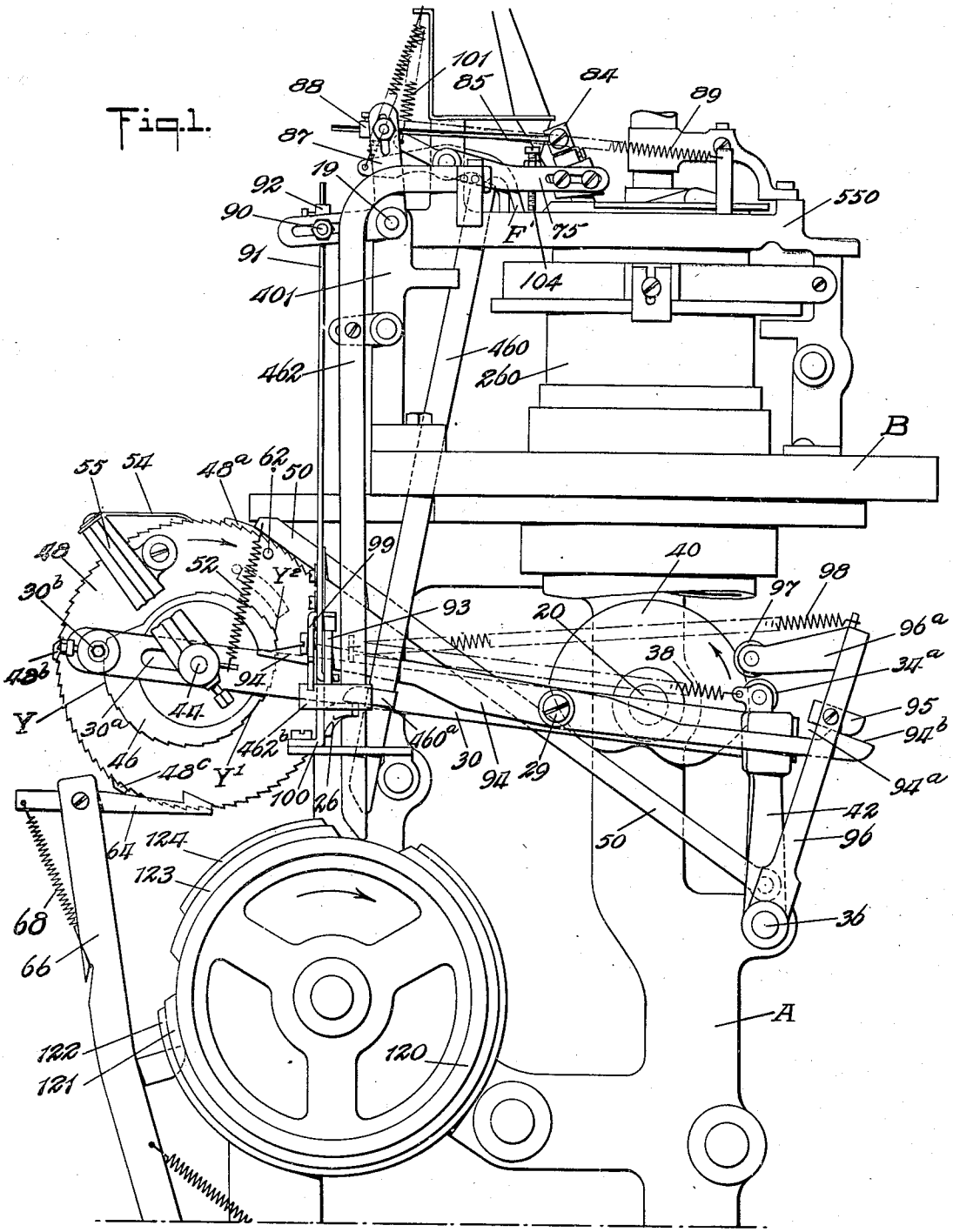
Dec. 26, 1939. E. PELOQUIN 2,184,503

CLAMP AND CUTTER MEANS FOR REINFORCING YARNS

Filed April 25, 1938 4 Sheets-Sheet 1

Fig. 1.



