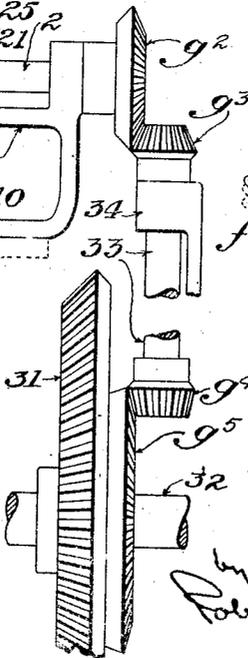
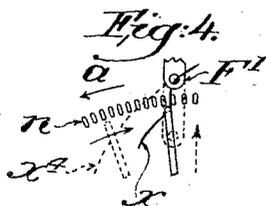
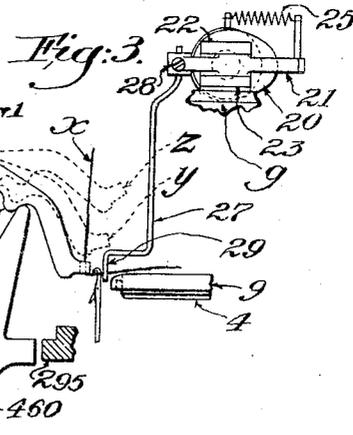
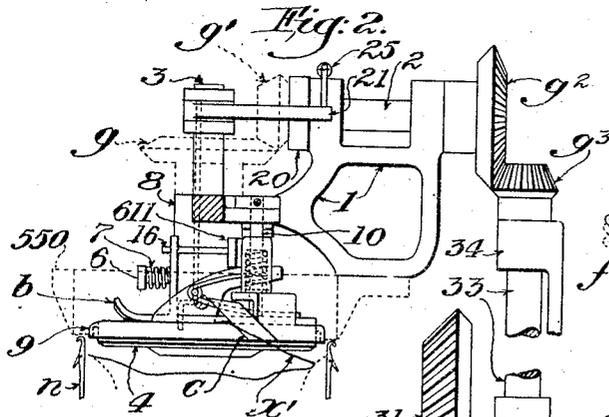
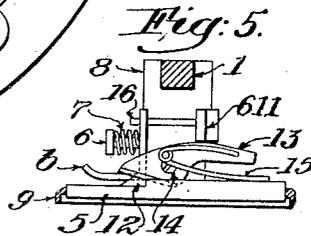
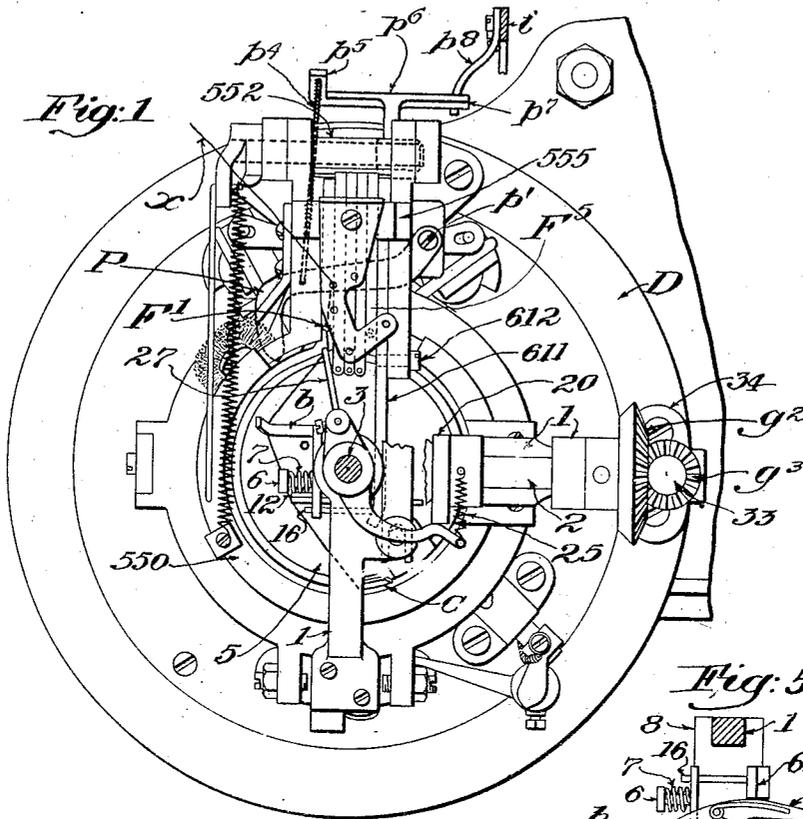


R. W. SCOTT.
 YARN FEEDING DEVICE FOR KNITTING MACHINES.
 APPLICATION FILED DEC. 13, 1915.

1,237,256.

