The invention has relation to automatic circular knitting machines; in the more specific phase thereof, it relates to machines of such class employing individually reciprocating cam-actuated independent needles.

The invention provides a double-feed machine adapted for the production of stockings having high splices and double soles, i.e., spliced soles.

The general aim of the invention is to increase the productiveness of an automatic circular knitting machine adapted to knit stockings having the features just mentioned, without increasing the speed of the machine.

The main principles of the invention, and certain of the specific features of invention, are applicable in the case of latch needle machines, as well as in the case of spring-bearded needles. Certain of the principles and features thereof are applicable more particularly in the case of machines employing spring-bearded needles.

The accompanying drawings show as an illustrative embodiment of the invention in its general entirety a spring-bearded needle machine. The manner and means of applying in the case of latch needle machines the principles and features of invention which are applicable to machines of such type will be apparent to those skilled in the art in the light of the disclosure in the said drawings and in the following description.

Usually in practice, in the process of knitting a stocking having a high splice and a foot with double or spliced sole upon an automatic circular knitting machine on the order of the well-known Banner machine, having a single feed-station, the garter top and adjoining portion of the upper part of the leg are knit of a yarn supplied by one of the yarn-guides, and the remainder of the leg to the beginning of the heel is knit with a yarn supplied by another yarn-guide. For the high splice a splicing yarn, supplied by its yarn-guide, is added to the yarn last mentioned in knitting those portions of the respective ankle courses which are at the back of the ankle. The heel is knit of one or more yarns supplied by the yarn-guide or guides controlling such yarn or yarns. The foot is knit of a yarn supplied by the proper one of the yarn-guides, for instance the main leg yarn, with the splicing yarn introduced into those portions of the respective courses which comprise the sole. The toe is knit of the same yarn or yarns as the heel. In this process, during the production of the leg, and of the foot between the heel and toe portions, a single round or course of stitches is knit in each revolution of the machine. Hence considerable time is consumed in the knitting of the leg and foot.

Double-feed machines, broadly considered, have been known in the art, but, so far as I am aware, double-feed machines have never been organized and adapted to the knitting of stockings having high spliced ankle portions and spliced or double soles. The nearest thereto has been the adaptation of double-feed machines to knit split-foot stockings; i.e., stockings in the case of which the body of the foot of a stocking is composed of two longitudinal halves united to each other by sutures along the sides of the foot. Such machines have not been adapted to produce stockings having high spliced ankle portions and foot portions composed of continuous round and round courses of the same yarn or yarns and having spliced or double soles. As organized heretofore they have not been capable of placing a splicing yarn in and out of knitting relations at the proper points in every course in knitting a high splice and a double or spliced sole. The endeavor to knit such goods upon a machine having a double-feed and equipped with devices for supplying a splicing yarn at the main feed only would result in the production of a high splice or double sole in which alternate courses only of the ankle or foot would contain partial courses of the splicing yarn.

The importance of increasing the productiveness of automatic circular knitting machines without increasing the speed of the machine is obvious. There are limits to the speeds at which such machines can be run successfully. This is true of machines employing latch needles as well as still more forcibly true of machines employing spring-bearded needles. In particular, a spring-
bearded machine is of limited speed capacity, this being true especially of spring-bearded needle machines of that type in which the needles are moved by cam-action individually and independently of one another for stitching purposes, and are "drawn" to form the stitches. There is in the case thereof a speed of which cannot be exceeded without breakage of needle-beards as a result of crystallization. 

The general aim of the invention is attained by the present invention in a double-feed machine, namely, a machine having a secondary feed-station, including stitch-cams, so that two courses of stitches may be formed in each revolution of the machine, through providing such machine with yarn-splicing devices, and in addition with means for controlling the knitting at said secondary stations so that knitting may proceed thereat during the production of a stocking leg and be suspended during the production of the high-spliced portion of the stocking, and of the heel, foot and toe. 

In the case of a machine embodying the main principles of the invention two courses are knit in each revolution of the machine throughout the production of the leg of the stocking, down to the beginning of the high splice. At such point, knitting at the secondary feed is suspended during the knitting of the ankle portion with a reinforcing thread in the high splice at the back of the ankle portion, as well as during the production of the heel, the production of the foot with its double sole, and the production of the toe.

