

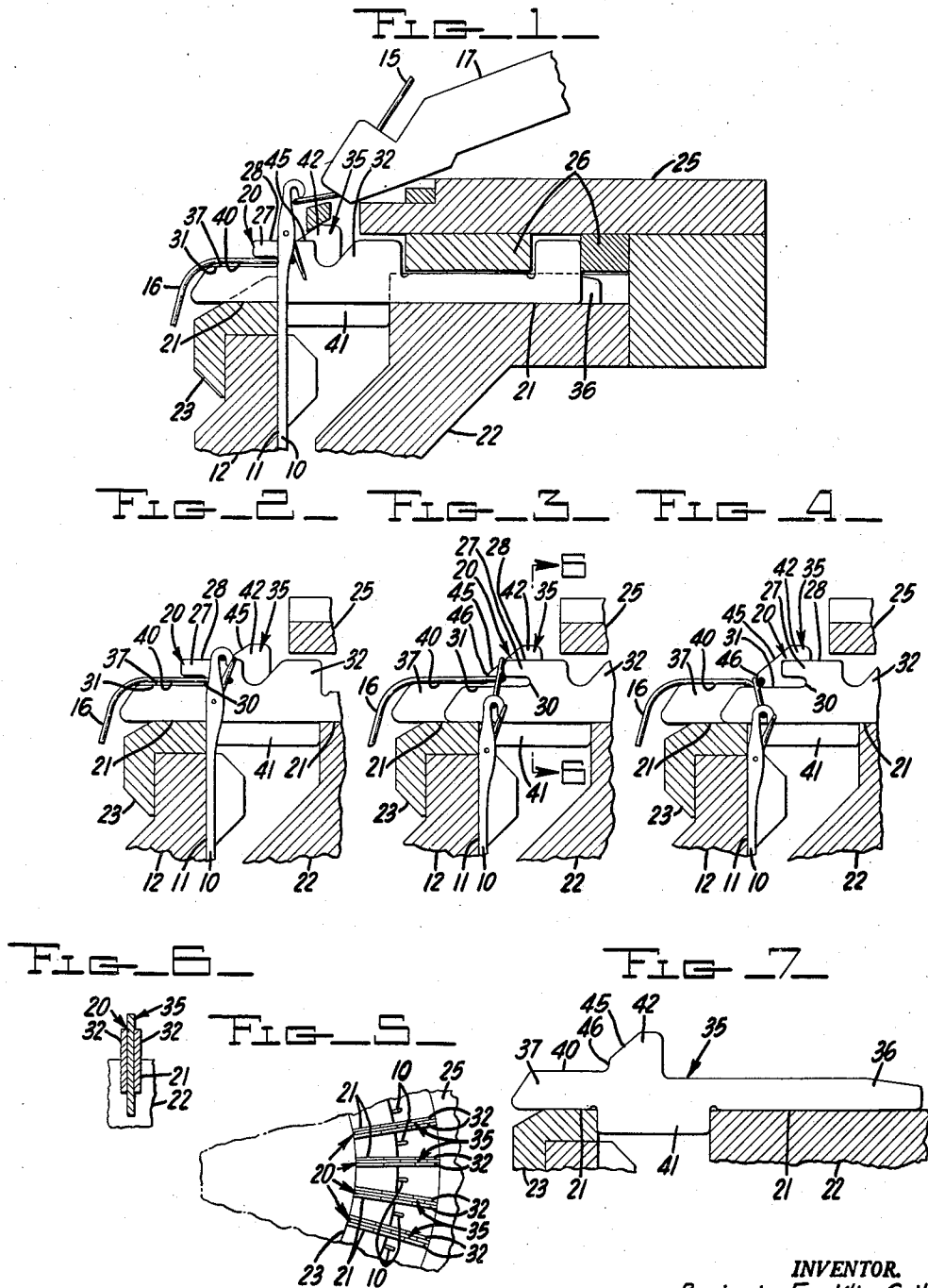
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SINKER STRUCTURE FOR CIRCULAR KNITTING MACHINES

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1

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SINKER STRUCTURE FOR CIRCULAR KNITTING MACHINES

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This invention relates to circular knitting machines and more particularly to means cooperating with the sinkers of such machines to facilitate the drawing of a uniform length of yarn by the needles in forming the loops of a fabric.