Patented Aug. 14, 1917.
 2 SHEETS—SHEET 1.



Inventor:
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 by
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Fig. 6.

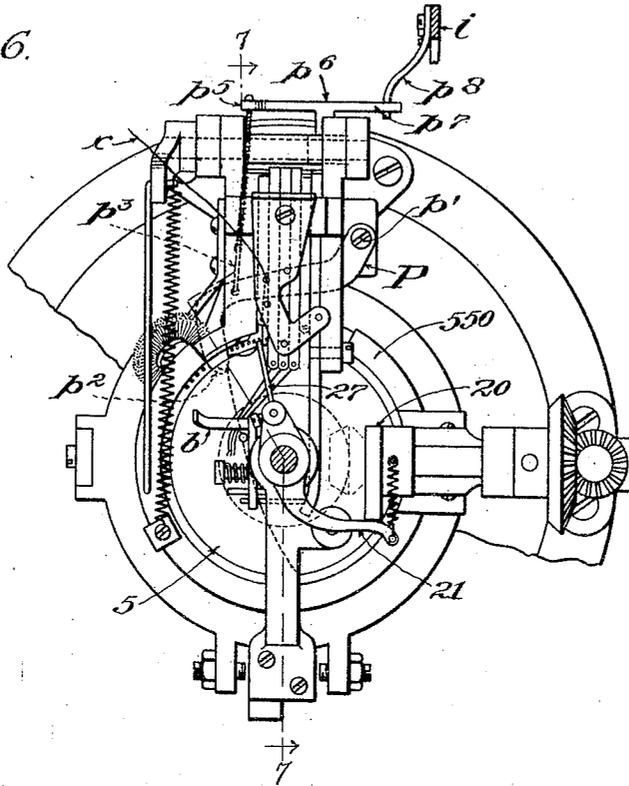
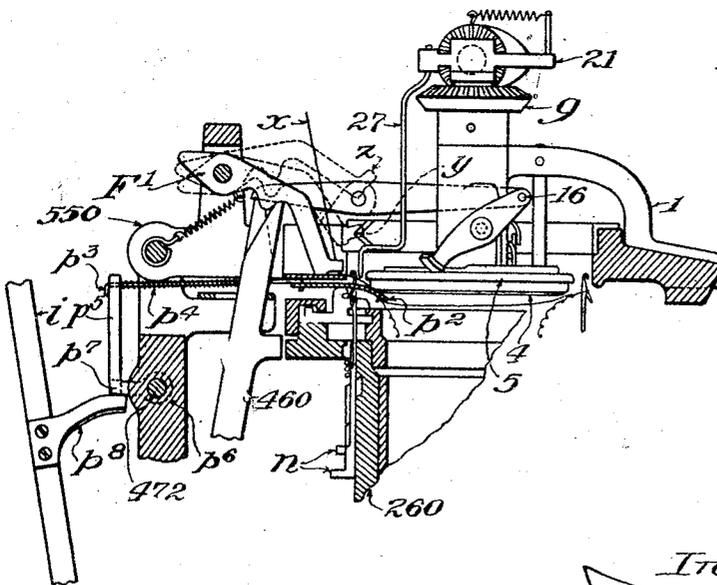


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT W. SCOTT, OF BOSTON, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO SCOTT & WILLIAMS, INCORPORATED; A CORPORATION OF MASSACHUSETTS.

YARN-FEEDING DEVICE FOR KNITTING-MACHINES.

1,237,256.

Specification of Letters Patent. Patented Aug. 14, 1917.

Application filed December 13, 1915. Serial No. 66,426.

To all whom it may concern:

Be it known that I, ROBERT W. SCOTT, a citizen of the United States, and resident of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Yarn-Feeding Devices for Knitting-Machines, of which the following is a specification.

