

Sept. 7, 1937.

A. A. CAUDLE ET AL.

2,092,347

CIRCULAR KNITTING MACHINE

Filed June 5, 1935

7 Sheets-Sheet 1

Sept. 7, 1937.

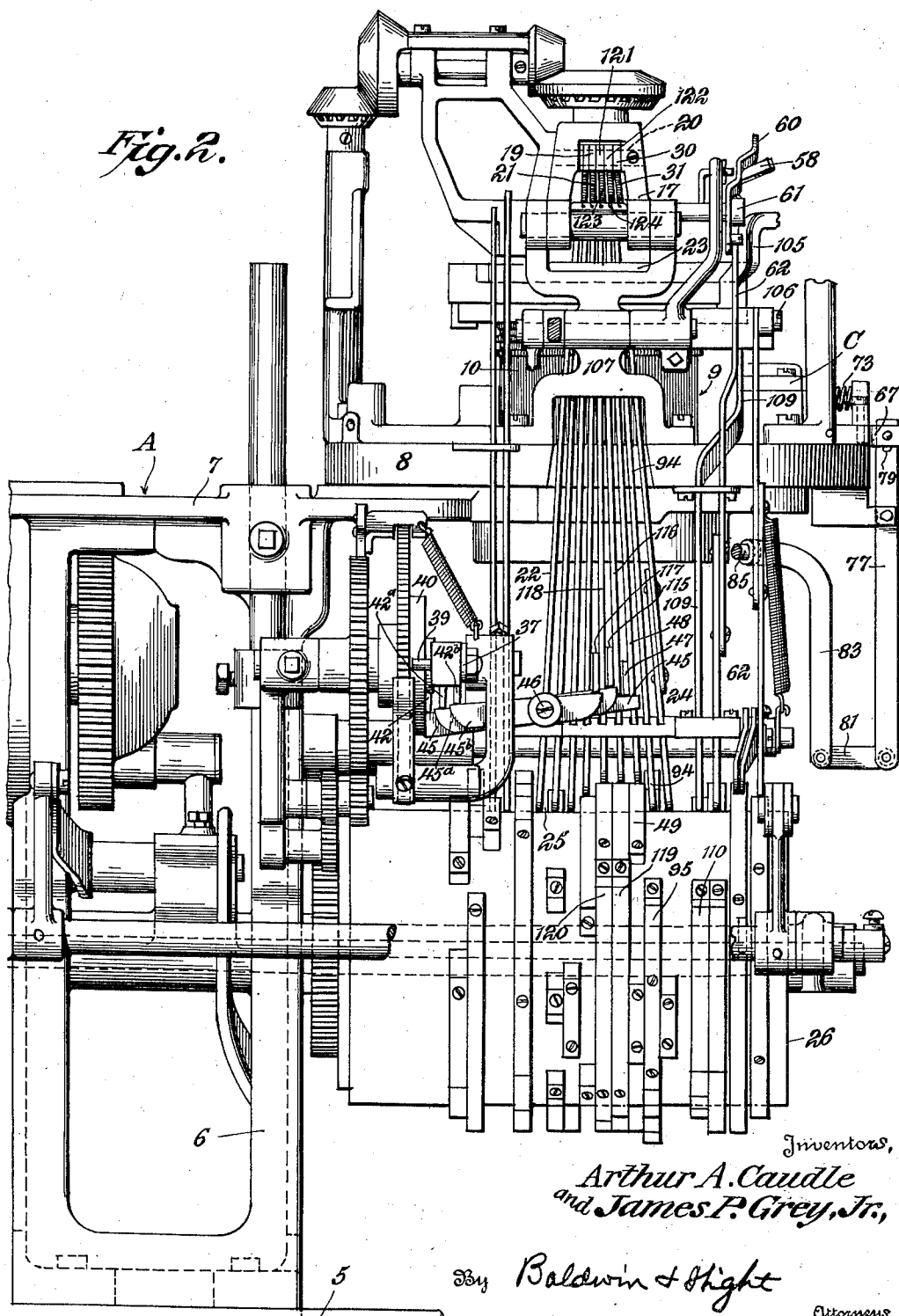
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Fig. 2.