In circular knitting machines, radially movable sinkers cooperate with a circular series of needles in drawing yarn to form the loops of a knitted fabric. The needles are lowered in a wave to engage and draw the yarn through the previously formed loops on the needles and over the stitch drawing surfaces of the sinkers which are then advanced in timed relationship to the needles to place the nibs thereof above the newly drawn loops to hold them as the needles rise to latch clearing level. As the needles are again lowered to engage yarn and draw the loops for the next course, the sinkers are retracted to remove the nibs from above the loops on the needles so that the yarn may again be drawn over the stitch drawing surfaces of the sinkers. In machines where the loops are drawn over the nibs of the sinkers, the sinkers are retracted as the needles are lowered to draw yarn for the new loops so that when the correct length of yarn is drawn the loops are pulled off of the nibs onto landing or knock-over surfaces of the sinkers by the needles. The sinkers are then advanced to place the nibs over the new loops to hold them as the needles again rise to latch clearing level. These movements of the needles and sinkers must be accurately timed so that each loop drawn by the needles will receive a uniform length of yarn. However, as often occurs, particularly during the stitch drawing movements of the needles, the loops are carried along with the sinkers as they are advanced or retracted thereby causing an increased tension in the loops which results in the robbing or withdrawing of yarn from a loop formed by a preceding needle which in turn causes an uneven loop formation.

It is an object of the invention to provide a circular knitting machine with means that will overcome the above mentioned and other difficulties encountered in the formation of uniform loops by the knitting elements of the machine.

Another object of the machine is to provide a circular knitting machine with a sinker structure that will function with the needles during the stitch drawing operations of the needles to form fabric loops of uniform length.

A further object of the invention is to provide a circular knitting machine with means which cooperate with the sinkers to maintain the loops in a fixed stitch drawing position during retracting movements of the sinkers relative to the needles.

A still further object of the invention is to provide a circular knitting machine with means which cooperates with the sinkers to maintain the loops in a fixed stitch drawing position during radial movements of the sinkers and which means also acts to maintain the lengths of the loops uniform as they are drawn down to the knockover level by the needles.

With these and other objects in view which will be-

2

come apparent from the following detailed description of the illustrative embodiment of the invention shown in the accompanying drawings, the invention resides in the novel elements, features of construction and cooperation of parts, as hereinafter more particularly pointed out in the claims.

In the drawings—

Figure 1 is a cross-sectional view on an enlarged scale taken through a portion of the needle and sinker mechanisms of a circular knitting machine and including sinker cooperating members according to the invention, the parts being shown in the positions they assume at the time the needles start moving downwardly to engage the yarn during a stitch drawing operation;

Figs. 2, 3 and 4 are views similar to a portion of Fig. 1 showing the relative positions of the elements at different points in a stitch drawing operation;

Fig. 5 is a plan view of a portion of the mechanism of Fig. 1 showing the sinker arrangement according to the invention;

Fig. 6 is a cross-sectional view taken along the line 6—6 of Fig. 3; and

Fig. 7 is a side elevational view of a sinker cooperating member and a portion of the sinker mechanism in which the member is mounted.

Referring to Figs. 1 to 4 of the drawing, there is shown a portion of the knitting mechanism of a circular knitting machine including needles 10 of the pivoted latch type which are slidably mounted in slots 11 in a needle cylinder, a portion of which is shown at 12. The needles 10 are operated in a conventional manner by cam means (not shown) which act on butt portions of the needles to raise and lower the needles to engage a yarn 15, fed thereto by a yarn carrier 17, to form the yarn into loops of a knitted fabric, indicated diagrammatically at 16. Cooperating with the needles 10 in forming the yarn 15 into loops are sinkers 20 which are mounted for sliding movement in slots 21 formed radially in a sinker dial or outer ring 22 and an inside sinker ring 23 secured to the needle cylinder 12 in a usual manner. The sinkers 20 are retained in the slots 21 by a sinker cap 25 secured to the ring 22 and the sinkers are advanced and retracted in the slots 21 between the needles by cams 26 carried on the sinker cap. The sinkers 20 are conventionally provided with nose or nib portions 27 having upper stitch drawing surfaces 28, throats 30 and lower land or knock-over surfaces 31.