My invention relates to yarn feeding devices for knitting machines, and in one specific embodiment to yarn feeding devices including a sectional splicing device for circular knitting machines.

One object of my invention is to provide for changing, severing, clamping and feeding a splicing yarn in connection with a circular knitting machine having a dial or instrument carrier mounted to cooperate with a circle of needles, as in rib knitting machines, or in machines having automatic transfer devices, looping devices, pile-forming devices or other devices necessitating instruments cooperating with the needles, or mounted in a dial or carrier near the needles. Other objects of my invention are to secure entrance of a yarn given to a continuous part only of the entire series of needles, as for sectional splicing, with certainty, so that in successive courses the splicing yarn is entered at the same point in the series of needles, to produce fabric sectionally spliced for a part of its width, the border of the spliced area occurring at the same needle-wale in course after course.

Yarn feeding devices cooperating with dial knitting machines have heretofore been rendered of difficult or imperfect operation by reason of failure to provide for entering a yarn guided in a plane favorable for entrance of the yarn at the needles at the time of entry. So far as I am aware, knitting machines of the prior art having a dial have always been provided with devices for giving the yarn to the needles of one set either mounted exclusively on one side of the needles, so that entry of the yarn was not secured positively by motion of yarn guided in a plane passing between adjacent needles, or so arranged as to present the yarn on a chord of the circle, at an unfavorable angle for entrance. One object of my invention is therefore to provide for entering yarn positively and deeply into engagement

between the needles while positioned cross-wise of the needles. 55

In modern high-speed knitting machines the needle carrier may be rotated from two hundred and fifty to three hundred revolutions per minute, each revolution representing a course knit at each needle in the carrier. The number of needles may be large, for instance 220 or 240; and, to select a numerical instance, with 220 needles and at 256 revolutions per minute, 938 needles will pass the yarn-feeding point during each second. Prior arrangements for moving a movable yarn guide into operative position mechanically in time with the passage of a particular pair of needles are not reliable to secure certain entry of the yarn when the relative speed approaches the order stated, especially when the space at the back of the needles is occupied by a dial and its adjuncts. I am aware of successful prior devices for securing sharp entrance and exit of a splicing yarn, by causing a different movement of the needles which are to take and those which are not to take the splicing yarn; but in some cases where it is desirable to avoid providing different kinds of needles for the spliced and unspliced portions, or where it is difficult to arrange the machine to operate different series of needles so as to cause them to take different paths at the yarn feeding point, it is still desirable to rely upon timed movements of the yarn finger or carrier to secure entrance and exit of the yarn. I have discovered by experiment that a great part of the inaccuracy of entry of the yarn in the operation of prior devices flowed from failure properly to guide the yarn during the sudden movement required to insert it between a given pair of the passing needles. 60 65 70 75 80 85 90

While my new device is applicable to knitting machines of many different types, I have chosen to illustrate one embodiment thereof in connection with a knitting machine of the type shown, described and claimed in my United States Letters Patent No. 1,148,055 dated July 27, 1915, my present devices comprising improvements upon the devices described therein and claimed in my application Serial No. 845,844 filed June 18, 1914, a continuation of the application resulting in said Letters Patent, 95 100 105

which may be referred to for constructions not described below.

I will now explain my invention in connection with the accompanying drawings in which—

Figure 1 is a plan above the bed plate and latch-guard ring of a hosiery knitting machine illustrating my invention;

Fig. 2 is an elevation, parts shown in Fig. 1 being broken away;

Fig. 3 is a detail elevation at a right angle to Fig. 2 showing the internal yarn-guide member cooperating with the splicing yarn finger;

Fig. 4 is a diagram in plan illustrating the relation of the needles, splicing yarn finger and the internal guide for the splicing yarn at the time of entrance of the splicing yarn;

Fig. 5 is a detail elevation of the yarn severing means;

Fig. 6 is a plan similar to Fig. 1 illustrating a modified operation of the devices; and

Fig. 7 is an elevation partly in section on line 7—7 of Fig. 6.