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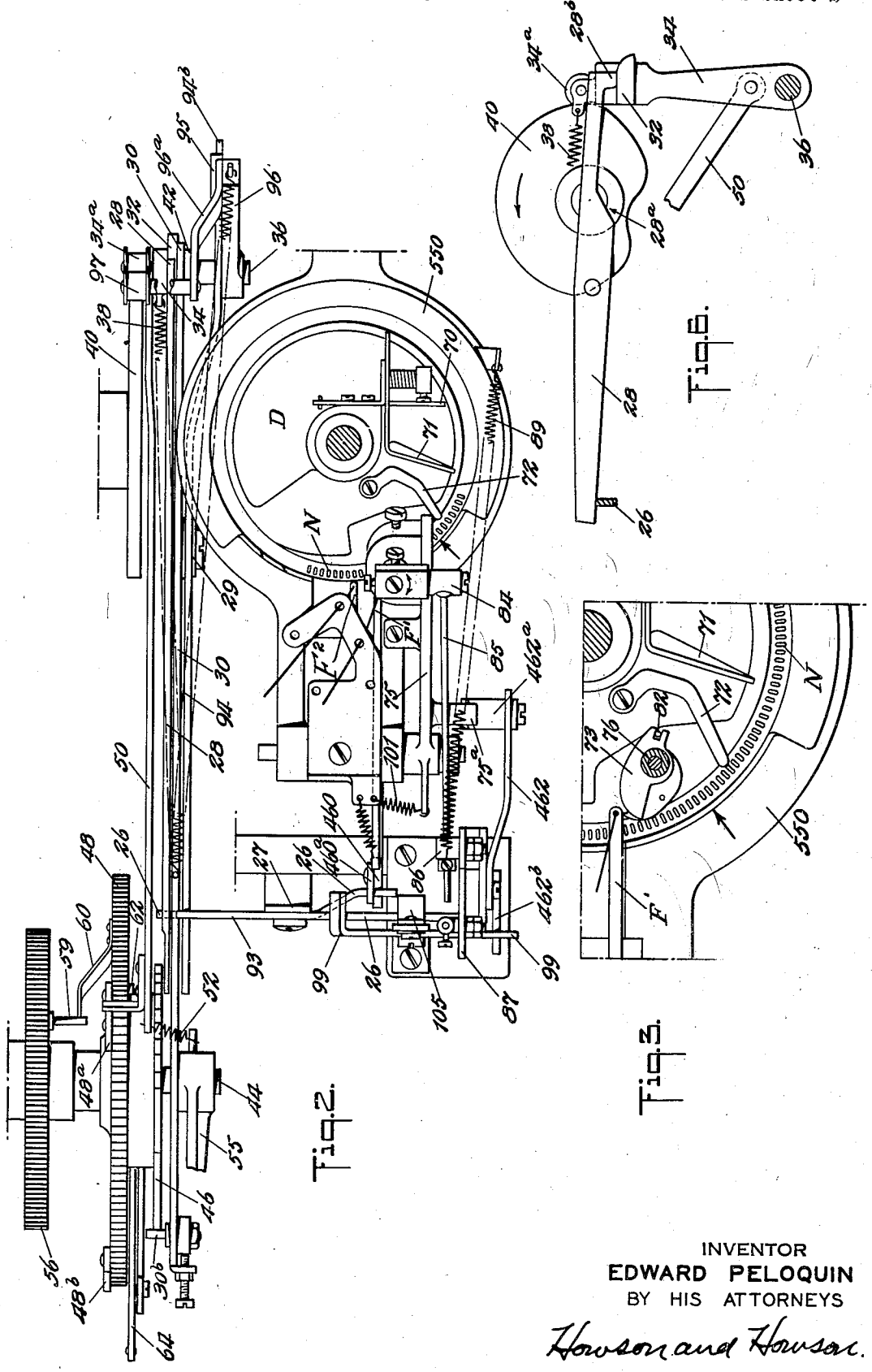


Fig. 2.

Fig. 6.

Fig. 3.