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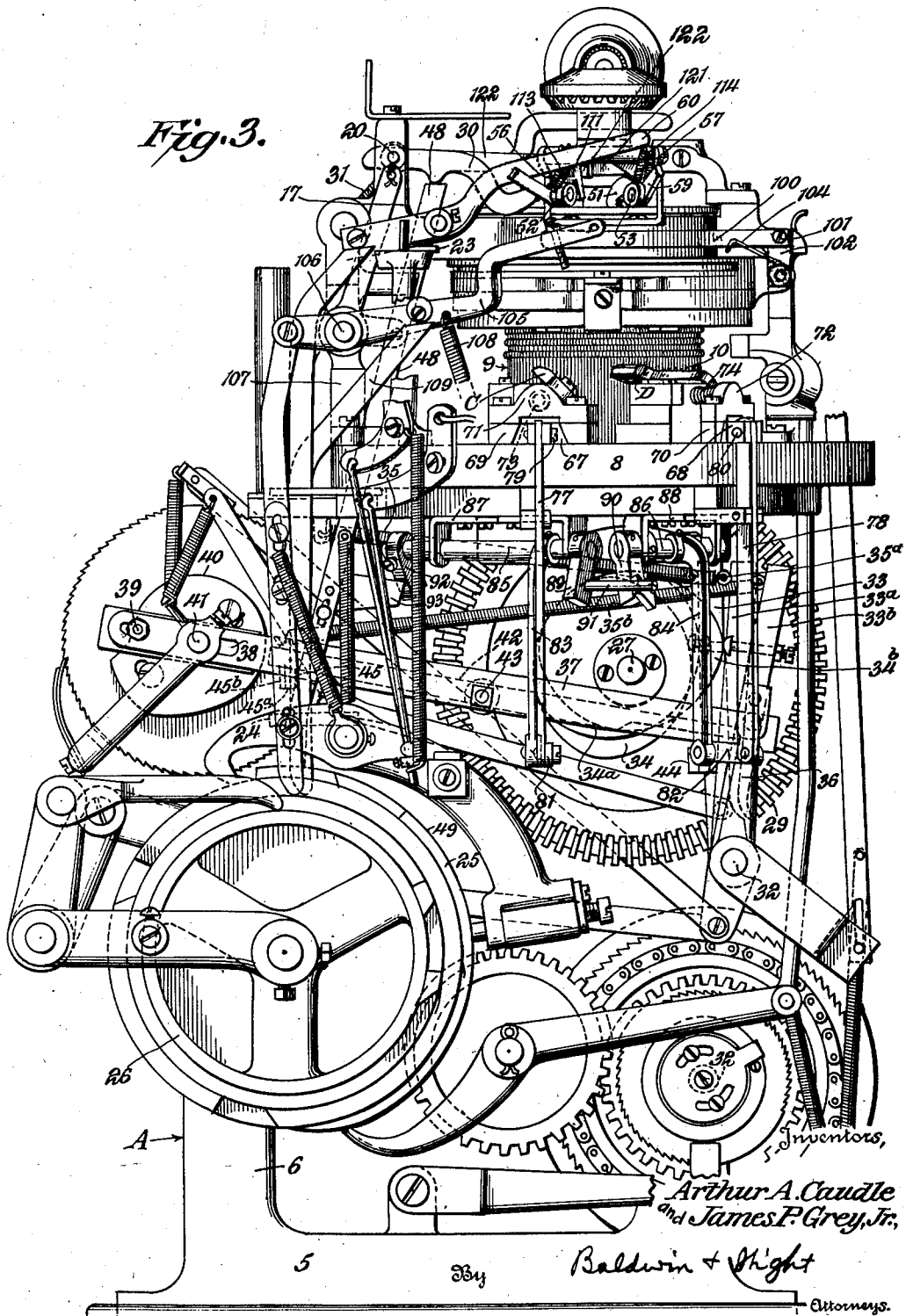
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CIRCULAR KNITTING MACHINE

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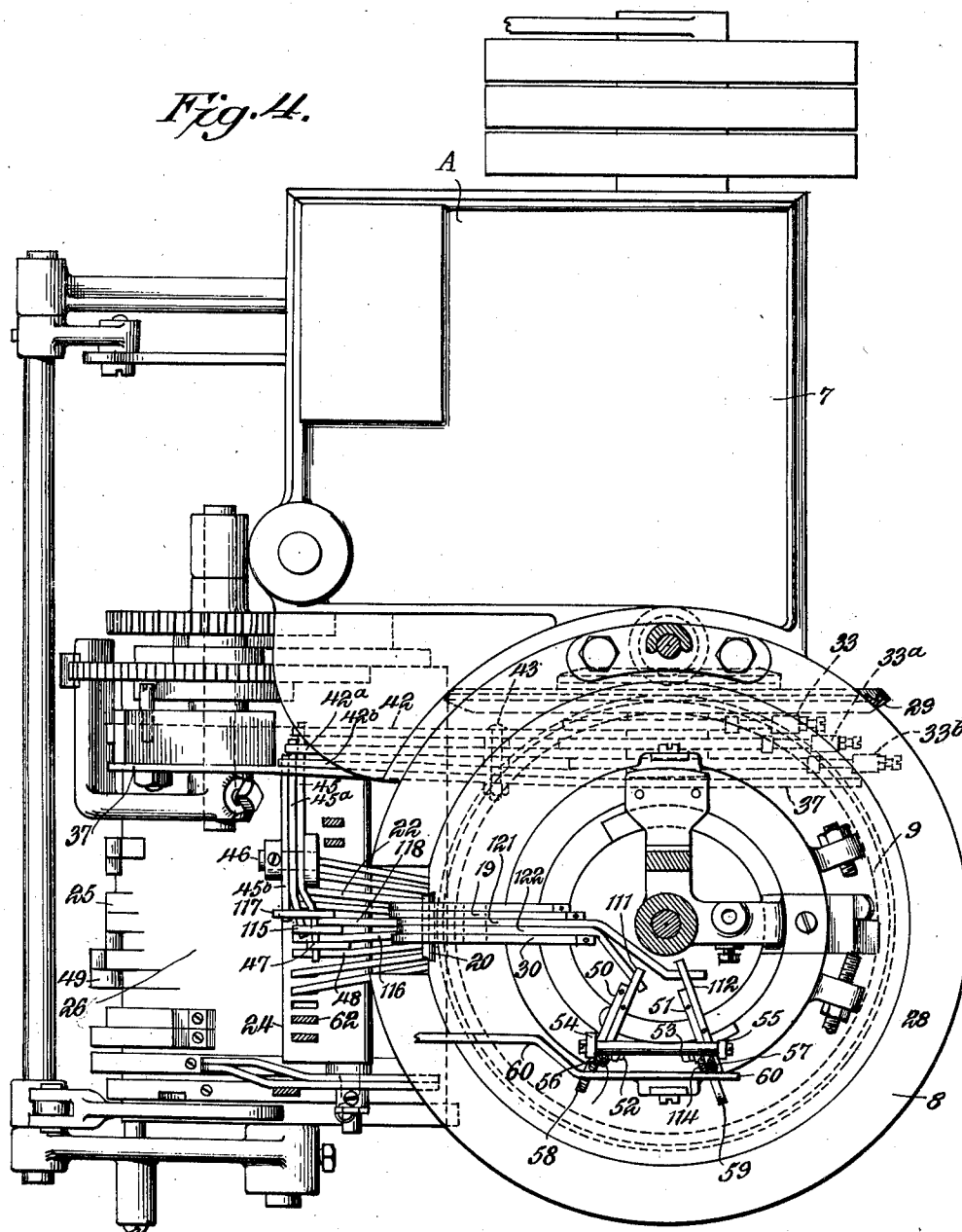
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Fig. 4.



