Sept. 7, 1937. W. A. INGALLS 2,092,701

FABRIC TRANSFER MECHANISM FOR KNITTING MACHINES

Filed June 24, 1935

FIG. 1.

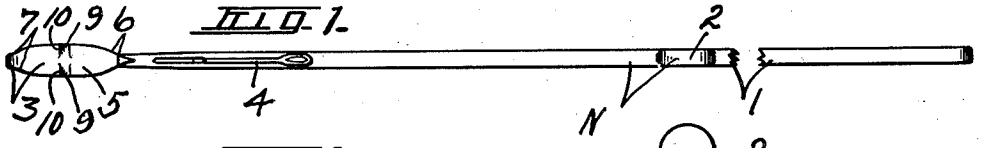


FIG. 2.

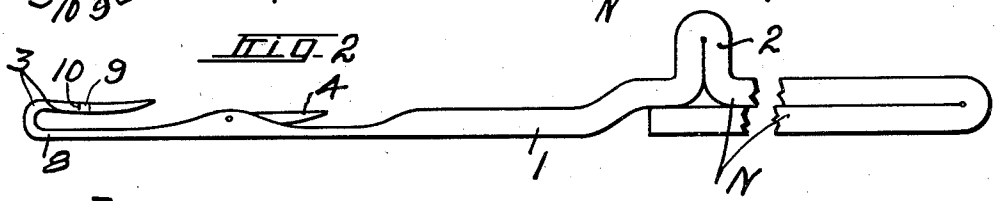


FIG. 3.

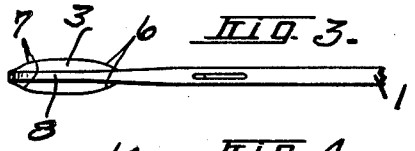


FIG. 4.

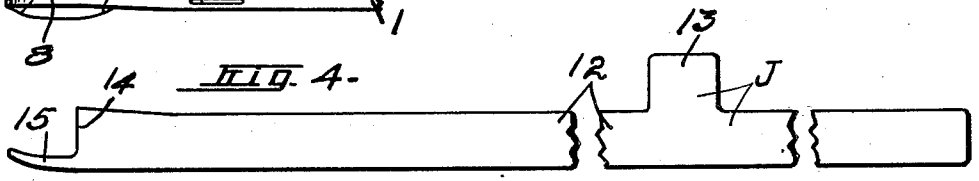


FIG. 5.

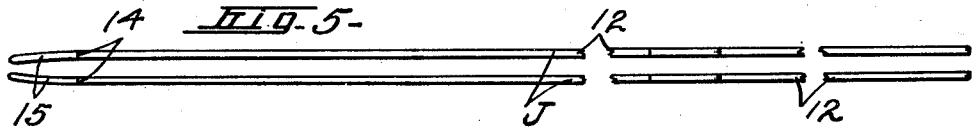


FIG. 6.

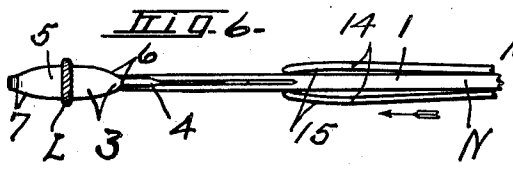


FIG. 9.

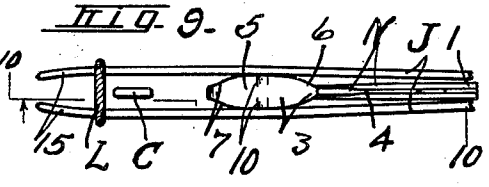


FIG. 7.

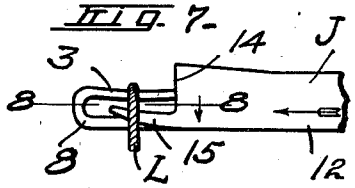


FIG. 8.