In carrying the invention into effect in a spring-bearded needle knitting machine I provide special features in connection with the presser-cam at the secondary feed-station, and with the stitch-cams at such feed-station. The ring carrying the presser-cam has combined with it means whereby, at the point of beginning to knit the high splice, it is actuated to place the presser-cam of the secondary feed-station in an inoperative position.

In the drawings:

Figure 1 shows in front elevation an automatic circular knitting machine containing the illustrative embodiment aforesaid of the invention.

Fig. 2 is a side elevation of the said machine as shown in Fig. 1.

Fig. 3 is a plan view thereof, showing also the yarn-supply stand.

Fig. 4 is a plan view of certain parts of the machine on a larger scale than Figs. 1 to 3.

Fig. 5 is an elevation of the yarn-holding and parting devices.

Fig. 6 is a plan view thereof.

Fig. 7 is an end view thereof, looking from the right-hand side in Fig. 5.

Figs. 8, 9, 10, are detail plan views, showing chiefly, in different positions, the needle-depressing or draw-cam of the stitch-cams at the secondary feed-station.

The machine that is shown in the accompanying drawings is the well-known Banner machine, adapted to the employment of spring-bearded needles, and designed with modifications and additions for the purposes of the invention, as will be apparent from the following description. The features of the Banner machine are substantially indicated in U. S. Letters Patent to J. D. Hemphill, No. 933,443, granted Sept. 7, 1909, for circular automatic stocking knitting machines. The accompanying drawings are meant to show only the general machine, and the relations, etc., of the parts which are involved more immediately in the invention.

Certain of the parts that are shown in the drawings hereof correspond with those of Patent No. 933,443, and are designated herein by the same reference characters as in the said patent. Thus, in Figs. 1 and 2 the machine-frame is marked a, the rotatable needle-cylinder is marked N, the needles occupying the grooves or tricks thereof are marked n, the non-rotateable cam-carrier is marked H, and knitting or stitch-cams corresponding with certain of those of the said patent are marked a, c, e.

The pulleys (shown in Figs. 1 and 3) for the driving-band of the machine are marked p, p', p", (respectively quick-speed, slow-speed, and loose or idle), and at s (Fig. 1) is the main shaft, on which the said pulleys are mounted. At s' (Figs. 1 and 2) is the pattern-shaft, f and q being the main pattern-drums or pattern-barrels upon the said pattern-shaft, and f' being the series of cams on drum or barrel f which acts upon member 64 carried by clutch-shifting lever 65, to control the said lever and through the same control the working of the machine to produce either continuous rotation of the needle-cylinder or reciprocating action thereof, as required. The details of the mechanism controlled by pattern-cams f', through which at times the needle-cylinder is rotated continuously in a forward direction for round-and-round knitting, in knitting stocking-legs and feet, and at times is reciprocated forward and back in knitting heels and toes, may be substantially as in Patent No. 933,443, and are unnecessary to be shown and explained herein. At s", Figs. 1 and 3, are the yarn-guides of the main feed-station, controlled in usual manner by pattern-indicators upon pattern-drum f acting upon pattern-levers or fingers f which respectively are connected with the respective yarn-guides through intermediate devices of well-known character. At F' are the pattern-controlled instep cams which, through engagement at the proper times with the long butts, n', of the instep needles, raise out of action the needles which are not utilized in knitting the
heel and toe of a stocking; and on the completion of the heel or toe depress the said needles so as to restore their butts to working relations with the stitch-cams of the main and secondary feed-stations. At R, R, are the narrowing pickers by which needles are successively rendered inoperative for narrowing purposes in knitting the first half of a heel or toe pouch, and at T, T, are the widening pickers by which the same needles are successively rendered operative again for widening purposes in knitting the other half of a heel or toe pouch.

At p, Figs. 1 and 3, is the pattern-lever or finger through which certain of the pattern-indicators of pattern-drum or barrel f act to cause the yarn-guide 5, Fig. 3, for the splicing yarn to be either raised into inoperative position, to discontinue the feeding of the said yarn to the needles, or lowered to provide for delivering such yarns to the needles so as to be knit. In order that during the knitting of the spliced portions of the stocking the splicing yarn-guide 5 may be raised and lowered alternately in every revolution of the machine, so that the splicing yarn shall be inter-knit with the main yarn only partway around in each course, I employ in practice convenient means for the purpose, as for instance means such as shown and described in U. S. Letters Patent for knitting machines, No. 1,293,743, granted under date of Feb. 11, 1919, upon my application. At 62, Fig. 1, is the rotating cam of such means, from which the raising and lowering movements of the splicing yarn-guide 5 are derived.