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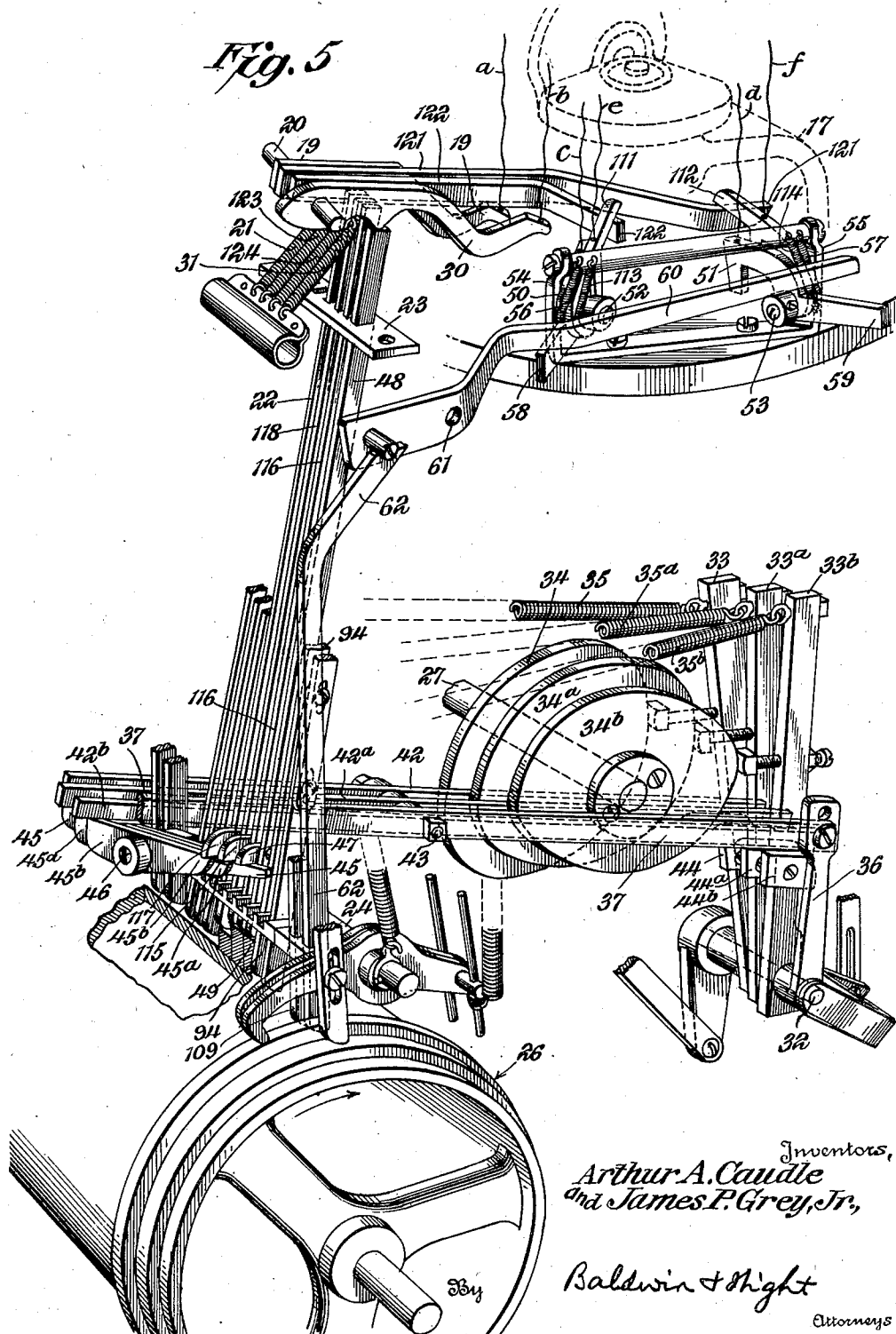
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CIRCULAR KNITTING MACHINE

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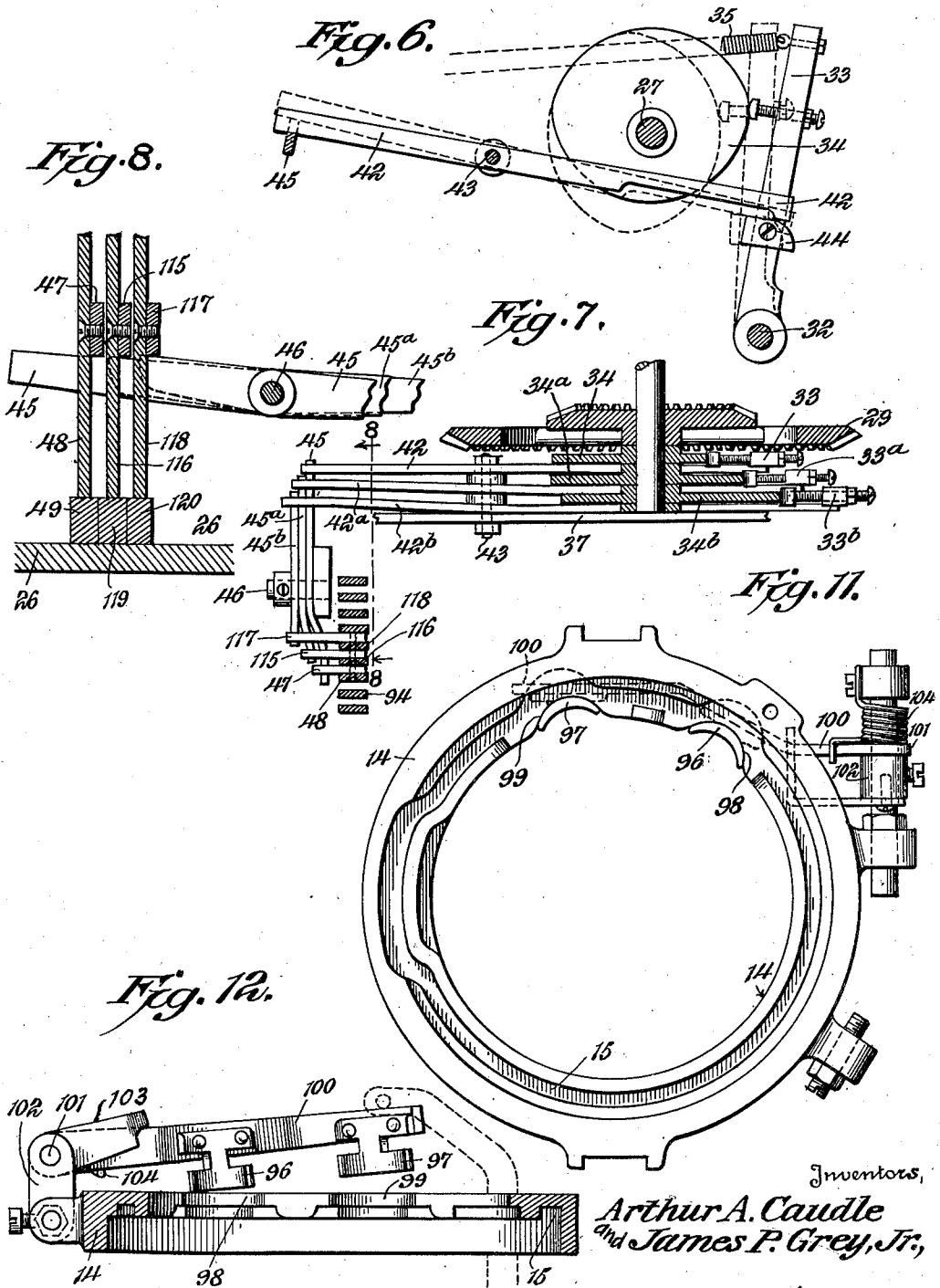
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CIRCULAR KNITTING MACHINE