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CLAMP AND CUTTER MEANS FOR REINFORCING YARNS

Filed April 25, 1938 4 Sheets-Sheet 3

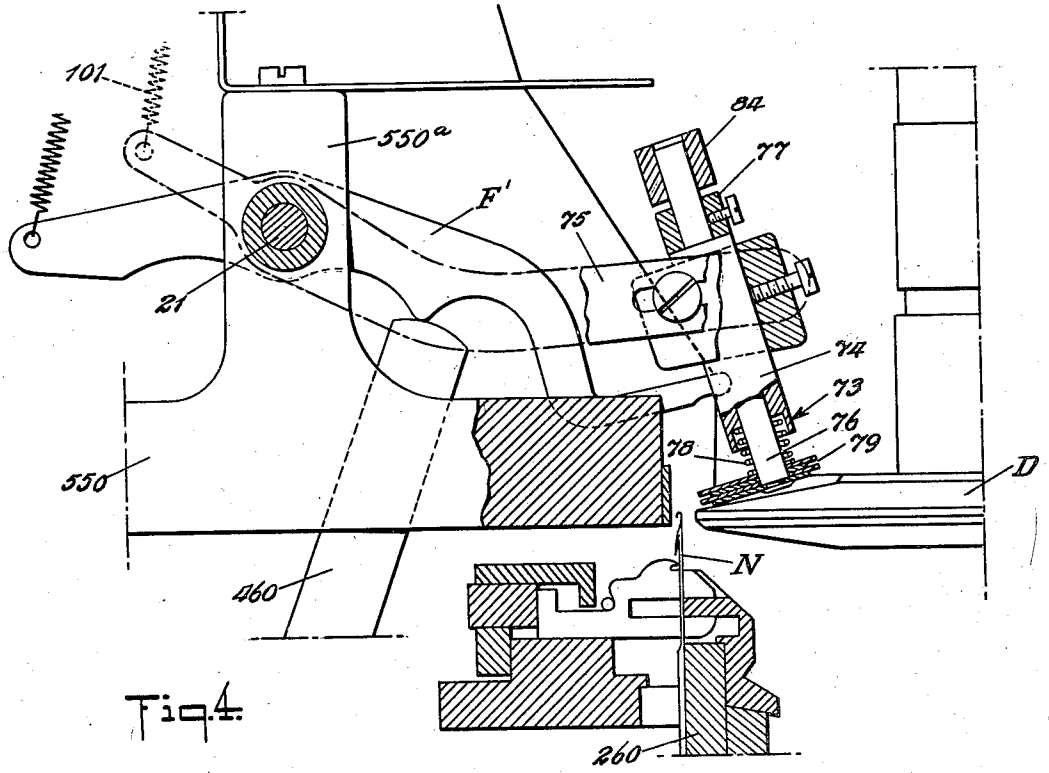


Fig. 4.

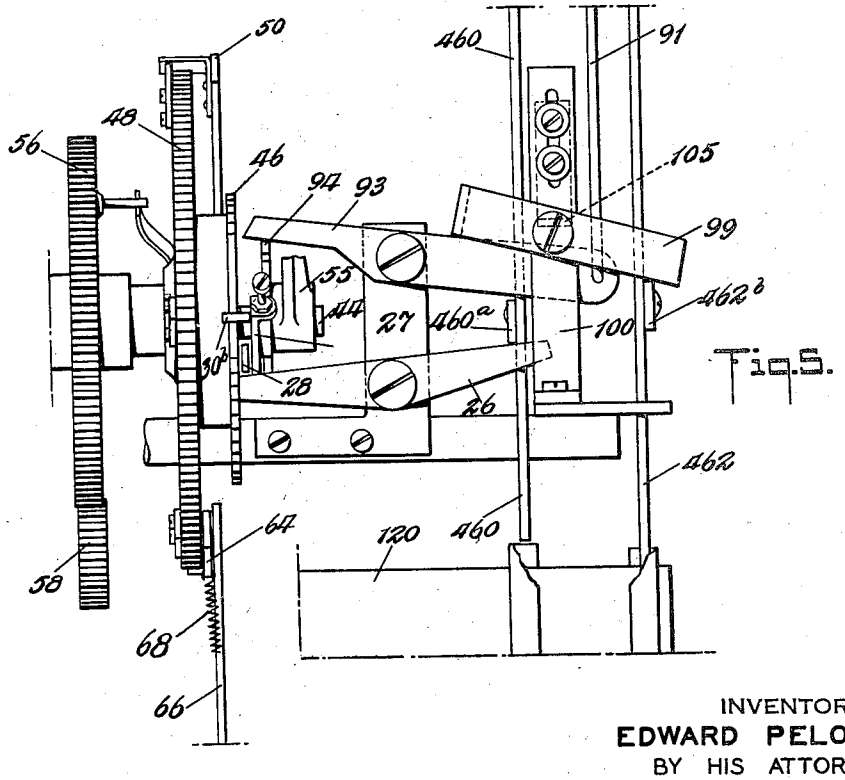


Fig. 5.

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CLAMP AND CUTTER MEANS FOR REINFORCING YARNS

Filed April 25, 1938 4 Sheets-Sheet 4

Fig. 7.

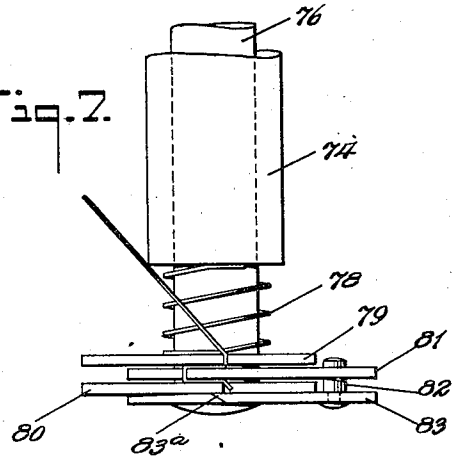


Fig. 8.

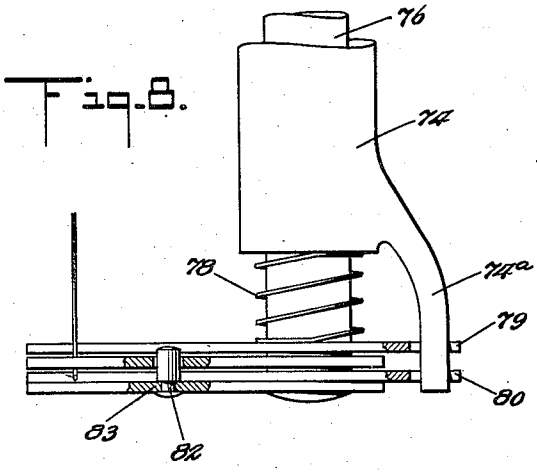


Fig. 9.