The needles 10 and sinkers 20 of the instant arrangement are operated substantially in the same manner as set forth in my co-pending patent application Serial No. 329,801, filed January 6, 1953, to engage and draw the yarn 15 over the upper stitch drawing surfaces 28 of the sinkers. As the needles are lowered to draw yarn for the new loops the sinkers are retracted and the new loops are drawn over the tips of the nibs 27 and down onto the knock-over surfaces 31 of the sinkers which hold the previously formed loops as the new loops are knitted therethrough. The sinkers 20 are then advanced to catch and hold the newly formed loops in the throats 30 of the sinkers as the needles are raised to latch clearing level.

During the drawing of the loops by the needles 10 and the simultaneous retraction of the sinkers 20, the loops are sometimes carried with the sinkers which results in improper drawing of the loops and the formation of defective fabric. In order to prevent such movement of the loops with the sinkers, according to the instant invention the sinkers 20 are in the form of individual side members 32 which are separated by a spacer or shedder element 35, a pair of side members and a shedder element being mounted in each slot 21 between adjacent needles (Figs. 5 and 6). However, but a single side or sinker element 32 may be used with

each of the shedder elements if desired. The pairs of side members 32 of the sinkers 20 are identical in structure and are advanced and retracted simultaneously to function as a single sinker in the slots 21 by the cams 26. The element 35 (Fig. 7) has a tail portion 36 and a nose portion 37 having an upper surface 40 which is parallel to and raised slightly above the knockover surfaces 31 of the side members 32. The shedder element 35 has a lower projecting portion 41 interfitting the space between inner and outer surfaces of the outer and inner rings 22 and 23, respectively, to hold the shedder element against radial movements with the side members 32. The element 35 is also provided with an upwardly projecting portion 42 having an inclined surface 45 extending downwardly to meet a vertical surface 46 extending upwardly from the surface 40 of the nose portion 37.

In operation the needles 10 are conventionally raised to a high position to clear the previously formed loops below the latches of the needles which are then lowered slightly to substantially the level indicated in Fig. 1 where the yarn 15 is about to be engaged beneath the hook portions of the needles and formed into loops thereby. At this time the side members 32, forming each sinker 20, are in their fully advanced positions. As each needle 10 is lowered the yarn is caught beneath the hook portion thereof and the previously formed loop which is held in the throat of the sinker, closes the latch of the needle and the needle starts to slip the loop, as shown in Fig. 2. During continued downward movement of the needle, yarn for the new loop is drawn thereby over the stitch drawing surface 28 of the sinker 20 and the sinkers are simultaneously retracted, the yarn for the new loop being held at this time by the inclined surface 45 of the spacer member 35. Simultaneously with the drawing of the correct length of yarn the tip of the nib of the sinker is withdrawn from the new loop (Fig. 3) and as the needle continues downwardly to the low position of Fig. 4, the new loop is pulled through the previously formed loop and slides down the inclined surface 45 onto the surface 40 of the spacer element 35 and the knockover surfaces 31 of the side members 32. When the needle 10 is again raised to its high position to clear the new loop, the side members 32 are advanced to catch and hold the new loop in the throats 30 thereof.

As will be obvious from the foregoing, the inclined surface 45 of the element 35 acts to hold the yarn from moving with the side members 32 of the sinker 20 as they are retracted or withdrawn so that the needle will always draw a uniform length of yarn to form the desired length loop. Furthermore, as the needle continues its downward movement, the inclined surface acts to maintain the length of the loop uniform and guides the loop as it is pulled to the knockover level, and thereby prevents the loop from being robbed of yarn by the loop formed by the next succeeding needle.