Filed June 5, 1935

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Fig. 9.

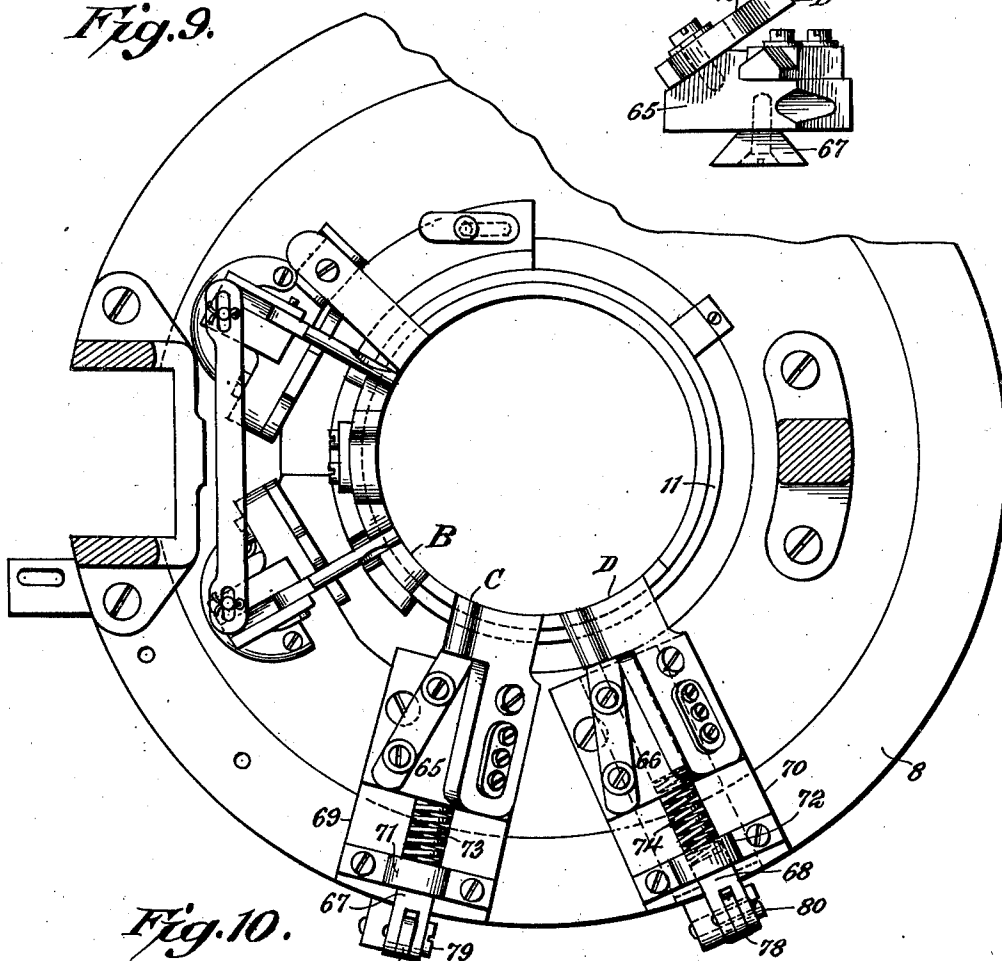


Fig. 10.

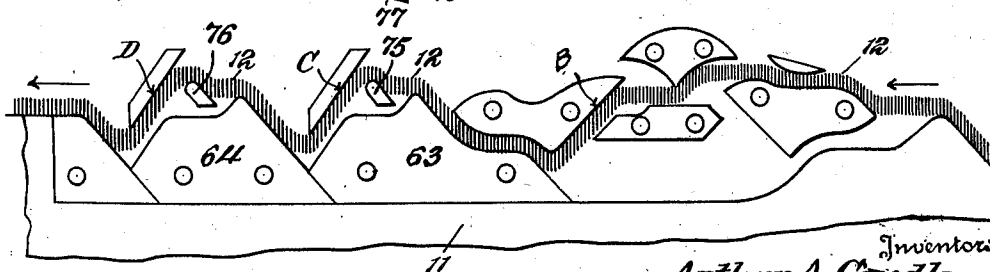
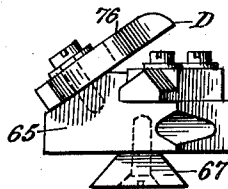


Fig. 13.