Referring now to the secondary feed-station which I employ in reducing the invention to practice,—

Two yarn-guides, 7 and 71, are shown employed at the secondary feed-station. One of them ordinarily will control a yarn for use in knitting the garner top of a stocking, corresponding with the yarn which is provided at the main feed-station for use in knitting such portion of a stocking. The other will control a yarn similar to that yarn which is supplied at the main feed-station for use in knitting the remainder of the leg of a stocking. Hence it is rendered possible to knit concurrently two courses of like yarn at each revolution of the machine in producing the garner top, and likewise in producing the remainder of the leg down to the beginning of the heel. These two yarn-guides are combined operatively, through intermediate devices of usual character, comprising levers 73, 72, engaging with said yarn-guides, and connecting-rods 73, 73, with pattern-levers or fingers 74, 74, which are controlled by annular lines of pattern-cams or indicators 75, 75, in connection with a pattern-drum 76 upon the pattern shaft s' adjacent the pattern-drum g. Knitting or stitch-cams, including the draw-cam or so-called knitting cam 81 shown in Figs. 8, 9 and 10, as well as other cooperating cams, are provided at 8 at the secondary feed-station, to actuate the needles for knitting. In the case of a spring-bearded needle machine, a presser-cam 9, Figs. 3 and 4, is provided for actuating the pressers 10, Fig. 4, shown as black rectangles in Fig. 4, to close the spring-beards of the needles against the needle-stems, as required in order to enable the loops remaining on the needle-stems to be landed on the points of the said beards, preliminary, to casting such loops over the tops of the needles in forming a course of stitches. The presser arrangement may be on the order of that shown and described in U. S. Letters Patent for knitting machine, No. 1,290,266, granted Dec. 19, 1916, upon application of George P. Bosworth.

The presser-cam 9 just referred to, at the secondary feed-station, and the two presser-cams 11, 111, at the main feed-station, are mounted upon the ring 12, the latter being provided as heretofore in practice with cams (not visible in Fig. 4) for actuating the web-holders, which alternate with the pressers. As will be understood, the web-holder cams are suitable to produce the requisite wave movement of the web-holders in and out radially at each feed-station. The customary rotary shifting movement of the ring 12 to accord with the shifting of the point at which the stitches are formed in heel and toe work is provided for as usual, the limits of such rotary shifting movement being defined through the engagement of a projection 121, extending radially from the ring, with adjustable stop-screws 122, 122, carried by the small plates 123, 123, which are employed for holding down the ring 12. Plates 123, 123, are fastened upon the top of the web-holder ring or cap 124, which latter is held from rotating, and is adjusted angularly around the axis of the needle-cylinder, through engagement of the ends of adjustable stop-screws 125, 125, carried thereby with opposite sides of the fixed standard 13 by which the yarn clamping and cutting devices are supported.

While knitting is progressing at the secondary feed-station, one of the secondary yarn-guides is down in position to deliver yarn to the needles so as to be knit, the secondary stitch-cams are in working condition, and the presser-cam 9 is in working position in relation to the stitch-landing point. When knitting is to be suspended at such station, the presser-cams have given to them by the devices which are described later herein angular movement which carries the presser-cam 9 of the secondary feed-station into a position such that the needle-beards are not pressed at the stitch-landing point at such feed-station. Consequently, as the needle-stems descend within the old loops thereon such loops pass under the beards instead of
being landed on the points of the beards, and knitting at the said feed-station thereby is discontinued. The presser-cam 11 at the main feed-station which is in action during con-
tinuous knitting is of sufficient length to permit the required extent of movement (ap-
approximately one-quarter of an inch) of the presser-cam ring to take place without hav-
ing any effect at the main feed-station. Ac-
companying this shift of the presser-cams, the
operative yarn-guide at the secondary feed-
station is raised through the action of the
pattern-mechanism so that the knitting yarn supplied thereby passes inward through the
depression of the needle-wave to the inner portion of the circle of needles, and is drawn into the grasp of the auxiliary binder to which reference will next be made, and be-
tween the blades of the auxiliary cutter. To
prevent running-off of the stitches at the sec-
ondary feed-station when the auxiliary press-
er-cam 9 is rendered inoperative, the shift of
the presser-cam ring is caused to take place in
such time-relationship to the raising of the yarn-
guide at such station that the said presser-
cam 9 ceases to act just prior to the last taking
of the yarn supplied by such yarn-guide by a
needle. The knitting cam 81 of the secondary
feed-station is withdrawn radially outward
into an inoperative position, by the devices
which are provided for such purpose, de-
scribed hereinafter.

