Jan. 22, 1957 D. W. RHOADS 2,778,211

KNITTING MACHINE NEEDLE OF THE SLIDING TONGUE TYPE

Filed Oct. 8, 1951

2 Sheets-Sheet 1

Fig. 1

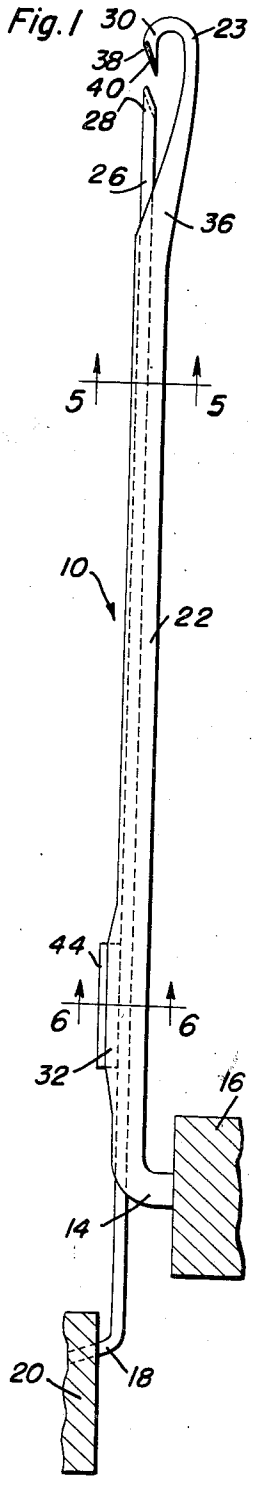


Fig. 2

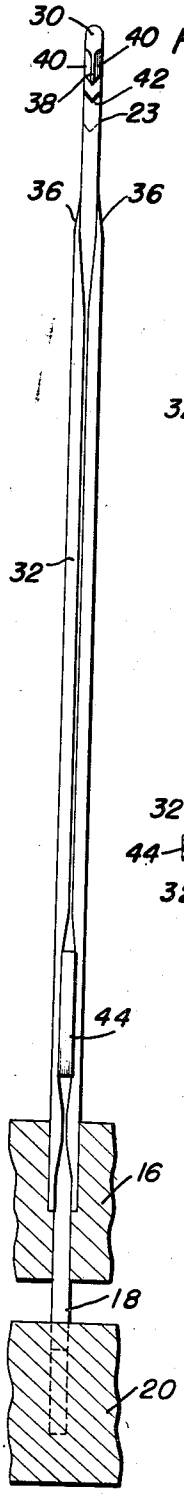


Fig. 5

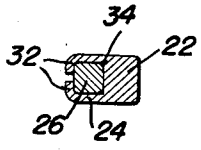


Fig. 6

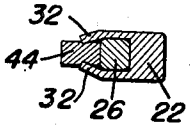


Fig. 3

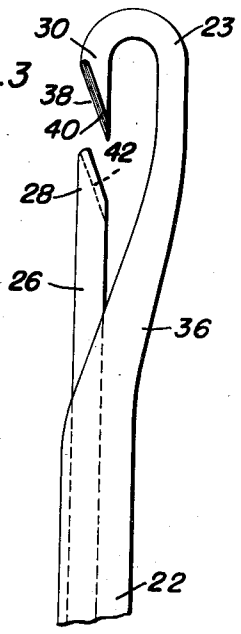
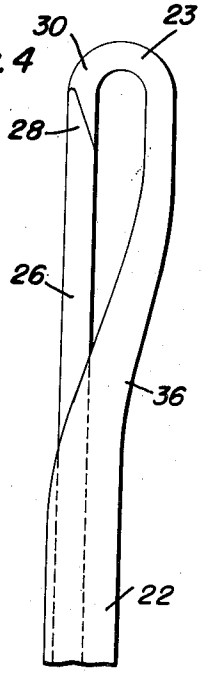