As shown in Figs. 1 and 2, the machine may be provided above the bed-plate D for the knitting head, preferably as an attachment of the latch guard ring 550, with a bracket 1 having horizontal bearings for a short shaft 2 and a vertical bearing 8 for a center spindle 3 held in said bracket at the center of rotation of the needle-carrier or cylinder 260 for needles *n*, and serving if desired as a carriage for an instrument dial 4, which may be driven, if so desired, by shaft 3, bevel gears *g'*, *g''*, and shaft 2. Bracket 1 supports a cap or plate 5, which may if desired carry on its under surface cams for actuating the needles or other instruments mounted in dial 4. In some cases the dial may be above its actuating cap, and the plate 5 may then be any cover or support arranged to be held stationary with respect to the yarn-feeding means. Plate 5 carries on its upper surface guiding, clamping and severing means for a series of yarns carried by movable yarn-guides preferably made as a series of yarn-fingers F^1 to F^5 pivoted on a stud in an extension 555 of latch guard ring 550. These yarn fingers may be constructed and operated substantially as explained in my said Letters Patent, one or more of them, such as F^1 , being arranged and actuated to feed a splicing-yarn *x* during the passage of a predetermined segment of the needles *n*, for instance of substantially half of said needles. One means, as shown in said Letters Patent, for actuating such a yarn-guide for this purpose may comprise a cam rotating with a part attached to or moving in unison with the needle-carrier, such as web-holder bed 295, Fig. 3, reacting with a lug on a thrust-

bar 460 to move the thrust-bar laterally against a lug *s* on the splicing yarn guide F^1 , to lift said guide to the position shown in dotted lines at *y* during each passage of the same part of the rotating circle of needles, thereby to throw yarn *x* above and within the circle of needles. Splicing yarn *x* will then be entered again during the same revolution by return of the yarn-guide F^1 to the full-line position, for instance by a spring *f*, when the rotating cam has passed.

The yarn-finger F^1 and others of the series when rendered inoperative, so as to cease splicing, or to change the yarns, will be lifted to the position shown at *z*, Fig. 3.

Yarn-fingers at position *y* or position *z* will guide a yarn attached to the forming fabric near the needles, by the rotation of the needles in the direction of the arrow *a*, Fig. 1, above the plate 5, under a guide *b* on top of plate 5, and unless severed, the said yarn will then pass at an opening or other guide on the periphery of plate 5 to the under side of dial 4. An inclined guide *c* for causing the yarn to pass beneath the plate 5 and dial 4 may be provided as shown in Figs. 1 and 2. The guide *b* may comprise an upwardly bent arm pivoted at 6 on a flat on the vertical bearing portion 8 of bracket 1, and be held by a spring 7 yieldingly against the upper surface of plate 5. Guide *c*, when employed, may be substantially opposite the yarn-feeding point, and in the instance shown, is formed as an attachment of a ring 9 arranged to form a smooth and rounded periphery for the dial 4 and plate 5. Ring 9 may be mounted on a stem 10 in a vertical bore in bracket 1, and may be vertically movable to uncover the instrument-grooves of the dial; but for the purpose of guiding the yarn it will be understood that the ring 9 may be fixed, or dispensed with altogether as illustrated in Fig. 6, the edge of plate 5 being employed instead. Guide *c* or its equivalent may be mounted directly on or formed in plate 5, the function of the parts mentioned being to cause runs or floats of yarn thrown above the plate 5 when withdrawn from the needles to pass to a position beneath plate 5 and dial 4 at the completion of a rotation or rotations, as shown at *x'*, Fig. 2. For this purpose, as when splicing yarn is floated above plate 5, any instruments employed in dial 4 may if desired be withdrawn within its periphery at the segment swept by the yarn-float *x'* or covered by ring 9, lowered during the splicing operation by hand or any practicable means.

I may provide a severing and clamping device for the splicing-yarn, when thrown out of work, and for the other yarns, for instance as shown in Figs. 1, 2 and 5, comprising a fixed shear blade 12 mounted on

bearing portion 8 of bracket 1 and a movable shear blade 13 pivoted at 14 on said portion 8, normally held closed by wire spring 15, and adapted to be operated by a lever 611 pivoted at 612 on the latch guard ring, for automatic operation by a pattern-controlled connection, for instance substantially as disclosed for operating the yarn-severing means in my said patent. Whenever one of the yarns carried by any of the yarn fingers, except the splicing yarn finger, is thrown above plate 5, the shears 12, 13, will be opened, and thereafter closed to sever the yarn. Whenever splicing is to cease, and the splicing-yarn finger is thrown to position z , the shears will be operated to sever the splicing yarn.

