April 28, 1936. A. DI FONZO 2,038,895

KNITTING APPARATUS

Filed Dec. 7, 1933

Fig. 1. Fig. 2. Fig. 3.

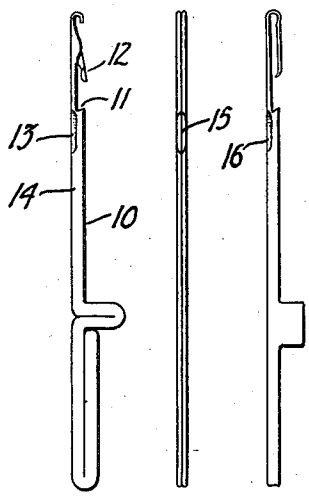



Fig. 6.

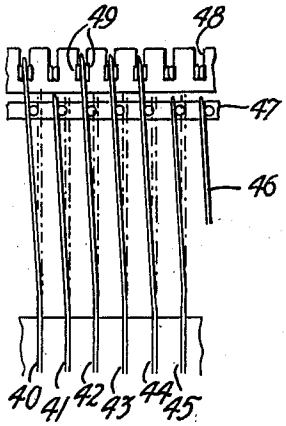



Fig. 5

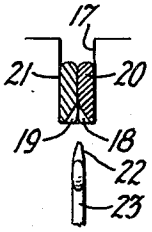



Fig. 4.

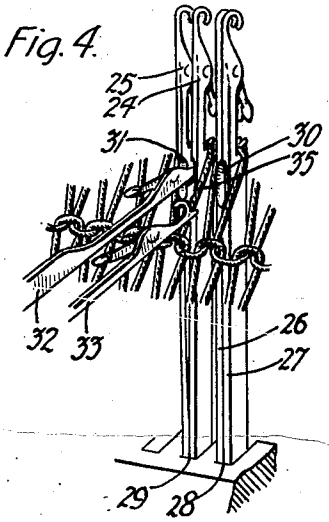
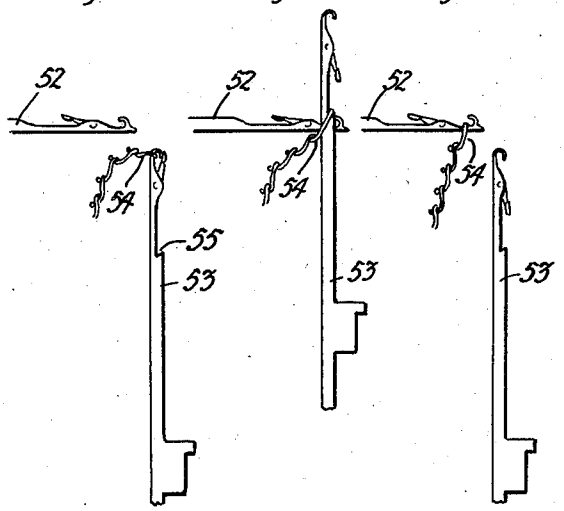



Fig. 7. Fig. 8. Fig. 9.




Inventor:
Antonio Di Fonzo
by Bennett H. Jackson Att'y.

Patented Apr. 28, 1936

2,038,895

# UNITED STATES PATENT OFFICE

2,038,895

## KNITTING APPARATUS

Antonio Di Fonzo, Cleveland, Ohio, assignor to Lombardi Knitting Machine Co., Inc., New York, N. Y.

Application December 7, 1933, Serial No. 701,279

1 Claim. (Cl. 66—24)

This invention relates to knitting apparatus involving needles of a special type.

An object of this invention is to provide a needle for a knitting machine having improved characteristics with respect to controlling operations exercised thereon or exercised by it in the knitting of a fabric. Another object is to incorporate in a needle means to facilitate the transfer of the stitch from one type of needle to another type as in a machine employing both cylinder and dial needles.

These objects may be accomplished in the following manner in accordance with the preferred embodiment of the invention in the assumed case where it is desired to transfer the stitch from a cylinder needle to a dial needle. Each of a plurality of slots in the needle cylinder contains a double shank needle, adjacent sides of said double shanks being beveled or otherwise reduced in thickness in the direction of the dial needles so as to facilitate the entrance and projection of a dial needle between and through each pair of shanks, so that the subsequent retraction of such a double cylinder needle will leave the cylinder needle stitch on the advanced dial needle. If desired each dial needle may have a pointed tip to insure the proper entrance of each dial needle between the double shanks of the associated cylinder needle, when the dial needle is racked or otherwise biased to be in juxtaposition to its cylinder needle upon the dial needle advancement.

This invention will be better understood by reference to the following detailed description taken in connection with the accompanying drawing in which—

Fig. 1 represents a needle embodying this invention:

Fig. 2 represents an edge view of a double shank needle embodying the invention:

Fig. 3 shows the invention applied to a spring needle:

Fig. 4 is a showing in perspective of how this invention assists in the transfer of the stitch from a cylinder needle to a dial needle;

Fig. 5 is a cross sectional view of a double shank needle in a needle slot;

Fig. 6 shows one manner of racking the dial needles in a machine embodying the invention; and

Figs. 7, 8, and 9 show the several steps in the process of transferring a stitch from a cylinder needle to a dial needle.

Fig. 1 shows a side view of a needle of the latched type, its shank 10 being provided with a shoulder 11 to support a yarn loop in the manner hereinafter described, said shoulder being on the same needle edge as the latch 12. Below shoulder 11 but on the opposite edge, the shank is beveled at the point 13, that is the edge 14 at the point 13 is of reduced thickness, the shank at the point assuming its normal thickness about halfway between the front and rear edges of the shank; the said beveling being on the side of the shank facing the observer.