Fig. 4



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2 Sheets-Sheet 2

Fig. 7

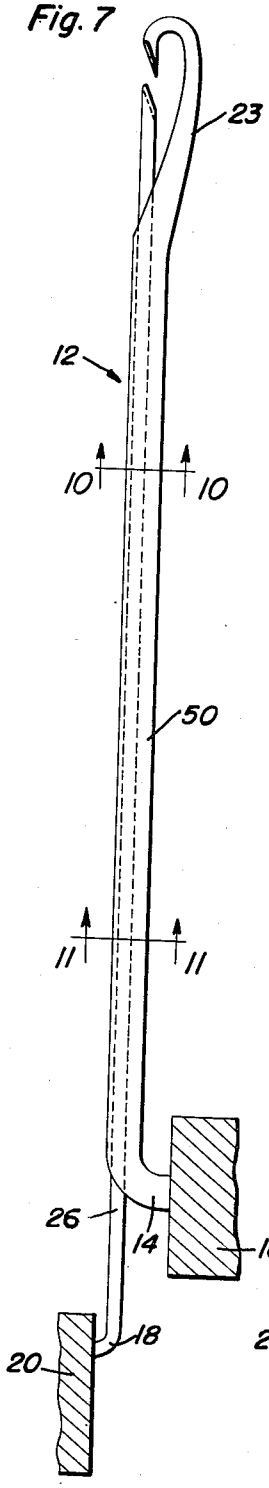


Fig. 8

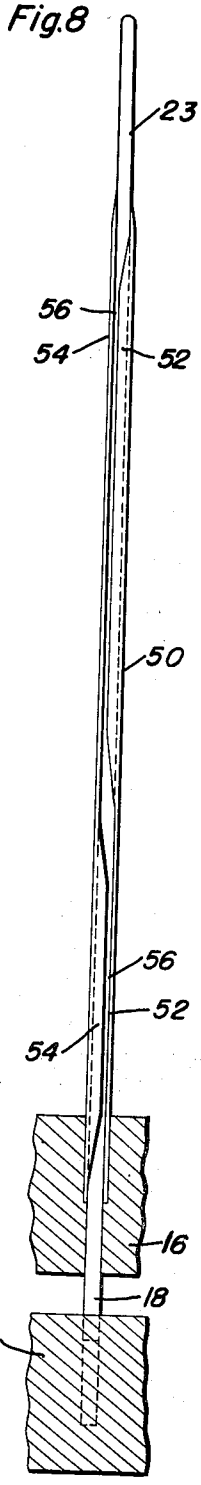


Fig. 9

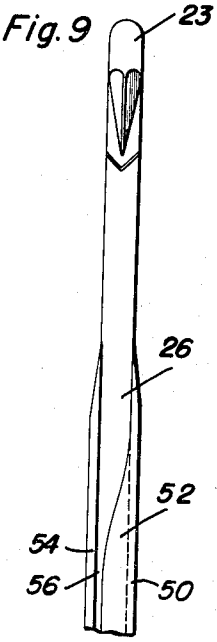


Fig. 10

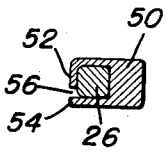
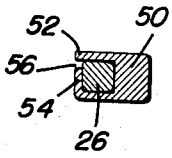


Fig. 11



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KNITTING MACHINE NEEDLE OF THE SLIDING TONGUE TYPE

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Application October 8, 1951, Serial No. 250,212

13 Claims. (Cl. 66—120)

This invention comprises novel and useful improvements in a knitting machine needle of the sliding tongue type and in general relates to a needle having greater certainty of operation in its opening and closing movements of the needle hook; improved lubrication of the sliding tongue and needle shank components of the needle; together with a needle having characteristics of an improved guided action of the sliding tongue, longer life and the capacity for operation in knitting machines at speeds in excess of 1000 revolutions per minute.

The primary object of this invention is to provide a knitting machine needle of the sliding tongue type which shall be capable of functioning satisfactorily in relatively fine gauges of knitting, shall be equally applicable to warp knitting machines of various types and operating at speeds in excess of 1000 revolutions per minute.

A further object of this invention is to provide in a knitting machine needle of the character set forth hereinbefore, complementary grooved and beveled surfaces on the adjacent portions of the sliding tongue and the needle hook to effect a guided and a more complete closing of the hook by the sliding tongue.

An important feature of this invention resides in providing in a knitting machine needle of the sliding tongue type a beveled edge on the tip of the hook portion which is inclined with respect to the longitudinal axis of the shank of the needle together with a complementary grooved portion on the sliding tongue.

A further object of the invention is to provide a knitting machine needle of the sliding tongue type wherein ample clearances are provided between the stem of the sliding tongue and the walls of the needle shank groove to permit easier sliding movement of the tongue without binding and facilitate lubrication thereof.

A further feature of the invention resides in the provision of a sliding tongue type of knitting machine needle wherein the shank of the sliding tongue has three of its side walls in engagement with the side walls of the needle shank but with the edges of the tongue side walls spaced from the corresponding edges of the needle shank groove to provide operating and lubricating clearances therebetween.

Yet another important feature of the invention resides in the provision of a needle of the character set forth above wherein the stem of the sliding tongue and the groove of the needle shank are of substantially the same cross-sectional shape and size, but wherein rounded edges or corners are provided upon the surfaces of one of the members to provide longitudinally extending channels or clearances therebetween.