It will be understood that the improvements specifically shown and described by which the above described results are obtained can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a knitting machine having yarn feeding means, a circular series of latch needles and radially movable sinkers cooperating with said needles in forming said yarn into fabric loops, said sinkers having an upper stitch drawing surface over which the yarn is drawn by said needles and a lower knockover surface, in combination with members, one cooperating with each of said sinkers, inclined surfaces on said members extending from above said stitch drawing surface to a point adjacent said knockover surface of said sinkers for holding the stitches drawn by said needles in a fixed position during radial retracting movements of said sinkers and for shedding the stitches from said stitch drawing surfaces of said sinkers, said inclined surfaces further

acting to guide said stitches to said knockover surfaces of said sinker.

2. In a knitting machine having yarn feeding means, a circular series of latch needles, and sinkers mounted for radial movement in slots formed in a sinker supporting ring, said sinkers each having a stitch drawing surface and a knockover surface, in combination with a member mounted in the slot for each sinker, an inclined surface on said member extending from above said stitch drawing surface to a point adjacent said knockover surface of said sinker cooperating with said sinker to hold the stitch drawn by said needles in a fixed position during radial retracting movements of each sinker and for shedding the stitch drawn by said needles from said stitch drawing surface of said sinker, said inclined surface further acting to guide said drawn stitch to said knockover surface of said sinker.

3. In a knitting machine having yarn feeding means, a circular series of latch needles, and sinkers mounted for radial movements in slots formed on a sinker supporting ring, each of said sinkers having a stitch drawing surface and a knockover surface, in combination with a member mounted in fixed position in the slot for each sinker, said member having an inclined surface extending from above said stitch drawing surface to a point adjacent said knockover surface of said sinker acting to hold a stitch drawn over said stitch drawing surface of said sinker as the sinker is withdrawn from the stitch, and a knockover surface which is spaced slightly above the knockover surface of said sinker.

4. In a knitting machine having yarn feeding means, a circular series of latch needles, and sinker structure cooperating with said needles to form said yarn into fabric loops, said sinker structure comprising a pair of side members and a shedder member between said side members; said pair of side members and shedder member being mounted in a common slot disposed in radial alignment with the spaces between pairs of needles, each of said side members having an upper stitch drawing surface and a lower knockover surface and being movable in unison in said slot, said shedder member having a fixed position in said slot and having an inclined surface extending from above said stitch drawing surface to a point adjacent said knockover surface of said sinker for holding the yarn in a fixed stitch drawing position during the movement of said side members and for shedding the stitch from said stitch drawing surfaces of said side members, said inclined surface of said shedder member further acting to guide said stitch to said knockover surface of said side members.

5. A sinker mechanism for a circular knitting machine comprising an outer sinker ring, an inner sinker ring, radially extending slots in said outer and inner sinker rings, a pair of sinkers mounted in each of said slots, cam means for moving said pairs of sinkers in said slots, and a shedder member mounted in said slots between each pair of sinkers, said sinker members having an upper stitch drawing surface and a lower knockover surface, said shedder member having a portion projecting between said outer and inner sinker rings for maintaining said shedder member in fixed position in said slots, an inclined surface adapted to hold a stitch drawn over the stitch drawing surface of said sinkers as said sinkers are moved in said slots by said cam means and a knockover surface cooperating with the knockover surfaces of said sinkers.

6. A sinker mechanism for a circular knitting machine comprising a supporting ring, radially extending slots in said supporting ring, a pair of side members mounted in each of said slots, cam means for moving said side members in said slots, and a shedder member mounted in said slots between each pair of side members, said side members having an upper surface over which stitches are drawn and a lower knockover surface, said

shedder member having a portion acting to hold it in fixed position in said slot and having an inclined surface extending from above said stitch drawing surfaces of said side members to a point adjacent said knockover surfaces of said side members for holding yarn in stitch drawing position as said side members are moved by said

cam means to withdraw said upper surfaces thereof from stitch drawing position.

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