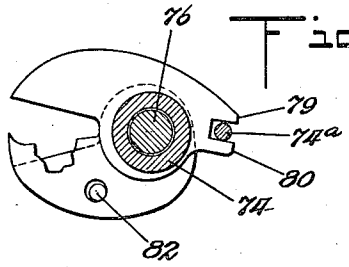


Fig. 10.

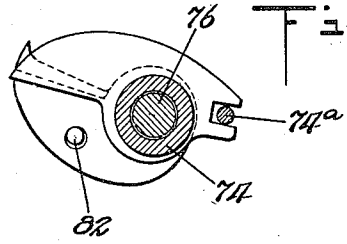


Fig. 11.

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Patented Dec. 26, 1939

2,184,503

UNITED STATES PATENT OFFICE

2,184,503

CLAMP AND CUTTER MEANS FOR REINFORCING YARNS

Edward Peloquin, Elizabeth City, N. C., assignor to Scott & Williams, Incorporated, New York, N. Y., a corporation of Massachusetts

Application April 25, 1938, Serial No. 204,165

12 Claims. (Cl. 66—134)

This invention relates to machines for knitting hosiery having reinforced portions, as a tapered high splice and sole, and more particularly to cutting and clamping means for the reinforcing yarn and it is an object of this invention to provide a cutting and clamping means, and operating means therefor, to cut and clamp the reinforcing yarn as it is withdrawn from the needles during the knitting of one course and to release it as the yarn is presented to the needles during the knitting of the succeeding course, the operation of the cutting and clamping means being so timed with respect to the withdrawal of the reinforcing yarn from the needles that the waste yarn is the same amount in each course irrespective of the number of needles taking the reinforcing yarn in each course.

In the drawings:

Fig. 1 is a partial view in elevation of a Scott and Williams machine for knitting hosiery with a tapered high splice and a reinforced sole which is equipped with cutting and clamp means for the reinforcing yarn in accordance with this invention;

Fig. 2 is a partial top plan view of the structure shown in Fig. 1;

Fig. 3 is a portion of the view of Fig. 2 drawn to a larger scale, parts being removed in order to more clearly show the relation of the cutter and clamp means for the reinforcing yarn to the finger for feeding the reinforcing yarn;

Fig. 4 is a fragmentary vertical sectional view showing the relations of the cutter and clamp means to the reinforcing yarn finger, needles, dial and other associated members;

Fig. 5 is a fragmentary view in elevation showing part of the mechanism for operating the finger for the reinforcing yarn and the cutter and clamp means during each revolution of the needle cylinder in the knitting of the high splice and the reinforced sole;

Fig. 6 is a fragmentary view showing in elevation part of the means for operating the finger for the reinforcing yarn;

Figs. 7 and 8 are detail views in elevation showing the cutting and clamping means in closed and open positions, respectively;

Figs. 9 and 10 are plan views showing the cutting and clamping means in open and closed positions, respectively; and

Fig. 11 is a partial view in elevation of a sample of hosiery knit on a machine equipped in accordance with this invention, the fabric of one side of the sample being removed at a plurality of places to show the uniform length of the waste portion of the reinforcing yarn despite variations in the numbers of the needles taking the reinforcing yarn in the knitting of the various courses of the high splice.

In the drawings the invention is shown in connection with a Scott and Williams circular knitting machine, only such parts of the machine being shown as are necessary to illustrate the invention. As shown, a bedplate B mounted on a frame A supports a needle cylinder 260 having needles N and operated by gearing, not shown, from the main drive shaft 20 which rotates synchronously with the needle cylinder. A dial D driven in the usual manner from the main drive shaft by a suitable driving means, not shown, is also provided. Yarn fingers F^1, F^2 etc., are pivotally supported on a pin 21 mounted in the standards 550ª projecting from the latch guard ring 550. Push rods 460 operated by cams on the main pattern drum 120 control operations of the yarn fingers F^1, F^2 to present and withdraw the yarns from the needles.

In the arrangement shown the yarn finger F^2 supplies the main body yarn to the needles and its push rod is operated by the usual cams (not shown) on the main pattern drum 120. The yarn finger F^1 feeds the reinforcing yarn for the high splice and double sole to the needles and as this yarn is fed for only a portion of each revolution in which it is introduced to the needles means are provided for operating its push rod 460 during each of a plurality of revolutions of the needle cylinder. The push rod 460 for the yarn finger F^1 is provided with a projecting lug 460ª adjacent its lower end and positioned to be engaged by one end of a lever 26 pivotally mounted on a bracket 27 supported from the machine frame A. The other end of the lever 26 is positioned to be engaged by an end of a lever 28 pivotally mounted on a pin 29 fixed in a movable supporting rod 30. The other end portion of the lever 28 is recessed, as at 28ª, a short distance inwardly from the end of the lever to receive a cam 32 mounted on a lever 34 and has a projecting cam engaging portion 28ᵇ positioned to be engaged by the cam 32. The lever 34 is pivotally mounted on a pin 36 mounted in the frame A and at its outer end carries a roller 34ª which is held by a spring 38 in engagement with a cam 40 fixed on the main drive shaft 20.

