desire it to be understood that although specific terms are employed, they are used in a generic and descriptive sense and not for purposes of limitation, the scope of the invention being set forth in the following claims.

Claims.

1. In a circular stocking knitting machine having a main yarn feed, means for reinforcing an area less than the full circumference of the stocking, comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from its lowest or feeding position and having an upper inactive position and an intermediate position, long and short butt needles arranged respectively in substantially half circles, cam means for dividing the long and short butt needles to permit feeding the reinforcing yarn to the short butt needles only, which also take the main yarn, and means to elevate said movable reinforcing yarn guide periodically into said intermediate position to lift the reenforcing yarn to and to insure its being taken by the last needle of the short butt needles and then to return it to said lowermost position before moving it into said upper inactive position.

2. In a circular stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from its lowest or feeding position and having an upper inactive position and an intermediate position, means to elevate said yarn guide into said upper inactive position, means to depress said yarn guide into the opposite extreme active position, and means to elevate said yarn guide into said intermediate position to lift the reenforcing yarn to and to insure its being taken by the last needle of the short butt needles and then to return it to said lowermost position before moving it into said upper inactive position, and cam means for dividing the long butt and short butt needles to permit feeding the splicing yarn to short butt needles only which also take the main yarn.

3. In a circular stocking knitting machine with a main yarn feed, a circular series of needles having two contrasting group formations, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown into an upper non-feeding position, a lowermost feeding position, and an intermediate position to lift the reenforcing yarn to and to insure its being taken by the last needle of the group of needles to receive said yarn with means to return said yarn guide from said intermediate position to said lowermost position before moving into said upper, non-feeding position, together with cam means for dividing the two groups of needles substantially at the reinforcing of the yarn guide.

4. In a circular stocking knitting machine, a pair of yarn guides co-axially mounted for up and down swinging movement and including a main yarn guide, and a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being a circular series of needles comprising two groups having contrasting butt formations, cam means for dividing the two groups of needles substantially at the reinforcing yarn guide, and means to move said reinforcing yarn guide into an uppermost non-feeding position, a lowermost feeding position and an intermediate position to lift the reenforcing yarn to and to insure its being taken by the last needle of the group of needles to receive said yarn with means to return said yarn guide from said intermediate position to said lowermost position before moving into said upper, non-feeding position.

5. In a circular stocking knitting machine having a main yarn feed, means for reinforcing an area less than the full circumference of the stocking, comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position, a circular series of needles having contrasting formations dividing them into a plurality of groups, cam means for dividing the needles in accordance with said groups for the reception of the reinforcing yarn, and means to lift said reinforcing yarn guide into an intermediate position to carry its yarn to and thereby in-

sure the endmost needle of the reinforcing series taking a reinforcing yarn and then to lower said yarn guide to its said feeding position before moving it further upward from its feeding position.

6. In a circular stocking knitting machine having a main yarn feed, means for reinforcing an area less than the full circumference of the stocking, comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be moved to and from feeding position and also into a position intermediate therebetween, a circular series of needles having contrasting group formations, means to divide the needles to permit feeding the reinforcing yarn to a reinforcing group thereof only and means to elevate said reinforcing yarn guide into said intermediate position thereby to lift its yarn to and thereby to insure the taking of the yarn by the last needle of the said reinforcing group and then to lower said yarn guide to its said feeding position before moving it further upward from its feeding position.

7. In a circular stocking knitting machine having a main yarn feed, means for reinforcing an area less than the full circumference of the stocking, comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be moved to and from feeding position and also into a position intermediate therebetween, a circular series of needles certain of which constitute a reinforcing group, means to divide the needles to permit feeding the reinforcing yarn to said reinforcing group only, and means to elevate said reinforcing yarn guide into said intermediate position thereby to lift its yarn to and thereby to insure the taking of the yarn by the endmost needle of the said reinforcing group and then to lower said yarn guide to its said feeding position before moving it further upward from its feeding position.

8. In a spring needle, circular, stocking, knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking, comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles certain of which constitute a reinforcing group, means to divide the needles to permit feeding the reinforcing yarn to said reinforcing group only, and cooperating means to move said reenforcing yarn guide into said intermediate position to position the yarn inside the beard of an endmost needle of the said reinforcing group and then to move said yarn guide to its said feeding position before moving it further upward from its feeding position.