The auxiliary knitting cam 81 is withdrawn
radially outward from its working position
shown in Fig. 8 to its fully inoperative posi-
tion shown in Fig. 10 by a two-step move-
ment. This action is caused to take place
about four courses after the shift of the press-
er-cam and yarn-guide or finger. The first
step-movement takes place during passage of
the long butts n of the instep needles by the
secondary feed-station, and is sufficient in
extent, as will appear from Fig. 9, to enable the knitting cam to clear the short butts no of
the heel and toe needles during the passage of
said butts. The second step-movement is suf-
ficient, as indicated in Fig. 10, to enable the
knitting cam 81 to clear the long butts when
they come around again, thereby avoiding
breakage through contact of such butts with
the knitting cam. As the cylinder continues
to rotate the needles are leveled up in usual manner by one of the needle elevatingcams
employed in conjunction with the knitting
cam 81.

The angular displacing movement of the
presser-cam 9 of the secondary feed-station is a backward movement thereof. It is pro-
duced in this instance by pattern-connections
comprising a bell-crank 128, Fig. 3, working
horizontally and having one arm thereof, 126,
engaged with the head of a screw 127, Figs. 3
and 4, applied to ring 12, a link 128, Fig. 3,
connected to the other arm of said bell-crank,
a rocker 129 to which said link is also connect-
ed, a rod 130 extending down from said rock-
er, a pattern-lever or finger 131, Fig. 3, to
which the lower end of said rod is connected,
and a line 132, Fig. 3, of pattern-indicators
or cams on the third pattern-barrel 76. Fol-
lowing the movement of the yarn previously
being knit at the secondary feed-station to a
non-knitting position within the needle-circle, the action of the butts of the revolving series of web-holders within the grooves of the web-
holder cams operates to return the ring 12,
operator-cams 9 and 11, and the web-holder
cams, to their original positions, angularly of
the machine, by a reverse movement of the ring and cams.

The two-step movement of the knitting cam
81 at the secondary feed-station from its
working position shown in Fig. 8 first into
its intermediate position shown in Fig. 9, and
then into its fully retracted position shown in
Fig. 10, is provided for in this instance by
means of a slide 82 having a slot 83 crossing the slide obliquely and occupied by the head
of a screw 84 applied to a projection 85 ex-
tending outward from the said knitting cam.
The said slide is connected by a link 86 to a
pin 87 carried by an upstanding arm of a bell-
crank 88, Fig. 2, having a horizontal arm thereof connected by a rod 89 to a pattern-
lever or finger 90 controlled by a line 892 of
pattern-projections or cams on the third pattern-barrel or drum 76.

Contracting spiral springs 50, 50 connected
with the two pattern-levers or fingers, 74,
74, operating to hold the engaging ends of
such levers or fingers in engagement with the
surface of the third pattern-barrel or drum,
operate to move pattern-fingers 74, 74, and
their connections reversely after having been moved by pattern-projections or cams of the
said barrel or drum. Springs 51, 51, connect-
ed with bell-cranks 1251 and 88, operate to
move the bell-cranke in opposition to the
pattern-projections or cams of the said third pattern-barrel or drum. The reverse move-
ment of the parts in connection with the slide
operates the slide to move the knitting cam inward back into its normal working posi-
tion.

In conjunction with the binder and cutter
for the yarns which are controlled by the
yarn-guides of the main feed-station I pro-
vide an auxiliary binder and cutter for the
yarns which are controlled by the yarn-
guides of the secondary feed-station. The
two sets of binders and cutters preferably are
combined and organized to be mounted upon
one support and to be actuated by one train
of operating connections. The construction,
etc., may be varied more or less in practice.