For the purpose of clamping the severed ends of yarns thrown out of work, guide b may be actuated about its pivot 6 by spring 7 to hold a yarn passed under it. The clamp formed by guide b and upper surface of plate 5 is conveniently opened automatically to release one yarn and receive another by a pin 16 in lever 611 taking into a hole in guide or clamp b , so that whenever lever 611 is depressed to open the shears 12, 13, the clamp is opened, and whenever lever 611 is released to sever the yarn, the clamp is closed.

The splicing-yarn x , when being given to a section of the needles, takes against but does not enter the closed clamp-guide b upon its withdrawal at each revolution, neither the severing means nor the clamp being worked when the finger F^1 is thrown to the position y .

The mechanism above mentioned for entering and removing the splicing-yarn works well at the high speeds desired, with respect to withdrawing the splicing-yarn at the desired place in the series of needles n to form the outgoing or withdrawing border of the spliced area at a predetermined wale of the fabric, but some uncertainty still exists under the best adjustments of the machine in the entrance of the yarn x at the needles.

Referring now to Figs. 1 and 4 it will be observed that the rotation of the needles or instruments in the direction of arrow α will have swept the splicing-yarn float about the periphery of the plate 5 until it encounters the guide c , the position of the splicing-yarn guide now elevated to position y being such as to cause the tension of the yarn to drag it inward toward the center of the plate 5 and under the upturned part of guide or clamp b . Under any arrangement dependent upon the position taken by such a float, the motion of the needles draws off the yarn at the back of the needles at an angle to the needles sloping in the direction of their travel, as illustrated by the position of the dotted line x^4 , Fig. 4. Upon now attempting to enter this yarn between a pair of

needles, it will be seen from inspection of Fig. 4 that the position of the yarn lying at such an angle is unfavorable for entrance to the space between adjacent needles. The yarn in the position x^4 lies at an angle also to the substantially radial and downward path swept by the yarn feeding end of the splicing yarn-finger F^1 when moving to enter the yarn x , and its motion by such movement of the yarn-guide is not a downward swing into the needles, as desired, but is partly a lateral sweep against their backs. If the yarn x is left in the position x^4 , it will eventually take between the needles when the yarn-finger F^1 is dropped, but only after being rubbed along their tops, and after the splicing yarn-guide has reached a position lower than that at which the yarn is sometimes capable of entering upon the needles.

I have therefore provided my machine with devices for correcting the angle of the floated yarn with respect to the line of needles prior to or during the entrance of the splicing yarn at the needles for the purpose of securing a favorable position for direct entrance of the yarn.

Referring now to Figs. 1 and 3, as one instance of means for this purpose I have illustrated a rocker-arm 21, held by collars 22, 23 on center spindle 3 for free rocking movement, for instance, as caused by a spring between said arm 21 and any convenient fixed part, as bracket 1, and a cam 20 fast on shaft 2. A wire arm 27 adjustably held in a bore in rocker-arm 21 by set-screw extends downwardly and then outwardly above plate 5, terminating in a downwardly extending guide 29 behind the needles n and above the plane of instruments carried by dial 4. An arc concentric with and behind the needles is swept by guide 29, which arc extends from directly in front of the active position of the splicing yarn finger F^1 , to a position outside of the line taken by the yarn x when thrown above and within the needles. The position of cam 20 is such as to hold the guide 29 to the left, Figs. 1 and 4, during passage of the withdrawn yarn x , which by the stitching movement of the needles passes between the edge 9 of the plate 5 and said guide, and under the guide. When the splicing yarn is to be entered, the most eccentric part of cam 20 holds guide 29 in the position shown in Figs. 1 and 4, said guide having swept the yarn x backward into or near the plane of movement of finger F^1 , and placed the yarn in a position to pass directly across the needles when the finger F^1 drops.