9. In a spring needle, circular, stocking knitting machine with a main yard feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles certain of which constitute a reinforcing group, means to divide the needles to permit feeding the reinforcing yarn to said reinforcing group only, and cooperating means to move said reenforcing yarn guide into said intermediate position to position the reinforcing yarn inside the beard of the last active needle of the said reinforcing group and then to move said yarn guide to its said feeding position before moving it further upward from its feeding position.

10. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles certain of which constitute a reinforcing group, means to divide the needles to permit feeding the reinforcing yarn to said reinforcing group only, and means to move the reinforcing yarn guide into said intermediate position, so as thereby to position the reinforcing yarn inside the beard of the last needle of the said reinforcing group and then to move said yarn guide to its said feeding position before moving it further upward from its feeding position.

11. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking compris-

ing a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles having contrasting group formations, cam means for dividing said needles in accordance with said group formations, thereby providing a group to receive the reinforcing yarn and means to move the reinforcing yarn guide into either its uppermost inactive position, its lowermost feeding position or its intermediate position to lift the reenforcing yarn guide to present its yarn to the beard of a needle of the group receiving said reenforcing yarn, and then to lower said yarn guide to its said feeding position before moving it further upward from its feeding position.

12. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles having contrasting group formations providing a reinforcing group and a non-reinforcing group of needles, cam means for dividing said needles in accordance with said group formations, and means to move the reinforcing yarn guide into either its uppermost inactive position, its lowermost feeding position or its intermediate position, whereby in said intermediate position the yarn is lifted inside the beard of the last active needle of the reinforcing group and is prevented from being seized by the non-reinforcing group of needles and is then lowered into its feeding position before being moved into its uppermost inactive position.

13. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles having contrasting group formations providing a reinforcing group and a non-reinforcing group of needles, and means to move the reinforcing yarn guide into either its uppermost inactive position, its lowermost feeding position or an intermediate position to lift the reenforcing yarn guide to present its yarn to the beard of a needle of the group receiving said reenforcing yarn, and then to lower said yarn guide to its said feeding position before moving it further upward from its feeding position.

14. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reinforcing an area less than the full circumference of the stocking comprising a reinforcing yarn guide located to feed at a point in proximity to but substantially removed from the main yarn feed and which point is very materially less distant from said main yarn feed than a half circle of the needles, said reinforcing yarn guide being movably mounted to be thrown to and from feeding position and also into a position intermediate therebetween, a circular series of spring beard needles having contrasting group formations providing a reinforcing group and a non-reinforcing group of needles, and means to move the reinforcing yarn guide into either its uppermost inactive position, its lowermost feeding position or an intermediate position, whereby in said intermediate position the yarn is lifted inside the beard of the last active needle of the reinforcing series and is prevented from being seized by the non-reinforcing needles and is then lowered into its feeding position before being moved into its uppermost inactive position.

15. In a spring needle, circular, stocking knitting machine with a main yarn feed, means for reenforcing an area less than the full circumference of the stocking, comprising a reenforcing yarn guide of greater length than the main yarn guide and presenting its yarn to the needles on their way to the main yarn guide at a point less than one quarter of the circle of needles from but substantially removed from said main yarn guide, said reenforcing yarn guide being movably mounted to be elevated to wholly inactive position or lowered to feeding position and to be moved to an intermediate position, a circular series of spring beard needles having contrasting group formations providing a reinforcing group and a non-reinforcing group of needles, means to rotate said series of needles, means to elevate said reenforcing yarn guide into either said uppermost, inactive position or to said lowermost feeding position, and means to bring said reenforcing yarn guide into said intermediate position from its

lowermost feeding position periodically in each of a series of rotations of the needles and then back to said lowermost feeding position without movement into its uppermost inactive position, whereby in said intermediate position the yarn is lifted inside the beard of the last active needle of the reenforcing group and is thereby also prevented from being seized by the non-reenforcing needles.

In testimony whereof, I have signed my name to this specification.

FRANK E. JONES.