The rod 30 has one end pivotally connected to an end of a link or support 42 which is pivotally mounted at its other end on the pin 36. Adjacent its other end the rod 30 is slotted, as at 30ª,

to receive a supporting pin 44 which is mounted in a bracket carried by the frame A and at its end the rod 30 has, adjustably mounted therein, a pin 30b which engages a cam 46. The cam 46 and a ratchet wheel 48 to which it is fixed are rotatably mounted on the pin 44 and are operated by a pawl 50 which is connected to the lever 34 to be operated thereby and is held in contact with the ratchet wheel 48 by a spring 52. A spring pawl or detent 54, mounted on an arm 55 fixed on the pin 44 and engaging the ratchet wheel 48, prevents reverse rotation of the ratchet wheel 48 and cam 46.

The cam 40 being fixed on the main drive shaft 20 rotates in synchronism with the needle cylinder 260 and operates the lever 34 once for each revolution of the needle cylinder, causing the pawl 50 to be operated to advance the ratchet wheel 48 and cam 46 step by step with each revolution of the needle cylinder. Operation of the lever 34 also shifts the cam 32 with respect to the lever 28 causing the cam 32 to oscillate from under the cam engaging portion 28b into the recess 28a and back under the cam engaging portion 28b. This movement of the cam 32 rocks the lever 28, causing the lever 28 to rock the lever 26 and lower and raise the push rod 460 and the yarn finger F1 which feeds the reinforcing yarn to the needles. The complete operation takes place once for each revolution of the cam 40 causing the yarn finger F1 to be operated to feed the reinforcing yarn to the needles for a portion of each revolution of the needle cylinder during which the operation takes place. The lever 28, however, is mounted on the rod 30 which carries the pin 30b in engagement with the cam 46, so as the ratchet wheel 48 and cam 46 are rotated the rod 30 is shifted, carrying with it the lever 28 so that the position of the cam engaging portion 28b of the lever 28 is shifted with respect to the cam 32, and the period during which the cam 32 travels in the recess 28a of the lever 28 and the reinforcing yarn is supplied in a revolution of the needle cylinder is changed.

As it is not desired to operate the ratchet wheel 48 and cam 46 during the knitting of the stocking leg, heel, toe and the reinforced portion of the sole of uniform width, the ratchet wheel 48 is provided with cam surfaces 48a, 48b and 48c, so positioned as to be engaged by the pawl 50 at such times as the ratchet wheel 48 and cam 46 are not to be operated. To shift the cam surfaces from beneath the pawl 50 so as to permit the pawl 50 to operate the ratchet wheel 48 and cam 46, there is provided a gear wheel 56 operated by a gear train 58 from the main pattern drum 120 and having a pin 59 which engages an abutment 60 fixed on the ratchet wheel 48. The gear train 58 is such that the gear wheel 56 makes a complete revolution for each revolution of the main pattern drum 120. There is also provided a pin 62 on the ratchet wheel 48 positioned to be engaged by a dog or pawl 64 pivotally mounted on a lever 66 and held in position to engage the pin 62 by a spring 68. The lever 66 is pivotally supported on the frame A in position to be engaged by a cam (not shown) on the main pattern drum 120 and operated to rotate the ratchet wheel 48 by the engagement of the dog 64 and pin 62 and shift a cam surface from beneath the pawl 50.

With the reinforcing yarn being withdrawn from the needles for a portion of each revolution there would be objectionable long floats of the reinforcing yarn extending from course to course of the stocking where the reinforcing yarn is introduced unless means were provided to cut and clamp the reinforcing yarn each time it is withdrawn from the needles and to hold the free end of the reinforcing yarn until it is again presented to the needles. There is provided, therefore, in addition to the usual cutter 70, movable clamp 71 and stationary clamp 72 for the yarns, a cutter and clamp means 73 for cutting and clamping the reinforcing yarn.

The cutter and clamping means 73 comprises a tubular member 74 carried at the end of a lever 75 pivotally mounted on the pin 21 which supports the yarn fingers. The member 74 has rotatably mounted therein a stem 76 which is kept in position in the member 74 by a collar 77 fixed on the upper end portion of the stem 76 and a spring 78 confined between the lower end of the member 74 and a plate 79. The plate 79 and a similar plate 80 are loosely mounted on the stem 76 and held in fixed position with respect to the tubular member 74 by means of a finger 74a which projects from the member 74 and engages in slots in the edges of the plates 79 and 80. Interposed between the plates 79 and 80 is a plate 81 loosely mounted on the stem 76 and connected by a pin 82 to a plate 83 fixed on the stem 76 so as to operate with the plate 83 upon rotation of the stem 76. The plates are so shaped that in their full open position, as in Fig. 9, the reinforcing yarn may be received in the angle formed by the plates and when the closing movement of the plates takes place the yarn is clamped by the plates 79, 81 and 80, as shown in Fig. 7, and severed by the cutting edge 83a of the plate 83.