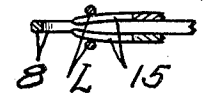
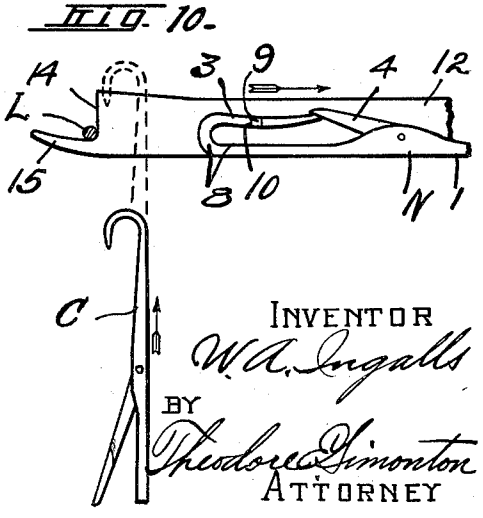


FIG. 10.



WITNESS

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FABRIC TRANSFER MECHANISM FOR KNITTING MACHINES

Willis A. Ingalls, Syracuse, N. Y.

Application June 24, 1935, Serial No. 28,084

6 Claims. (Cl. 66—24)

This invention relates to new and useful improvements in fabric transfer mechanism for a knitting machine having two sets of needles, a vertical or cylinder set and a horizontal or dial set, and is an improvement upon the means for transferring the fabric from one set of needles to the other set comprising the subject matter of my Patent No. 1,849,716, dated March 15th, 1932.

An object of this invention is to provide an improved knitting machine needle particularly adapted for knitting fine fabrics and which will function with separate relatively movable transfer members for displacing the fabric loop formed by said needle and to transfer the same to a corresponding needle of another set.

Further objects of the invention are to provide transfer means of the above mentioned class which will efficaciously operate with fabric having relatively small size loops without danger of splitting or otherwise damaging the yarn and which is simple, durable and economical in construction.

Other objects and advantages pertaining to the specific construction and operation of the needles and transfer members associated therewith will more fully appear from the following description taken in connection with the accompanying drawing in which:

Figure 1 is a longitudinal front edge view of my novel knitting needle with an intermediate portion thereof broken away.

Figure 2 is a side elevation of the needle illustrated in Figure 1.

Figure 3 is a rear edge view of the hook end portion of the needle illustrated in Figures 1 and 2.

Figure 4 is a side elevation of one of the transfer members or jacks adapted to cooperate with the needle shown in Figures 1, 2, and 3.

Figure 5 is a longitudinal front edge view of a pair of transfer members as illustrated in Figure 4 showing the same arranged in transverse spaced relation as when mounted in cooperative relation with a knitting needle.

Figure 6 is a longitudinal front edge view of the forward portions of the transfer members and a needle mounted therebetween, said needle being illustrated in a partially extended position with a fabric loop maintained on the hook of the needle in position to receive the transfer members.

Figure 7 is a detail side elevation of the forward ends of the transfer members and needle illustrating the transfer member moved forwardly from the position illustrated in Figure 6 into operative engagement with the fabric loop.

Figure 8 is a detail horizontal sectional view taken on line 8—8, Figure 7.

Figure 9 is a view similar to Figure 6 illustrating the transfer members advanced to their forward position with a fabric loop mounted thereon and maintained thereby in position to be transferred to a corresponding needle of an adjacent set and which is shown in cooperative alignment therewith.

Figure 10 is a detail vertical sectional view taken on line 10—10, Figure 9.

The needle and transfer members comprising this invention are adapted to be used in connection with conventionally constructed knitting machines, and particularly those of the circular type comprising a set of horizontal or dial needles, and a set of vertical or cylinder needles and which may be reciprocated longitudinally by means of suitable cam rings of the usual construction for circular knitting machines.

The needle illustrated in Figures 1, 2, and 3 may be used in either the dial or cylinder set of needles in cooperative alignment with a corresponding needle of the opposite set. This needle as N comprises a shank 1 of any suitable length having a shoulder or butt 2 adapted to be engaged by a suitable cam ring, not shown, for reciprocating the needle in the usual manner. The forward end of the shank 1 is provided with a hook or head 3 and a pivoted latch 4 adapted to cooperate with the hook or head for casting off the fabric loop in the conventional manner. It will be observed that the needle is of conventional construction with the exception of the head or hook 3 which, as illustrated, comprises a substantially flat body portion 5 of greater width than the shank 1 and which is arranged symmetrically with said shank to extend substantially equal distances beyond either side of the shank. The forward or free end of the hook is tapered at opposite sides thereof as at 6 to form a pointed end for cooperating with the free end of the latch 4 to receive the loop from said latch during the cast off operation. The opposite end of the body 5 is also tapered at opposite sides thereof as at 7 and is formed integral with a neck portion 8 which is of less width than that of the shank 1 of the needle as illustrated in Figure 3.