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UNITED STATES PATENT OFFICE

2,092,347

CIRCULAR KNITTING MACHINE

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Application June 5, 1935, Serial No. 25,148

12 Claims. (Cl. 66—49)

This invention relates to new and useful improvements in circular knitting machines for knitting stockings and is adapted to be applied to a machine of the Scott and Williams type, in which a single main yarn is employed in knitting the leg and foot portions, an additional yarn for reinforcing the foot portion and portion above the heel, and separate yarns for knitting the toe and heel portions.

In the application of Arthur A. Caudle for improvements in Circular knitting machines, Serial No. 756,692, filed December 8, 1934, means are provided for feeding two extra natural silk yarns to the needles during the rotation of the needle-carrying cylinder to thereby eliminate formation of rings and also greatly increase the speed of knitting the leg and foot portions of a stocking, and consequently increase the production of the machine.

The main object of our invention is to feed three main yarns to the needles while knitting the leg and foot portions of the stocking and in addition to feed three auxiliary reinforcing yarns to the needles while knitting the foot portion and a small part of the leg portion, whereby stockings having reinforced soles and so-called high-spliced heels will be knitted, and the machine output will be increased materially over the Scott and Williams machine referred to above.

In the drawings:

Figure 1 is a front elevation of a circular knitting machine embodying our invention;

Figure 2 is a rear elevation of the machine;

Figure 3 is an elevation of the left side of the machine;

Figure 4 is a top plan view of the machine, certain of the parts being omitted and other parts being shown in section to better illustrate our invention;

Figure 5 is a perspective view showing the three main yarn fingers, the three auxiliary yarn fingers, and the mechanism for actuating the same;

Figure 6 is a detail view of the means employed for actuating one of the auxiliary yarn fingers;

Figure 7 is a plan view, partly in section, of the means shown in Figure 6;

Figure 8 is an enlarged cross-section taken on the line 8—8 of Figure 7;

Figure 9 is a plan view of the head, certain of the parts being omitted;

Figure 10 is an enlarged detail elevation of the stitch cams;

Figure 11 is a bottom plan view of the sinker ring;

Figure 12 is a vertical cross-section taken through said ring; and

Figure 13 is an enlarged end view of an auxiliary stitch cam.

Our invention is adapted to be applied to the well known Scott and Williams circular knitting machine employed for knitting tubular stockings having a reinforced sole and high-spliced heel, and, therefore, we have shown in the accompanying drawings only those parts of such a machine as will enable any one skilled in the art to understand the nature and operation of our invention.

The Scott and Williams machine includes a frame A having a base 5, a pair of spaced standards 6, 6, and a top 7. Supported by the top 7 is the usual circular head 8 in which the cylinder 9 is rotatably mounted. This cylinder carries latched needles 10 which are vertically reciprocated in the usual manner by a main stitch cam B which is fixed to a cam ring 11 mounted on the head and receiving the needle butts 12, as shown in Figure 10. Cooperating with the needles to form stitches are the usual sinkers which are actuated by means of a stationary sinker ring 14 mounted on the head at the upper end of the cylinder. The sinker ring is provided with a horizontally extending cam groove 15 for receiving the sinker butts. Pivoted as at 16 to the head 8 above the cylinder is the usual frame 17 which carries the usual dial. A main yarn finger 18 for the main yarn *a* is pivoted on a horizontal shaft 20 mounted on the dial frame 17 and functions to guide the main yarn *a* to the needles 10 at the main stitch cam B during the rotation of the cylinder when the leg and foot portions of the stocking are being knitted. The main yarn finger 18 is normally held against upward movement by a coil spring 21. The finger 18 is raised out of cooperative relation with the needles when the end of the leg and foot portions are reached, by a thrust bar 22 which is mounted in upper and lower guide plates 23, 24 and is actuated by a peripheral cam 25 mounted on a pattern drum 26 driven from the main shaft 27.

Fixed to the cylinder 9 is a driven gear 28 which is rotated by a driving gear 29 fixed on the drive shaft 27 for rotating the cylinder in an anti-clockwise direction when knitting the leg and foot portions of a stocking and for oscillating the cylinder when knitting the heel and toe portions of a stocking. As soon as the leg and foot portions have been respectively completed, a thread change-over is made in the usual

manner, the cylinder is oscillated, and the heel and toe are thereby knitted.

Pivoted on the shaft 20 alongside the main yarn finger 19 is an auxiliary yarn finger 30 for directing an auxiliary or reinforcing yarn *b* to the main stitch cam B when the cylinder is being oscillated to knit the heel and toe portions of the stocking. A coil spring 31 tends to hold the auxiliary yarn finger 30 against upward movement. Supported on the front of the standards 6, 6, of the frame is a horizontal shaft 32, and journaled on said shaft is the lower end of vertical lever 33. Fixed to the main shaft 27 and disposed in alignment with the lever 33 is a peripheral cam 34 for actuating said lever. This lever 33 is yieldably held in contact with the cam by a coil spring 35. Also pivoted on the shaft 32 is a crank arm 36, and pivotally connected to the upper end of this arm is the front end of a horizontal bar 37, the rear end thereof having a slotted connection as at 38 with a concentric pin 41 carried by a cam 40. The bar 37 is reciprocated endwise by means of the cam 40 through the medium of a cam pin 39 carried by said bar. A lever 42 is fulcrumed intermediate its ends on a horizontal pin 43 carried by the bar 37. A cam 44 is fixed to the vertical lever 33 and is disposed directly below the forward end of the lever 42 whereby when the lever 33 is moved under the influence of the cam 34, the lever 42 will be rocked, as shown in Figure 6. By reference to this figure, it will be observed that when the vertical lever 33 is moved forwardly, the adjacent end of the lever 42 will be raised and consequently the rear end of said lever will be lowered. Disposed under the rear end of the lever 42 is a horizontal lever 45 which is fulcrumed intermediate its ends on a bearing 46 carried by the lower guide plate 24. The fulcrum 46 of the lever 45 and the fulcrum 43 of the lever 42 are disposed in planes at right angles to each other. One end of the lever 45 is disposed directly under the lever 42 and the opposite end of said lever 45 is disposed under an abutment 47 carried by a thrust bar 48. This thrust bar is mounted for vertical movements in the upper and lower guide plates 23, 24 and has its upper end directly disposed below and in engagement with the auxiliary yarn finger 30 and its lower end in cooperative relation with a peripheral cam 49 on the pattern drum 26. Thus, by means of the mechanism above described, the auxiliary yarn finger 30 is held in its upper position and out of cooperative relation with the needles when the leg with the exception of high-spliced heel portion, heel, and toe portions of the stocking are being knitted, and is automatically lowered into cooperative relation with the needles when the high-spliced heel portion and foot portion of the stocking is being knitted. Thus, during the knitting of the high-spliced heel portion and the foot portion, both the main yarn *a* and the auxiliary yarn *b* are directed to the needles, and the auxiliary yarn finger 30 is intermittently actuated by the mechanism above described to reinforce the stocking above the heel and also the sole of said foot portion in any shape which might be desired.