When yarn x is taken by the needles, the float x' of said yarn is held down by the needles to pass freely between said guide and the edge 9 of plate 5. The figure of cam 20, as shown, may be such as to move rocker-arm 21 and guide 29 backward to the position shown in dotted lines in Fig. 4 before

rotation of needles n causes the end entered at the needles of float x' to pass its position.

Any convenient means for actuating rocker-arm 21 may be employed, but I prefer the rotated shaft 2 and cam 20 as shown. Shaft 2 is conveniently driven by a bevel gear g^2 thereon meshing with a bevel g^3 on a vertical shaft 33 passing through a hole in bed-plate D and having a bearing in standard 34, said shaft being driven by a bevel g^4 on its lower end engaging a bevel g^5 on the hub of gear 31 on main drive shaft 32, whereby the center spindle 3 is driven in unison with the needle-carrier for the needles n .

One advantage of the indicated driving means is capacity for separation of gears g^2 , g^3 , when latch guard ring 550, bracket 1, and other attachments of said latch guard ring are lifted for access to the needles. Unless positively disturbed, a broken drive connection of this sort is restored upon replacing the part moved away without disturbance of the rotative adjustment of the part.

In some cases it is desirable to float the splicing-yarn under the dial 4 without permitting the diametrical floats to pass above the cap 5, and as shown in Figs. 1, 6 and 7, I may accomplish this by use of an instrument P passing above the cylinder needles n at the place where they are withdrawn downwardly to knit, and beneath the dial, in cooperation with the depending arm 27, 29 or other positioning means for the splicing yarn. The instrument P, Figs. 6 and 7, may be a welt-presser employed at another time in the operation to cause fabric held on the instruments in the dial to pass downward beneath the dial, and I do not herein claim said instrument, except in combination with the means for positioning a withdrawn yarn, so that the yarn will enter the needles when intended to be inserted, said yarn being guided by instrument P beneath the dial. Said instrument may be pivoted at p' on an attachment of the standard for latch-ring 550, and may cooperate with a dial and a plate 5 having a ring 9 as shown in Fig. 1 or without such a ring, as shown in Figs. 6 and 7. Said instrument may be constructed in any convenient form, for instance as a thin spring metal body, terminating at p^2 in a downwardly-bent cam-end adapted to pass over the needles and web-holders and under the plate 5 and dial 4 when actuated by a connection p^3 , which may be a wire-link surrounded by a compression spring p^4 , and passed through a hole in the upright arm p^5 of a rocker p^6 free to swing on stud 472 in a fixed part of the machine, and having a horizontal arm p^7 adapted to be moved against gravity or a spring by a lug p^8 adjustable on a pattern-controlled connection such as the bar z , which may be the bar shown in my said patent for operating the yarn take-up

mechanism. Whenever splicing is to be done, the bar z is lifted by a suitable indication on the pattern surface controlling it to move the cam-end p^2 of lever P inward as shown in Fig. 6.

A movable yarn-guide, such as splicing yarn finger F^1 , upon being lifted to position y , will then withdraw the yarn toward the backs of the needles, the relative motion sweeping the attached end of the yarn against the instrument P, around which the yarn will reeve as the relative travel of the fabric causes it to define an increasing chord of the circle of needles, the yarn pulling off from the elevated finger F^1 to permit this passage beneath the dial and plate 5. So much of the yarn as extends between the splicing-yarn finger and the cam-end p^2 of instrument P will rest in the space between the needles and the edge of plate 5, and against plate 5. At this time arm 27 is positioned near instrument P, but before the yarn is again entered, said arm 27 will move to bring its depending end 29 against the yarn between p^2 and the bore in the yarn-finger, to move the yarn for entry substantially into the plane of movement of finger F^1 .

When the finger F^1 is lifted to position z at the end of splicing, the shears 12, 13 and clamp b will be operated to sever and hold it above the plate 5, the instrument P being withdrawn prior to this time to permit the yarn to sweep around plate 5 and above it, as in the case of the yarns carried by the remaining yarn-fingers. The bar z may be controlled for this purpose by suitable cams on the pattern surface controlling it for its usual functions.

When a yarn, for instance the splicing yarn, is guided beneath the dial by such an instrument as presser P, the space back of the needles need not be kept open to permit the yarn to sweep the edge of the dial or other obstruction, except at the space between the place of exit of the yarn and the position of the guiding instrument, and the needles, transfer implements or other instruments may be projected at other parts of the circle. A floated yarn guided under the dial in the manner described is subjected to little or no strain, and less yarn is taken into the float than when it is thrown above the obstruction back of the needles.