As illustrated in Figures 1 and 2, the body portion 5 of the hook is preferably provided with transversally disposed aligned recesses or notches 9 formed in the upper outer edge thereof which provide retaining shoulders as 10 in the upper

outer face of the hook adapted to arrest to a slight degree, the knit loop as said loop is passed over the head. It will be observed, by referring to Figures 1 and 2, that inasmuch as these arresting means or shoulders **10** are formed only in the upper outer edge of the hook body they will offer very little obstruction to the removal of the loops from the needle during the casting operation, and at the same time, will sufficiently arrest the loops when it is desired to transfer said loops to a corresponding needle of the companion set to properly maintain the loop in position to be engaged by the transfer members or jacks in a manner which will hereinafter be more fully described.

The transfer members or jacks J, as illustrated in Figures 4 and 5, each comprises a shank portion **12** which is preferably of greater width than the shank portion **1** of the needle and is provided with a butt or shoulder **13** adapted to be engaged by a suitable cam ring, not shown, for reciprocating the transfer members or jacks. These transfer members or jacks are arranged in pairs and each has the forward or outer end thereof provided with a shoulder **14** and a longitudinally extending prong **15** which extends outwardly from the shoulder **14**. The prongs **15**, as illustrated in Figure 4, are preferably curved upwardly from the back edge of the shank so that the outer end of each prong will lie in a plane substantially midway between the body portion **5** of the needle hook **3** and the neck **8**, as illustrated in Figure 7. These prongs **15** of each pair are also preferably slightly curved inwardly toward each other as illustrated in Figures 5 and 8, so as to lie in a plane within that of the opposite longitudinal edges of the body portion **5** of the needle head **3**.

It will be readily understood that when knitting ribbed fabric or double plain fabric, I preferably use one half as many needles in one set as there are needles in the other set, and allow alternate needles in the set having the greater number to remain idle without knitting, while the remaining needles of said set cooperate with the needles of the other set to form the ribbed fabric in the usual manner. As illustrated more particularly in Figures 6 to 10 inclusive, I have illustrated my novel knitting needle and the transfer members associated therewith, as being mounted in a horizontal position as when used as dial needles and, therefore, the needles and transfer members will be hereinafter considered as forming the dial needles of a knitting machine, and which are adapted to cooperate with the cylinder needles as C, Figures 8 and 10, for forming ribbed or double plain fabric, although it is to be understood that my novel knitting needle and transfer members may as readily comprise the cylinder set in which case they will as readily function with the other or dial set of needles for forming double plain or ribbed fabric.

In operation, each pair of transfer members J is mounted one adjacent either side of a corresponding needle N to ride in the groove, not shown, for said needle and is normally maintained in a retracted position during the operation of the needles in forming a ribbed fabric. When it is desired to change from the ribbed stitch to a plain stitch, the needles N are progressively moved outwardly to bring the knit loop as L inside of the needle latch **4** after which the needles are returned to an intermediate position to cause the loop L to close the latch **4** of the needle in the conventional manner and be positioned upon the head or hook **3** substantially midway between the ends of the body portion **5** thereof as illustrated in Figure 6. If the hook or head of each needle N is provided with the shoulders **10**, it will be obvious that these shoulders will function to arrest the loop to a limited degree and thus maintain said loop on the head or hook against accidental displacement while the needle is in the intermediate position.

The transfer members J for the respective needle N are then progressively moved forwardly during which movement the prongs **15** will ride beneath the body of the hook **3** and enter the corresponding loop L as shown in Figures 7 and 8 which, due to the relatively wide head portion of the hook engaged by the loop, will be maintained distended and thereby prevent any possibility of the ends of the prongs piercing and thus splitting or otherwise mutilating the yarn forming the loop.