The above mechanism is embodied in the well known Scott and Williams machine for knitting circular stockings and further description of its operation is believed to be unnecessary.

In applying our invention to the above described Scott and Williams machine, we provide two additional yarn fingers 50, 51 which are piv-

otally mounted on horizontal bearing pins 52, 53 fixed on brackets 54, 55 mounted on the dial frame 17 at spaced points in advance of the main stitch cam B. The two additional main yarn fingers 50, 51 serve to lead two additional main yarns *c*, *d* to the needles when knitting the leg and foot portions of the stocking. These fingers are normally held down in cooperative relation with the needles by coil springs 56, 57. These fingers are provided with outwardly extending lever arms 58, 59 which are adapted to be engaged successively by a lever 60 pivoted as at 61 on the latch ring when the heel and toe portions of the stocking are being knitted to thereby successively raise said fingers out of cooperative relation with the needles. This lever 60 is operated from the pattern drum 26 by a vertical thrust bar 62 which is slidably supported in the upper and lower guide plates 23, 24. All three main yarn fingers 19, 50, 51 are raised by the pattern drum and are respectively lowered by the springs 21, 56, and 57.

Cooperative with the needle butts 12 and located in cooperative relation with the additional main yarn fingers 50, 51 are spaced auxiliary stitch cams C and D. These two cams are movable horizontally into and out of engagement with the needle butts, and when these cams are in operative position they cooperate with stationary cam plates 63, 64 fixed to the cam ring 11 to thereby form between the stitch cam C and the cam plate 63, and between the stitch cam D and the cam plate 64 downwardly inclined grooves for receiving the needle butts as shown in Figure 10. These stitch cams C and D are supported on the head 8 for horizontal reciprocations, and their movements are controlled by the pattern drum 26. The stitch cams C and D are removably attached to the inner ends of heads 65, 66 which are secured to the inner ends of bars 67, 68 which are slidably mounted in bearing blocks 69, 70 fixed to the head 8, the slide bars being movable in different radial planes with respect to the cylinder 9. Attached to the outer ends of the blocks 69, 70 are posts 71, 72, and disposed between said posts and the heads 65, 66 are coil springs 73, 74 which function to yieldably urge the stitch cams C and D inwardly. Also removably attached to the inner ends of the heads 65, 66 are stitch shedding cams 75, 76. Thus, by means of the springs 73, 74, the stitch cams C and D and also the stitch shedding cams 75, 76 are yieldably and normally held in cooperation with the needles. In order to periodically retract the stitch cams C and D, as well as the stitch shedding cams 75, 76 upon completion of the leg and foot portions of the stockings, we have provided the following mechanism:

Vertically disposed levers 77, 78 are fulcrumed intermediate their ends to the periphery of the head 8 and the upper ends of these levers are pin and slot connected as at 79, 80 to the outer ends of the slide bars 67, 68. The lower ends of the levers 77, 78 are connected by links 81, 82 to the lower ends of depending rock arms 83, 84 fixed to horizontal rock shafts 85, 86 journaled in brackets 87, 88 secured to the under side of the head 8. Secured to the inner ends of the shafts 85, 86 are short depending rock arms 89, 90, and attached to the arm 89 is a horizontal arm 91 which extends in front of the arm 90, whereby upon the rocking of the shaft 85 the shaft 86 will be correspondingly rocked and both stitch cams C and D as well as their asso-

ciated stitch shedding cams 75, 76 will be moved outwardly and out of cooperative relation with the needles. Fixed to the shaft 85 is an inwardly extending rock arm 92 which is engageable by an abutment 93 fixed to a thrust bar 94 movably supported in the upper and lower guide plates 23, 24 for vertical movements by a peripheral cam 95 on the pattern drum 26.

When the needles are drawn down by the stitch cams C and D, it is necessary to shift the associated sinkers 13 in order to form stitches as will be readily understood. We have, therefore, provided two spaced sinker cams 96, 97, as shown in Figures 11 and 12, and these two cams are disposed in cooperative relation to said stitch cams C and D. The sinker ring 14 has its inner face cut-away as at 98, 99 to receive the sinker cams 96, 97 which are rigidly mounted on an arm 100 pivoted at one end as at 101 to a post 102 fixed to the sinker ring 14, the arm being located above the ring. The arm is urged upwardly against a stop arm 103 on the post 102 by a spring 104. Normally the arm 100 is in a horizontal position, as shown in Figure 1, wherein the sinker cams 96, 97 are normally disposed in cooperative relation with the sinkers. When, however, the two additional yarn fingers 50, 51 are elevated upon the completion of the leg and foot portions of the stocking, the sinker cams 96, 97 are likewise elevated so as to throw out the two additional main yarns *c*, *d*, and the cylinder 9 is then oscillated to knit the heel and toe portions of the stocking. To this end the arm 100 is normally held in its horizontal position against upward movement by the spring 104 by means of a lever arm 105 which is fulcrumed at one end on a horizontal shaft 106 mounted in a bracket 107 on the head 8. The free end of the lever arm 105 is disposed above the cam-carrying arm 100 and is yieldably held thereagainst by a spring 108 having its upper end connected to the lever arm 105 and the other end to the head 8. The tension of the spring 108 is considerably greater than the tension of the spring 104. The lever arm 105 is elevated in proper timed relation by a thrust bar 109 which is slidably mounted for vertical movements in the upper and lower guide plates 23, 24 and is actuated by a peripheral cam 110 on the pattern drum 26.