A further important object of the present invention is to provide a knitting machine needle of the sliding tongue type wherein the shank of the needle is provided with a groove receiving the stem of the sliding tongue, and wherein the shank has an overlying wall or flange for retaining the stem of the needle against lateral displacement from the shank groove.

A further important object of the invention is to provide a knitting machine needle of the sliding tongue type as set forth in the preceding objects wherein a lubricating means is carried by the needle shank in lubricating contact with the sliding tongue stem thereof.

These, together with various ancillary features and objects of the invention, which will later become apparent as the following description proceeds, are attained by the present invention, preferred embodiments of which have been illustrated, by way of example, in the accompanying drawings, wherein:

Figure 1 is a side elevational view of an embodiment of knitting machine needle of the sliding tongue type in accordance with this invention, certain parts of the needle supporting operating mechanism being indicated in section therein, the needle being shown with the tongue retracted into the open position of the needle;

Figure 2 is a top plan view of the arrangement of Figure 1;

Figure 3 is an enlarged detail view of the hook end of the needle and tongue of Figures 1 and 2, taken upon an enlarged scale;

Figure 4 is a view similar to Figure 3 but showing the tongue and hook in the closed position of the needle;

Figure 5 is a vertical transverse sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 1 and illustrating the association of the needle shank and its groove with the sliding tongue stem of the needle;

Figure 6 is a vertical transverse sectional view taken substantially upon the plane indicated by the section line 6—6 of Figure 1 and illustrating the manner in which a lubricating element is associated with the tongue stem and needle shank groove of the needle;

Figure 7 is a view similar to Figure 1 but of a modified construction of the invention;

Figure 8 is a bottom plan view of the arrangement of Figure 7;

Figure 9 is a fragmentary top plan view of the arrangement of Figure 7, being a detail view of the hook portion of the needle taken upon an enlarged scale;

Figures 10 and 11 are vertical transverse sectional views taken respectively upon the planes indicated by the section lines 10—10 and 11—11 of Figure 7.

Reference is now made more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, and wherein the numeral 10 designates generally the embodiment of needle of Figures 1–6, while the numeral 12 designates the embodiment of needle of Figures 7–11. As illustrated, in both the embodiments, the shank of the needle or needle butt is identical being indicated by the numeral 14 and being mounted in a needle bed plate 16, while the end portion of the needle tongue is angularly disposed to the stem thereof as shown at 18, and is engaged in a tongue operating member indicated generally by the numeral 20.

Referring first to the embodiment of Figures 1–6, it will be seen that the needle consists of two relatively movable elements, the first including a needle shank 22 having the abovementioned butt at one end, and having a needle hook 23 at its opposite end, together with a sliding tongue 26 having the abovementioned laterally disposed terminal portion 18 at one end, and having a hook closing portion 28 at its opposite end.

As will be more readily apparent from a comparison of Figures 1, 2, 5 and 6, it will be seen that the needle shank 22 is provided with a needle shank groove 24 which is generally of square cross-section and which extends longitudinally throughout the entire length of the shank. The needle hook 23 has its terminal portion or hook seat portion 30 disposed in alignment with the longitudinal axis of the needle shank groove 24 as will be apparent from Figures 1 and 3.

It will be observed that the stem of the sliding tongue

26 is of substantially the same sectional configuration and size and the needle shank groove 24 whereby the tongue may be inserted into the shank groove from the end opposite the hook of the needle and may have smooth, guided sliding movement therein towards and from the hook of the needle.

It is preferred to form what may be termed the top wall of the needle shank groove with inturned flanges 32 which extend towards each other and overlie the adjacent side wall of the sliding tongue 26 and which thus provide a longitudinal slot in the needle shank extending the entire length thereof.

This slot provides means for admitting air into the groove along the length of the shank and tongue, and provides means for manually introducing oil into the groove to lubricate the sliding movement of the tongue relative thereto.

It will be apparent however that this slot need not extend throughout the entire length of the shank but could extend throughout only predetermined portions thereof; and the slot need not be disposed upon the top wall of the groove but could be located upon some other wall if desired and in different positions thereon.

In order to facilitate the ease of sliding movement of the tongue within the shank groove of the needle, it is preferred to provide longitudinal clearances or passages in the groove therebetween. For this purpose, as shown best in Figures 5 and 6, one or more corners of the tongue stem 26 may be rounded as at 34, while the corresponding edges of the groove may be square to provide a longitudinally extending passage therebetween. These passages serve to permit the flow of air between the stem of the tongue and the shank of the needle thereby preventing binding and rendering sliding movement of the tongue within the shank groove easier; and facilitates the lubrication of the relatively sliding tongue and shank.