To operate the cutter and clamp means 73 an arm 84 is fixed to the upper end of the stem 76 and at its outer end has a ball and socket connection with one end of a link 85, the other end of which projects through a pin 86 adjustably mounted in an arm of a bell crank lever 87 pivotally mounted on the pin 19 which connects the latch ring 550 to the standard 401. A collar 88 fixed on the link 85 causes the link and the cutter and clamp means 73 to be operated by movement of the bell crank lever 87 in one direction while a spring 89 connected to the collar 88 and the latch ring 550 insures movement of the link and cutter and clamp means in the opposite direction when the bell crank lever 87 is moved away from the collar 88. Through a pin 90 adjustably mounted in the other arm of the bell crank lever 87 there extends one end of a link 91 which has a collar 92 fixed thereon. The other end of the link 91 is connected to an end of a lever 93 which is pivotally mounted on the bracket 27 above the lever 26. The other end of the lever 93 engages an end of a lever 94 which is pivotally mounted on the pin 29 carried by the supporting rod 30. The other end of the lever 94 is recessed, as at 94a, and has a cam engaging projection 94b positioned to be engaged by a cam 95 mounted on a lever 96 which is pivotally mounted on the pin 36. The free end of the lever 96 is provided with an arm 96a having a roller 97 mounted in the outer end thereof and held in engagement with the cam 40 by a spring 98 extending between the outer end of the lever 96 and a convenient point on the frame A.

When not in use the cutter and clamp means 73 is held in an inoperative position against the action of the spring 101 by the push rod 462 which is raised by cams on the main pattern drum 120 and has a laterally extending abutment 462a extending beneath a laterally ex-

tending abutment 75a on the lever 75 which carries the cutter and clamp means 73. The push rod 462 is also provided with an abutment 462b which engages beneath one end of a lever 99 pivotally mounted on a bracket 100 carried by the frame A. The other end of the lever 99 has a portion extending at right angles to the body of the lever and projecting over one end of the lever 93 in a position to engage the lever 93 when the push rod 462 is raised. Raising the push rod 462, in addition to raising the cutter and clamp means 73, operates the lever 93 to the position in which the cutter and clamp means 73 are held in the closed or clamping position and lifts the end of the lever 93 from the lever 94 and prevents operation thereby as the cam 40 is rotated. When a cam is shifted from beneath the push rod 462 permitting the cutter and clamp means 73 to be lowered to its operative position the abutment 462b is withdrawn from beneath the lever 99 and the lever 93 is lowered into engagement with the end of the lever 94 so that the cutter and clamp means 73 are opened and closed once during each revolution of the needle cylinder 260 by the operation of the cam 40. An adjustable stop 104 limits the downward movement of the lever 75 and the cutter and clamp means 73 and a stop 105 adjustably mounted on the standard 103 limits the upward movement of the lever 93 and the opening movement of the cutter and clamp means 73. Lever 94, being mounted on the supporting bar 30 will be shifted with the bar 30 by the operation of the ratchet wheel 48 and cam 46, changing the relation of cam engaging portion 94b on lever 94 to cam 95 on lever 96 and the time during which the cam 95 travels in the recess of the lever 94 and changing the times at which cutter and clamp means are opened to release the reinforcing yarn and closed to again cut and clamp the yarn. Since both the changes in the times of the operation of the cutter and clamp means 73 and the changes in the times at which the reinforcing yarn is presented to and withdrawn from the needles are brought about by the operation of the cam 46 these changes correspond and the lengths of the waste ends of the reinforcing yarn are kept uniform irrespective of the changes in the number of the needles taking the reinforcing yarn during a revolution of the needle cylinder.