Cooperating with the auxiliary stitch cams C and D for reinforcing or splicing the sole and that portion directly above the heel are two auxiliary yarn fingers 111, 112 which are fulcrumed on the bearing pins 52, 53 which support the additional main yarn fingers 50, 51. Springs 113, 114 are connected to these auxiliary yarn fingers 111, 112 for normally holding them against upward movement. These auxiliary yarn fingers 111, 112, like the auxiliary yarn finger 30, are held in their upper positions and out of cooperative relation with the needles when the leg except that portion above the heel, heel, and toe portions of the stocking are being knitted, and are automatically lowered into cooperative relation with the needles when the high-spliced heel portion of leg and foot portion of the stocking is being knitted to direct auxiliary yarns *e*, *f*, to the needles. These auxiliary yarn fingers 111, 112 are operated in succession by trains of mechanism similar to that train which operates the auxiliary yarn finger 30. To this end, vertical levers 33a, 33b are fulcrumed on the shaft 32, and fixed to the main shaft 27 and engaging and actuating said levers are peripheral cams 34a, 34b. The levers 33a, 33b are yieldably held in contact

with said cams by coil springs 35a, 35b. Levers 42a, 42b are fulcrumed intermediate their ends on the horizontal pin 43 which is carried by the bar 37. Cams 44a, 44b are fixed to the vertical levers 33a, 33b and are disposed directly below the front ends of the levers 42a, 42b, whereby, when the levers 33a, 33b are moved under the influence of the cams 34a, 34b, the levers 42a, 42b will be rocked. Thus, when the vertical levers 33a, 33b are moved forwardly, the adjacent ends of the levers 42a, 42b will be raised, and consequently the rear ends of said levers will be lowered. Disposed under the rear ends of the levers 42a, 42b are horizontal levers 45a, 45b which are fulcrumed intermediate their ends on the bearing 46. One end of the lever 45a is disposed directly under the lever 42a and the opposite end of said lever 45a is disposed under an abutment 115 carried by a thrust bar 116. One end of the lever 45b is disposed directly under the lever 42b and the opposite end of said lever 45b is disposed under an abutment 117 carried by a thrust bar 118. The thrust bars 116, 118 are slidably mounted for vertical movements in the upper and lower guide plates 23, 24, and the lower ends of said thrust bars normally engage peripheral cams 119, 120 located on the pattern drum 26. Fulcrumed on the pivot shaft 20 which supports the main yarn finger 19 and the auxiliary yarn finger 30, are levers 121, 122 which are normally held against upward movement by springs 123, 124. These levers 121, 122 are disposed directly above the upper ends of the thrust bars 116, 118 and lie in contact therewith, and extend forwardly under the auxiliary yarn fingers 111, 112. The horizontal levers 45, 45a and 45b are always in motion due to their connections with the cams 34, 34a and 34b, and while the leg portion of the stocking with exception of high-spliced heel portion is being knitted the thrust bars 48, 116 and 118 are held up out of contact with said levers by the peripheral cams 49, 119 and 120 on the pattern drum. Just as soon, however, as the reinforcing of high-spliced heel portion and of the foot portion is to start, the cams 49, 119 and 120 on the pattern drum permit the associated thrust bars to drop into engagement with said horizontal levers and thereby permit the auxiliary fingers 30, 111 and 112 to be lowered to direct the auxiliary or splicing yarns *b*, *e* and *f* into cooperative relation with the needles. Thus, during the knitting of the high-spliced heel and foot portions, the three main yarns *a*, *c* and *d* and the auxiliary or splicing yarns *b*, *e* and *f* are directed to the needles at the stitch cams B, C and D, and consequently three courses of two yarns each are knitted simultaneously.

In the operation of our machine, the auxiliary stitch cams C and D, as well as the auxiliary stitch shedding cams 75, 76, are located in cooperative relation with the needle; the main yarn fingers 19, 50, 51 are held by their associated springs in cooperative relation with the needles, and the auxiliary cams 96, 97 are likewise held in cooperative relation with the sinkers. The cylinder 9 is rotated and the three main yarns *a*, *c* and *d* are fed to the needles and formed simultaneously into three courses of stitches. This knitting is continued until the beginning of the high-spliced heel is reached at which time the pattern drum 26 effects a lowering of the auxiliary yarn fingers 30, 111 and 112 into cooperative relation with the needles, thereby to reinforce the lower portion of the leg immediately

above the heel portion. The pattern drum 26 then functions through the medium of the thrust bars 22 and 62 to raise the main yarn fingers 19, 50, 51 and the auxiliary yarn fingers 30, 111, and 112 out of cooperative relation with the needles; to withdraw the auxiliary stitch cams C and D, as well as the stitch shedding cams 75, 76, from cooperation with the needles through the medium of the thrust bar 94, and to elevate the sinker cams 96, 97 from cooperation with the sinkers through the medium of the thrust bar 109. A mercerized yarn is then thrown in by the usual mechanism, the cylinder is oscillated, and the heel is thereby knitted. The mercerized yarn is then thrown out and the cylinder is rotated. At this time, the main yarn fingers 19, 50, 51 and the auxiliary yarn fingers 30, 111, 112 are lowered into cooperative relation with the needles, and the auxiliary stitch cams C and D, as well as the auxiliary stitch shedding cams 75, 76 and the auxiliary sinker cams 96, 97, are moved into cooperative relation with the needles and sinkers. By this means the foot portion is knitted by the three main yarns *a*, *c*, and *d*, and the sole is reinforced by the auxiliary or splicing yarns *b*, *e*, and *f*. After the foot has been knitted, the auxiliary stitch cams C and D, the auxiliary stitch shedding cams 75, 76, the auxiliary sinker cams 96, 97, the main yarn fingers 19, 50, 51, and the auxiliary yarn fingers 30, 111, 112 are all thrown out of cooperative relation with the needles and sinkers. A mercerized yarn is then thrown in, the cylinder is again oscillated, and the toe portion of the stocking is thereby knitted.