The devices last referred to are mounted upon a supporting arm 14 which is attached
to the upper end of the standard 13. The
fixed lower members or jaws of the two sets
of binders and cutters are constituted by dif-
ferent portions, 151, 152, of a plate 15 carried by the lower end of a block 16, Fig. 6, which is attached to the inner end of the supporting arm 14. Or the said lower jaws may be made as separately formed pieces that are attached to the said plate 15. The movable jaw or member 17, Fig. 5, of the main binder is attached to a block 171 mounted between guides 172 on the fixed block 16 so as to be capable of movement vertically, and it is actuated upon by an expanding spiral spring 173 that tends to move it downward toward the fixed lower jaw 151. The said movable jaw or member 17 is raised through the action of the upper edge of a lever 18 against a pin 174 projecting from the carrying block 171 of the said movable jaw or member. The lever 18 is pivotally mounted upon a screw 181 in connection with the fixed block 16, and for its actuation is connected by a link 19 to a lever 20 which is pivoted at 201 upon the fixed supporting arm 14, and in turn actuated by means of pattern-cams upon the third pattern-barrel or drum 76 through intermediate connecting devices. The said intermediate connecting devices comprise the vertically movable rod 21 working through a fixed guide 211 projecting from standard 13. The upper end of the rod 21 is engaged with the outer arm of the said lever 20, the rod being connected at its lower end with the lever 22, which in turn is connected by a rod 23 with a pattern-lever or finger 24 controlled by means of the pattern projections or cams 252 on the pattern-drum or barrel 76. The cutter devices cooperating with the main binder comprise a fixed edge or blade 26 upon the portion 151 of plate 15, and a movable blade 27 which is pivoted to the said plate at 271. The said movable blade 27 is actuated through engagement with the binder-acting lever 18, the said movable blade having a laterally offset portion which works in a slot 272 made in the said lever. When lever 18 is actuated to raise the movable binder-member 17, it acts also through engagement with the movable cutter-member to separate the latter from the stationary cutter-member. Thereby the cutter and binder are opened simultaneously to receive a yarn. When the lever 18 is moved reversely, it operates the movable cutter-member 27 to close the cutter to sever the yarn, while simultaneously therewith the movable binder-member 17 is closed down upon the yarn through the action of the spring 173. At 572 is a leaf-spring which is pivoted upon the pivotal screw 271 of the movable cutter-member 27 and is engaged by a pin 273 projecting from the said cutter-member into a slot 274 in the spring, so that the spring accompanies the movable cutter-member in the swinging movements of the latter, while acting to keep the movable cutter-member pressed sidewise against the stationary cutter-member, to insure a good cutting action. The movable jaw or holding member 28 of the auxiliary binder is pressed down upon the upper surface of the stationary projection 152 in connection with plate 16, by means of a leaf-spring 29, Fig. 7, bearing upon the top of the said movable jaw or member 28. The cutter provided in connection with the auxiliary binder comprises a movable blade 30 forming a part of a lever 301 that is pivoted at 302 upon block 16. The said movable blade is arranged to coact in cutting with one edge of the projection 152, and is pressed laterally against the side of movable binder 28 and said projection 152, to insure good cutting action, by means of a leaf-spring 303, combined substantially as in the case of the leaf-spring 272 in connection with the movable cutter-member 27. For the actuation of the movable jaw or member 28 of the auxiliary binder to raise the same from the stationary member 152, it is in pin-and-slot engagement with the bell-crank 31 which is mounted pivotally at 32 on a portion of the block 16, or it might be upon the inner end of the arm 14, the said bell-crank 31 being engaged with the lever 20 by means of a projection 311 from one arm of the bell-crank occupying a hole 202 in the lever 20. When the lever 301 is rocked to raise the cutter-member 30, the movable jaw or binder-member 28 is raised through the engagement of the top edge of the cutter-blade 30 with the pin 281 projecting from the jaw or member 28.

Through the described combinations and connections the movable jaws or members and the movable blades of the cutters of both the main and the auxiliary binders and cutters are opened simultaneously to receive yarns from both feed-stations, and the closing action of all four elements is simultaneous likewise.