In the knitting of a stocking which, in the machine shown, is knit beginning at the top, the push rods 460 and 462 are raised by the cams 122 and 121, respectively, holding the reinforcing yarn finger F^1 and the cutter and clamp means 73 out of action during the knitting of the stocking top and leg L. During this time the lever 93 is held away from the lever 94 and the pawl 50 rides on the cam surface 48a on the ratchet wheel 48 and does not operate the ratchet wheel. The pin 59 on gear 56 is spaced from the abutment 60 on the ratchet wheel 48 and is gradually brought nearer thereto as the main pattern drum is racked around. At this time the cam 46 is in the position shown in Fig. 1, a position which limits the taking of the reinforcing yarn to the small number of needles necessary to knit the narrow upper portion of the high splice M. A racking movement of the main pattern drum shifts the cams 121 and 122 from beneath the push rods 462 and 460, respectively, to lower the reinforcing yarn finger F^1 to present the reinforcing yarn to the needles and then to place the cutter and clamp means 73 in operative position for the knitting of the first course of the high splice M and the lever 93 in operative relation with the lever 94 for the operation of the cutter and clamp means 73. Knitting of the courses of the high splice continues with the pin 30b resting on the surface y of the cam 48 causing the high splice or reinforced portion to be of uniform width until, as at the course x a further rack of the main pattern drum 120 engages the pin 59 on gear 56 with the abutment 60 on ratchet wheel 48 and moves the ratchet wheel 48 sufficiently to shift the cam surface 48a past the pawl 50 and permit the pawl 50 to operate the ratchet wheel 48 and cam 46. This movement of the ratchet 48 shifts cam 46 so that the cam surface y passes from beneath the pin 30b and the gradual widening of the high splice M begins, the uniform length of the waste ends E of the reinforcing yarn being maintained during the step by step variations in both the time for which the reinforcing yarn is presented to the needles and the time between the opening and closing of the cutter and clamp means 73. During the knitting of the high splice M the operation of the ratchet wheel 48 by the pawl 50 advances the abutment 60 away from the pin 59. The widening of the high splice continues until the cam 46 reaches a position where the pin 30b is on the cam surface y^1, corresponding to the course X^1 of the high splice and the movement of the ratchet wheel 48 brings the cam surface 48b to a position where the pawl 50 rides thereon and further movement of the ratchet 48 and cam 46 is stopped. Several courses are knit with the pin 30b on the surface y^1 and then the main drum 120 is racked for the knitting of the heel.

This movement of the main pattern drum 120 places the cams 123 and 124 beneath the push rods 462 and 460, respectively, first raising the cutter and clamp means 73 and stopping the opening and closing thereof and then raising the yarn finger F^1 to withdraw the reinforcing yarn from the needles to be cut and clamped by the main cutter 70 and clamp 71. As the pawl 50 rides on the cam surface 48b the ratchet 48 and cam 46 remain stationary throughout the knitting of the heel.

Upon completion of the heel H the main drum 120 is again racked to move the cams 123 and 124 from beneath the push rods 462 and 460, respectively, permitting the push rods to be lowered and the yarn finger F^1 and then the cutter and clamp means 71 to be returned to operative positions, the cutter and clamp means to be opened and closed and the knitting of the reinforced sole S to be started.

This movement of the main pattern drum 120 causes the pin 59 to engage the abutment 60 and shift the ratchet 48 sufficiently to move the cam surface 48b past the pawl 50. The pawl 50 thereupon operates the ratchet 48 and cam 46 and after the knitting has proceeded to the course w the cam surface y^1 is moved from beneath the pin 30b and the step by step narrowing of the reinforced sole portion begins, the operation of the cutter and clamp means being adjusted accordingly and the operation continuing until the course w^1 is reached. At course w^1 the cam surface y^2 is moved beneath the pin 30b and the cam surface 48c is positioned so the pawl 50 rides thereon and operation of the ratchet wheel 48 and cam 46 is prevented. At this time the pin 62 on the ratchet wheel 48 has been moved over the head of the pawl or

dog 64 and is positioned to be engaged by the pawl or dog 64 upon operation thereof.

The knitting continues with the reinforced portion of the sole of uniform width until the course w^2 is reached when a movement of the main pattern drum 120 causes a cam thereon (not shown) to operate the lever 66 to shift the ratchet wheel 48 by the engagement of the pawl 64 with the pin 62. The movement of the ratchet wheel 48 shifts the cam surface 48c past the pawl 50 and permits the operation of the ratchet wheel 48 and cam 46 for the gradual widening of the reinforced portion of the sole until the course w^3 is reached. When the course w^3 has been knit a movement of the main pattern drum 120 places the cams 121 and 122 beneath the thrust rods 462 and 460, respectively, the cutter and clamp means 73 being raised first to its inoperative position and its operation stopped and the yarn finger F^1 then raised to withdraw the yarn from the needles, the reinforcing yarn being taken by the main cutter 70 and clamp 71. The operation of the ratchet wheel 48 and cam 46 by the pawl 50 continues, however, during the knitting of the toe until the cam surface 48a is positioned so that the pawl 50 rides thereon and the ratchet wheel 48 and cam 46 stopped in correct position for the starting of the knitting of the high splice M.

While the use of a single reinforcing yarn has been shown and described it is to be understood that different reinforcing yarns may be used in the high splice and sole, the yarns being fed from yarn fingers controlled as described and the cutter and clamp means for the reinforcing yarns being rendered operative each time either reinforcing yarn is presented to the needles.