The new inventions herein shown and described but not claimed are claimed in my co-pending applications Serial Nos. 66,424 and 66,425, filed December 13, 1915.

What I claim is:

1. A knitting machine having needles and a splicing yarn-feeding device operative during passage of a part only of said needles to feed a splicing yarn, whereby said yarn is floated behind the said needles, in combination with a plate supported within said

needles, a guide for moving the floated yarn beneath said plate and a guide adapted to receive the floated yarn behind the needles, and actuating means for differently positioning said last mentioned guide with reference to the splicing yarn-feeding means to maintain the splicing yarn in position for entrance.

2. A circular knitting machine having needles and a splicing yarn-feeding device operative during passage of a segment only of said needles to feed a splicing yarn, whereby said yarn is floated within the said needles at each course knit, in combination with an internal plate and guides adapted to receive the floated yarn within the needles, respectively to guide it beneath said plate and to position it for entrance; and means operative to move said positioning guide with reference to the splicing yarn-feeding means during each course.

3. A knitting machine having needles, yarn-feeding means, a removable latch-guard, oscillating yarn-guiding means mounted on said latch-guard and extending within the needles, a rotary cam and means for rotating it mounted on said latch-guard, and means for actuating said yarn-guiding means from said cam.

4. A knitting machine having a dial, needles, and yarn-feeding means movable with respect to the needles to enter the yarn upon them, in combination with a movable guide to position the yarn for entry and a movable guide adapted to cause a withdrawn float of said yarn to lie beneath the dial.

5. A knitting machine having needles, a yarn-guide movable crosswise of the needles to enter and remove its yarn, an instrument adapted to be moved across the needles to receive and guide the yarn downward when it is withdrawn, and a movable positioning device for the withdrawn yarn adapted to act on the yarn between said instrument and said yarn-guide.

6. A knitting machine having a circular series of needles, a movable yarn-feed guide adapted to withdraw the yarn from the needles, in combination with a dial, means to position the withdrawn yarn for reentry, and means to guide the withdrawn yarn under the dial acting at a point near the place of action of said yarn-feed guide.

7. A knitting machine having needles, a dial, and means movable crosswise of the needles to enter a yarn at the needles, in com-

ination with means movable behind the needles to position the yarn for entry, and an instrument movable over the needles to guide the yarn under the dial when it is withdrawn.

8. A knitting machine having a circle of needles, a movable yarn-guide, a dial and a plate obstructing substantially all the space within the needles, a movable yarn-guide, an instrument adapted to guide a yarn withdrawn by said yarn-guide under said obstructions, and means above said obstructions to receive and position a part of the yarn for reentry.

9. Sectional splicing means adapted for cooperation with circular knitting machines having an instrument-dial comprising in combination, a splicing-yarn guide and means to actuate it to withdraw a yarn above the needles at times related to the passage of a segment of the needles; a plate above said dial mounted substantially concentric with the needles whereby a yarn withdrawn passes above said plate, a depending arm mounted to move between said plate and the needles, and means to move said arm to encounter and move the yarn into position for entrance at the needles between successive actuations of said splicing-yarn guide.

10. Yarn-feeding means for a circular knitting machine having needles and an instrument dial comprising said dial, a plate above said dial, movable yarn-feeding yarn guides, and yarn guiding means on said plate, in combination with means on said plate for guarding a yarn sweeping the periphery of said plate from contact with the edge of said dial or instruments carried thereby.

11. An internal yarn-guiding device for knitting machines having a circle of needles, and a dial within said needles, comprising a plate above and covering said dial, and a ring at the periphery thereof adapted to guide a yarn withdrawn from the fabric at said needles and passed above said plate.

12. An internal yarn-guiding device for knitting machines having a circle of needles and a dial within said needles comprising a plate above and covering said dial, and a yarn-guarding ring at the periphery of said plate mounted for movement thereon to cover or uncover the verge of said dial.

Signed by me at Boston, Massachusetts, this tenth day of December, 1915.

ROBERT W. SCOTT.