The movable jaw or member 28 is slitted at 282, Fig. 5, at its under side, and in the slit is contained a wire spring 283, preferably made of piano wire, arranged to press against the top surface of the bottom jaw 152, and serving to maintain continuously a hold upon a yarn-end occupying the auxiliary binder after the upper jaw 28 has been raised so as to open the auxiliary binder. This holding action is important, it serving to retain the said yarn-end at those times when the binder and cutter devices are operated in connection with change of yarn at the main feed-station at times when no change is required to take place at the secondary feed-station.

What is claimed is:
1. A circular knitting machine, for knitting a stocking, having a main knitting station with knitting-cam devices and yarn-feeding means, including sectional splicing means, and a secondary knitting station with knitting-cam devices and yarn-feeding means, circumferentially spaced from the...
main station, adapted to cooperate with the main knitting station in producing two courses in a revolution of the machine during the formation of a stocking leg, and having combined therewith means to render inoperative the knitting means of said secondary station when sectional splicing is being effected.

2. A circular spring-bearded needle knitting machine, for knitting a stocking, having a main knitting station with knitting-cam devices and yarn-feeding means, including sectional splicing means, and a secondary knitting station with knitting-cam devices and yarn-feeding means, circumferentially spaced from the main station, adapted to cooperate with the main knitting station in producing two courses in a revolution of the machine during the formation of a stocking leg, the said stations respectively having presser-cams, and the said machine having combined with the foregoing elements instrumentalities to render inoperative the knitting means of said secondary station when sectional splicing is being effected, such instrumentalities including means for effecting withdrawal of the presser-cam of such station.

3. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing means comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, by a movement of the previously operative yarn-guide into an inoperative position, by withdrawal of the presser-cam from the point at which during knitting at such stitches are landed on the needle beards, and by withdrawal of the knitting cam.

4. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing means comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, by a movement of the previously operative yarn-guide into an inoperative position, and for causing retraction of the presser-cam, timed so that such cam ceases to act just prior to the last taking of the yarn by a needle.

5. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing devices comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and, for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, by a movement of the previously operative yarn-guide into an inoperative position, by withdrawal of the presser-cam from the point at which during knitting at such stitches are landed on the needle beards, and by withdrawal of the knitting cam.

6. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing devices comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, including means for causing movement of the previously operative yarn-guide into an inoperative position, and for causing retraction of the presser-cam, timed so that such cam ceases to act just prior to the last taking of the yarn by a needle.

7. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing devices comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and, for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, by a movement of the previously operative yarn-guide into an inoperative position, by retraction of the presser-cam, timed so that such cam ceases to act just prior to the last taking of the yarn by a needle, and by withdrawal of the knitting cam.

8. A double-feed automatic circular knitting machine having instep needles with long butts and other needles with short butts, instep cams, and narrowing and widening devices, and having also main and secondary feed-stations, the said main feed-station hav-
ing sectional splicing devices comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, including means for withdrawing the knitting cam by a two-step movement, the first step enabling it to clear the short butts, and the second step enabling it to clear the long butts.

9. A double-feed automatic circular knitting machine having instep needles with long butts and other needles with short butts, instep cams, and narrowing and widening devices, and having also main and secondary feed-stations, the said main feed-station having sectional splicing devices comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion, by a movement of the previously operative yarn-guide into an inoperative position, by shift of the presser-cam into an inoperative position relative to the point at which during knitting at such station stitches are landed on the needle beads, and by withdrawal of the knitting cam by a two-step movement, the first step enabling it to clear the short butts, and the second step enabling it to clear the long butts.

10. A double-feed circular knitting machine comprising spring-bearded independently actuated needles and main and secondary feed-stations respectively having presser-cams located thereat, said main feed-station having sectional splicing means comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and means for rendering the secondary feed-station inoperative for further knitting at the beginning of a high spliced ankle portion and during the production of said high spliced ankle portion and of the heel, foot, and toe.

11. A double-feed circular knitting machine having at its main feed-station sectional splicing means comprising a splice yarn-guide controlled by devices which place the splice yarn in and out of position to be knit at points in every course knit at such station during the knitting of a spliced portion of a stocking, and also having means for rende-
CERTIFICATE OF CORRECTION.

Patent No. 1,736,742.

Granted November 19, 1929, to

RAYMOND FISHER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 6, line 83, claim 5, after the word "such" insert the word "station"; page 7, line 60, claim 11, for the word "inoperative" read "operative"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of December, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.