I claim—

1. The combination in a knitting machine having means for knitting a fabric having a reinforced portion of varying width, of clamping and cutting means for the reinforcing yarn and cam means for varying the operation of the clamping and cutting means in accordance with the changes in the width of the reinforced portion, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

2. In a knitting machine having means for knitting a fabric of a body yarn, means for presenting a reinforcing yarn to the needles, clamping and cutting means for said reinforcing yarn and means for operating said yarn presenting means intermittently to present the yarn to varying numbers of needles and cam means for operating said cutting and clamping means in accordance with the operation of said yarn presenting means, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

3. In a knitting machine having means for knitting a fabric of a body yarn, means for feeding a reinforcing yarn to the needles, means for operating said feeding means to present the reinforcing yarn to varying numbers of needles in different courses of the fabric, means for cutting and clamping said reinforcing yarn, cam means for operating said cutting and clamping means for each reinforced course and means for correspondingly varying the operations of said operating means for said feeding means and said cutting and clamping means, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

4. In a knitting machine having means to knit a fabric of a body yarn, means for feeding a reinforcing yarn to the needles, cutting and clamping means for the reinforcing yarn, means operating said yarn feeding means to feed the reinforcing yarn to the needles for a portion of each of a plurality of courses, means operating said cutting and clamping means to release and to cut and clamp the reinforcing yarn in a plurality of said courses and adjusting means for said operating means comprising a cam for simultaneously changing the time during which the reinforcing yarn is presented to the needles in the knitting of a course and the times of operation of said cutting and clamping means and means for operating said cam, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

5. In a knitting machine having means to knit a fabric of a body yarn, means for feeding a reinforcing yarn to the needles, cutting and clamping means for the reinforcing yarn, means operating said yarn feeding means to feed the reinforcing yarn to the needles for a portion of each of a plurality of courses, means operating said cutting and clamping means to release and to cut and clamp the reinforcing yarn in a plurality of said courses, said operating means comprising cooperating cam surfaces, a cam for relatively shifting the cooperating cam surfaces of each of said operating means to correspondingly change the time during which the reinforcing yarn is presented to the needles in the knitting of a course and the times of operation of said cutting and clamping means and means for operating said cam to relatively shift said cam surfaces step by step, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

6. In a knitting machine having means to knit a fabric of a body yarn, means for feeding a reinforcing yarn to the needles, cutting and clamping means for the reinforcing yarn, means operating said yarn feeding means to feed the reinforcing yarn to the needles for a portion of each of a plurality of courses, means operating said cutting and clamping means to release and to cut and clamp the reinforcing yarn in a plurality of said courses, said operating means comprising cooperating cam surfaces, and adjusting means for relatively shifting the co-operating cam surfaces of each of said operating means to correspondingly vary the operations of said reinforcing yarn feeding means and said cutting and clamping means, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

7. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, cam means for operating said clamping and cutting means, means for progressively varying the lengths of the portions of successive courses in which said reinforcing yarn is knit and means for progressively varying the time elapsing between a movement of said clamping and cutting means to open position and a movement to closed position in accordance with the change in the lengths of the

portions of the courses in which said reinforcing yarn is knit, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn from the needles.

8. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, means for varying step by step the length of the portions of successive courses in which the reinforcing yarn is knit, cam means for operating said clamping and cutting means to open and closed positions and means for varying step by step the time during which the clamping and cutting means are open during successive revolutions in accordance with the change in the length of the portions of said courses having reinforcing yarn knit therein, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

9. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, means for varying the lengths of the portions of successive courses in which the reinforcing yarn is knit, means for operating said clamping and cutting means comprising cooperating cam surfaces determining the opening and closing times of said clamping and cutting means and means for changing the relations of said cooperating cam surfaces to vary the opening and closing times of said clamping and cutting means in accordance with the change in the length of the portions of said courses having reinforcing yarn knit therein, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

10. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, means for varying the lengths of the portions of successive courses in which the reinforcing yarn is knit, means for operating said clamping and cutting means comprising cooperating cam surfaces determining the opening and closing times of said clamping and cutting means and means for relatively shifting said cooperating cam surfaces to progressively vary the time elapsing between the opening and closing of said clamping and cutting means in accordance with the change in the length of the portions of said courses having reinforcing yarn knit therein, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

11. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, means for varying the lengths of the portions of successive courses in which the reinforcing yarn is knit, means for operating said clamping and cutting means comprising cooperating cam surfaces determining the open and closed periods of said clamping and cutting means and means for shifting said cam surfaces relatively, step by step to progressively increase one and decrease the other of said periods in accordance with the change in the length of the portions of the courses having reinforcing yarn knit therein, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

12. In a knitting machine having means for feeding a reinforcing yarn to the needles during the knitting of portions of each of a plurality of successive courses, means for clamping and cutting said reinforcing yarn, means for varying the lengths of the portions of successive courses in which the reinforcing yarn is knit, means for operating said clamping and cutting means comprising cooperating cam surfaces determining the times at which said clamping and cutting means releases and takes the reinforcing yarn during the knitting of each of the courses in which the reinforcing yarn is knit, a cam for relatively shifting said cooperating cam surfaces in accordance with the change in the lengths of the portions of said courses having reinforcing yarn knit therein, and means for operating said cam, said clamping and cutting means being opened upon the presenting of the reinforcing yarn to the needles and closed upon the withdrawal of said yarn therefrom.

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