After the prongs **15** have passed within the loop L and before said prongs approach the outer end of the hook **3** and neck **8**, the shank **12** of each transfer member adjacent the shoulder **14** will engage the forward or inner tapered portion **6** of the hook body and will be moved outwardly thereby so as to separate the ends of the prongs sufficiently to permit said prongs to freely pass beyond the neck portion **3** without coming into engagement therewith. As the transfer members J continue their outward movement from the position shown in Figures 7 and 8, the shoulders **14** of the members will engage the loop L and cause said loop to be carried thereby to a position beyond the outer end of the needle and as shown in Figure 9, into a plane beyond the path of movement of the needle C of the other or cylinder set of needles. It will also be observed by referring to Figure 9, that inasmuch as the shanks **12** of the transfer members J are of greater width than the head **5** and neck **8** of the hook **3**, the transfer members will ride along opposite side edges of the body **5** of said hook which will maintain the outer ends of the members in an abnormal spaced relation, whereby the corresponding needle C of the companion set may readily enter between said transfer members.

After the transfer members J have thus been moved to their outermost position as illustrated in Figure 9, the corresponding needle C of the companion or cylinder set is then moved forwardly between the respective transfer members J as illustrated by broken lines in Figure 10, after which said transfer members J will again be returned to their innermost position and in so doing, will deposit the loop L upon the respective needle C, thereby completing the transfer of the loop from the needle N of one set to the corresponding needles C of the other set, after which the needle C may be actuated in the conventional manner to knit a plain stitch fabric and the needles N together with the transfer members J, may be returned to their innermost inoperative position and be maintained therein by any suitable guide mechanism, not shown, so as to permit the free operation of the needle C for knitting the plain fabric.

Although the construction and operation of the device as shown herein are particularly simple, practical and efficient, I do not wish to be limited to the exact construction shown as it is evident that various changes may be made in the details thereof without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. In combination, a knitting needle having a shank and a widened hook tapered at the forward end thereof connected with said shank, transfer members slidable along opposite sides of the needle and provided with prongs projecting laterally inwardly to travel beneath the widened portion of the hook, and shoulder means for displacing a fabric loop from the needle upon relative longitudinal movement of the needle and transfer members, said transfer members being adapted to engage said widened portion of the hook during said relative movement for spacing the prongs.

2. In combination, a knitting needle having a shank, a hook having a portion of greater width than the thickness of the shank, and a neck portion of less width than the shank connecting the widened portion with said shank, transfer members slidable along opposite sides of the needle and provided with prongs adapted to travel beneath the widened portion of the hook, each of said transfer members being provided with a widened shank portion adapted to engage the widened portion of the hook for spacing said prongs to permit the free passage of the prongs beyond the neck portion.

3. A knitting needle having a shank, a substantially flat hook or head connected at one end with the shank and having an elongated widened portion intermediate the ends thereof spaced from said shank, said widened portion having a shoulder formed in the outer face thereof for arresting a fabric loop formed by the needle as said loop is moved longitudinally over the hook or head from the forward end thereof toward the other end.

4. In combination, a knitting needle having a shank, an elongated hook connected at one end with the shank, said hook having a widened portion intermediate the ends thereof of greater width than the shank of the needle and separated from said shank to form an unobstructed space therebetween, transfer members slidable along opposite sides of the needle and provided with prongs adapted to travel in said space beneath the widened portion of the hook, and shoulders projecting laterally beyond the prongs for displacing a fabric loop from the needle when the transfer members are moved in one direction.

5. In combination, a knitting needle having a shank and a widened hook separated from the shank to form an unobstructed space therebetween, transfer members slidable along opposite sides of the needle and provided with prongs adapted to travel in said space beneath the widened portion of the hook, and shoulders projecting beyond the front edge of the needle for displacing a fabric loop from the needle when the members are moved in one direction and to engage said widened portion of the hook during said movement for spacing the prongs.

6. In combination, a knitting needle having a shank, a hook having a portion of greater width than the thickness of the shank, and a neck portion connecting the hook with the shank with the widened portion of the hook separated from said shank to form an unobstructed space therebetween, transfer members slidable along opposite sides of the needle and provided with shoulders projecting beyond the front edge of the needle for displacing a fabric loop from the hook when the members are moved in one direction, said members having prongs projecting lengthwise thereof beyond the shoulders and extended inwardly to travel in said space beneath the widened portion of the hook for entering the loop, said shoulders being adapted to engage the widened portion of the hook during said movement for spacing the prongs to permit the free passage of said prongs beyond the neck portion.

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