In accordance with the preferred form of this invention the needle of Fig. 1 is preferably associated with a needle having a similarly beveled shank except that when the two needles are placed side by side with their hooks in the same direction the two beveled portions are adjacent as shown in Fig. 2 at the point 15 to form a partial recess between the shanks to facilitate the entrance of the tip of a dial needle as will be explained hereinafter.

This invention is of course not limited to a latched needle as it may be applied to any type of needle. For example in Fig. 3 the beveled edge 16 is applied to the shank of a beard needle.

Fig. 5 may be taken as a sectional view of the double needle of Fig. 2 taken at the point 15 with the double needle in a common needle slot 17. The two beveled edges 18 and 19 of the needle shanks 20, 21 are shown adjacent so that the projection of the special sharpened point or tip 22 of the dial needle 23 between the beveled edges will readily force the two needle shanks apart to provide space for the dial needle therebetween. The special tip 22 on the dial needles is desirable but not essential.

In Fig. 4 a few dial and associated cylinder needles are disclosed to illustrate the manner of the stitch transfer from a cylinder needle to a dial needle. Thus the two cylinder needles 24, 25 are supported in the same slot 29, while the two cylinder needles 26, 27 arise from a common needle slot 28. Needles 24, 25 are shown separated by the entrance of a dial needle 32 at the beveled recess 31, while the two needles 26, 27 are shown unseparated since their dial needle 33 is not shown advanced.

The yarn loop 35 which was previously formed by the double needle 24, 25 is supported on the needle shoulder such as shoulder 11 of Fig. 1. The dial needle 32 is shown far enough advanced between the double needle 24, 25 that the retraction of the double needle 24, 25 will cause the said loop 35 to be caught in the hook of dial needle 32 and ultimately feed of the needle 24, 25 when needle 24, 25 is retracted below the level of the dial needle. This therefore insures the transfer

of the stitch from the cylinder needle **24, 25**, to the dial needle **32**. It is of course apparent that a similar advancement of the dial needle **33** would serve to transfer to itself the yarn loop shown in Fig. 4 supported by the shoulder on cylinder needle **26, 27**.

Whenever it is desired to transfer the stitches from a group of cylinder needles to a group of dial needles it may be desirable to have the machine function in the manner shown in Fig. 6. In the top view of that figure there is shown a plurality of dial needles **40** to **46** which normally lie in positions shown by the dotted lines but which may be deflected to the left by a deflecting bar **47** so that any desired dial needle such as needle **42** will be aligned with its associated double cylinder needle so that when the dial needle **42** is advanced the point of the dial needle will enter the recess formed by the beveled portions such as **18, 19**, Fig. 5 and separate the double shank to withdraw the stitch last made by cylinder needle **49**. The slots **48** for the cylinder needles are also shown in this figure. It is of course understood that the machine may include suitable means (pattern controlled if desired) for controlling the advancement and retraction of the dial and cylinder needles as well as the movement of the deflecting bar **47**.

The specific manner in which the stitch transfer is made is shown more clearly in Figs. 7, 8 and 9 where in Fig. 7 both the dial needle **52** and the cylinder needle **53** are shown in retracted position with the cylinder needle hook containing the recently formed yarn loop **54**. The subsequent raising of needle **53** will open the needle latch and cause the yarn loop to fall to shoulder **55** in Fig. 8. The advancement of the dial needle **52** to pass between the double needle **53** (like needle **24, 25** Fig. 4) will cause the dial needle to pierce the loop **54** also, so that when the double cylinder needle **53** is retracted the loop **54** will be caught in the hook of the dial needle after which such a yarn loop may be treated in any desired manner known in the art.

It is of course contemplated that each cylinder needle slot such as slot **28** is of such a width as to permit the insertion of a double needle or two separate needles as in Fig. 2, which means that either slot **28** is twice the ordinary width or else that each needle **26** and **27** is of one half the thickness of the usual cylinder needle.

While the beveled portion such as portion **13** Fig. 1 extends only for about half the width of the needle shank it is obvious that the portion of reduced shank thickness may extend over a greater or lesser amount of the shank width or may even extend over the entire shank width. Other modifications of the invention are intended to be comprehended with the scope of this invention as defined in the appended claim. For example the double needle **26, 27** of Fig. 4 may be united for example at their ends opposite the yarn hooks, such as being made of one piece of metal doubled back on itself to form the two shanks. It also should be apparent that the invention is of utility in any machine having two rows of needles. While in the above description the two rows have been cylinder and dial needles, the two distinct rows may be for example the two angularly spaced needle rows of a flat type machine, in which the needles of one row are of the double shank type as in Fig. 4.

It will also be apparent that this invention is of particular value in rib stitch knitting machines, a type which is known in the knitting industry. Its application to a machine of that type will be apparent to those skilled in the art.

What is claimed is:

A multiple knitting needle adapted for operation in a common slot of uniform width in a knitting machine, comprising two shanks having contacting surfaces for the major portion of their lengths, at least one of said shanks having a yarn receiving hook, means on one of said shanks below the open end of said hook for retaining a yarn loop released from said hook, the adjacent faces of said shanks at a point below said means being beveled to present a recess when the contacting shanks are viewed from the edge of said needle opposite the open end of said hook, said recess being of suitable dimensions to facilitate the insertion of another needle between said shanks, the combined thickness of said shanks being substantially constant throughout the entire length of said shanks, the combined thickness of said two shanks being substantially equal to the width of said slot, and means for simultaneously advancing both of said shanks when it is desired to transfer to another needle a loop held by said retaining means.

ANTONIO DI FONZO.