It will be understood that various changes may be made in the specific construction and relative arrangement of the parts without departing from the invention as defined in the claims.

We claim:

1. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and foot portions and for splicing the foot portion during rotation of the cylinder including means for directing a plurality of yarns to the needles at angularly spaced points for knitting a plurality of courses simultaneously in the leg and foot portions, and including means for directing a corresponding number of splicing yarns to the needles at the same points when knitting the foot portion.

2. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the foot portion during rotation of the cylinder including a plurality of angularly spaced stitch cams cooperating with the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams; a plurality of sinkers cooperating with the needles, and a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the foot portion of the stocking.

3. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the foot portion during rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams, said cams being angularly spaced

and disposed in cooperative relation to the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the foot portion of the stocking, means for automatically withdrawing the auxiliary stitch cams and the main yarn fingers from cooperation with the needles when the end of the leg and foot portions are reached, and means for automatically withdrawing the auxiliary yarn fingers from cooperation with the needles when the end of the foot portion is reached.

4. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and foot portions and for splicing the foot portion during rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams, said cams being angularly spaced and disposed in cooperative relation to the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the foot portion of the stocking, means for automatically withdrawing the auxiliary stitch cams and the main yarn fingers from cooperation with the needles when the end of the leg and foot portions are reached, means for automatically returning the auxiliary stitch cams and the main yarn fingers into cooperative relation with the needles at the beginning of the foot portion, and means for automatically withdrawing the auxiliary yarn fingers from cooperation with the needles when the end of the foot portion is reached.

5. In a circular knitting machine for knitting stockings, the combination of a stationary head, an alternately rotary and oscillatory needle-carrying cylinder mounted in said head, a latch ring supported on the head above the cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the foot portion during the rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams mounted on the head and disposed in angularly spaced relation, a main yarn finger and a plurality of additional main yarn fingers mounted on the latch ring in cooperative relation with the stitch cams, a plurality of auxiliary yarn fingers mounted on the latch ring in cooperative relation with the main yarn fingers and the stitch cams for directing splicing yarns to the needles only during the knitting of the foot portion of the stocking.

6. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and foot portions and for splicing the foot portion during rotation of the cylinder including means for directing a plurality of yarns to the needles at angularly spaced points for knitting a plurality of courses simultaneously in the leg and foot portions, and including means for directing a corresponding number of splicing yarns to the needles at the same points when knitting the high-spliced heel portion and the foot portion.

7. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the so-called high-spliced heel and foot portions during rotation of the cylinder including a plurality of angularly spaced stitch cams cooperating with the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, and a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the high-spliced heel portion and the foot portion of the stocking.

8. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the so-called high-spliced heel and the foot portion during rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams, said cams being angularly spaced and disposed in cooperative relation to the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the high-spliced heel portion and the foot portion of the stocking, means for automatically withdrawing the auxiliary stitch cams and the main yarn and splicing yarn fingers from cooperation with the needles when the end of the leg and foot portions are reached.

9. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the portion above and adjacent to the heel, and the foot portion during rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams, said cams being angularly spaced and disposed in cooperative relation to the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the high spliced heel and the foot portion of the stocking, means for automatically withdrawing the auxiliary stitch cams and the main yarn and splicing yarn fingers from cooperation with the needles when the end of the

leg and foot portions are reached, means for automatically returning the auxiliary stitch cams and the main and splicing yarn fingers into cooperative relation with the needles at the beginning of the foot portion, and means for automatically withdrawing the auxiliary yarn fingers from cooperation with the needles when the end of the foot portion is reached.

10. In a circular knitting machine for knitting stockings, the combination of a stationary head, an alternately rotary and oscillatory needle-carrying cylinder mounted in said head, a latch ring supported on the head above the cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing the portion above and adjacent to the heel and the foot portion during the rotation of the cylinder including a main stitch cam and a plurality of auxiliary stitch cams mounted on the head and disposed in angularly spaced relation, a main yarn finger and a plurality of additional main yarn fingers mounted on the latch ring in cooperative relation with the stitch cams, a plurality of auxiliary yarn fingers mounted on the latch ring in cooperative relation with the main yarn fingers and the stitch cams for directing splicing yarns to the needles only during the knitting of the high-spliced heel portion and the foot portion of the stocking.

11. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder and a set of knitting instrumentalities for knitting the leg and foot portions and for splicing portions of the stocking during rotation of the cylinder including means for directing a plurality of yarns to the needles at angularly spaced points for knitting a plurality of courses simultaneously in the leg and foot portions and including means for directing a corresponding number of splicing yarns to the needles at the same points when knitting the spliced portions.

12. In a circular knitting machine for knitting stockings, the combination of an alternately rotary and oscillatory needle-carrying cylinder, and a set of knitting instrumentalities for knitting the leg and the foot portions and for splicing portions of the stocking during rotation of the cylinder including a plurality of angularly spaced stitch cams cooperating with the needles, a plurality of main yarn fingers disposed in cooperative relation with said stitch cams, a plurality of sinkers cooperating with the needles, and a plurality of auxiliary yarn fingers disposed in cooperative relation with the stitch cams for directing splicing yarns to the needles only during the knitting of the spliced portions of the stocking.

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