It will of course be apparent that only one of the corners of the tongue stem may be rounded, or two or more of the same may be rounded as found to be expedient. Obviously, the desired longitudinally extending passages could be provided in other ways as by dishing or recessing one or more of the flat sides of the tongue stem or the side walls of the needle shank groove.

Referring now specifically to Figure 2, it will be seen that that portion of the needle shank 22 from which the hook portion 23 extends, is forwardly tapered as at 36 to merge into the relatively narrower material of the hook portion 23.

In accordance with this invention, an improved means is provided whereby the sliding tongue closes the hook portion of the needle. The terminal portion 30 of the hook 23 is provided with an edge 38 formed by doubled sides 40, which edge is inclined with respect to the longitudinal axis of the sliding tongue and the needle shank. The terminal portion 28 of the sliding tongue is cutaway at the angle as the edge 38 and is provided with a V-shaped groove 42 which is complementary to the beveled sides 40 of the edge 38. The edge and groove are so shaped and positioned that the groove envelops and seats upon the edge 38 with the sides of the groove 42 slidingly embracing the beveled sides 40 of the terminal portion 30 when the tongue is slid against the hook in the needle closing position illustrated in Figure 4. In this position, it will now be apparent that the edges and sides of the sliding tongue form continuations of the edges and sides of the hook portion.

This construction insures a complete and more certain closing of the hook by the tongue; provides a guiding action as the tongue approaches the hook and moves into closing position thereon; and insures smoother surfaces of the tongue and hook when the needle is closed.

As abovementioned, it is possible for the longitudinally extending passages between the adjacent edges of the tongue stem and of the shank groove as well as the slot between the flanges 32 to function as means for lubricating the sliding movement of the tongue relative to the shank. However, it is preferred to utilize these members solely for the admission of air between the tongue and the shank and to provide lubrication means in the form of a block or strip of lubricating material 44, see Figures 1, 2 and 6, such as a graphite block, or any other lubricant carrying or constituting material. This block is inserted between the flanges 32 adjacent the rear end of the needle shank where the flanges are laterally displaced and upwardly turned and are then swaged or clamped upon the block 44 as will be clearly apparent from Figures 1 and 6.

The position of the lubricating means 44 upon the shank of the needle is such that the same will not be struck by or interfere with the operation of the knock-over mechanism of the knitting machine.

It will thus be observed that the sliding tongue is effectively guided throughout the entire length of the needle; is effectively lubricated in a simple manner; and is prevented from binding by the provision of means for introducing air between the tongue and the shank throughout the entire length of engagement of these members.

Reference is now made to the modified construction of Figures 7–11, wherein the same general construction of sliding tongue, complementary hook and tongue closing means, and the same general air passage means between the shank groove and the tongue stem are provided. In this form however a slightly different construction of needle shank is provided, and the lubricating means of the previous embodiment has been omitted. In the latter construction, the needle shank, now indicated by the numeral 50 has the overlying or overlapping flanges 52 and 54 of the top wall of the needle shank of unequal widths. Thus, as will be seen by comparing Figures 7, 8, 10 and 11, the flange 52 at the hook end of the needle is of greater width than the flange 54 whereby the slot 56 between these flanges is disposed towards the left side of the needle as viewed in Figure 8, while adjacent the butt end of the needle the flange 54 is wider than the flange 52, whereby the slot 56 is disposed at the right side of the needle shank as seen in Figure 8. This construction results in a zigzagging or staggered slot 56 along the length of the needle so that guiding action upon what may be termed the top surface of the needle tongue is afforded at both the front and rear portions of the same but only a relatively small midportion of the needle shank failing to provide any guiding action.

The operation of this form of the invention is identical with that previously described and further explanation is believed to be unnecessary.

From the foregoing, the construction and operation of the device will be readily understood and further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having complementary mating surfaces engageable with each other for closing the hook, one of said surfaces comprising a knife edge with beveled sides and the other of said surfaces comprising a V-shaped groove having beveled sides.

2. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle

tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having complementary mating surfaces engageable with each other for closing the hook, said mating surfaces when abutting being disposed in intersecting planes which are inclined to the longitudinal axis of the tongue.

3. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank, said passage extending substantially the entire length of the sliding engagement of the shank and stem and opening to atmosphere at both of its ends including means extending through a wall of said shank for connecting said groove with the atmosphere.

4. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank, said passage extending substantially the entire length of the sliding engagement of the shank and stem and opening to atmosphere at both of its ends including means extending through a wall of said shank for connecting said groove with the atmosphere, said last means comprising a slot extending longitudinally of said shank.

5. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank means extending through a wall of said shank for connecting said groove with the atmosphere, flanges on the walls of said shank, said last means comprising a slot extending longitudinally of said shank and being defined by the adjacent edges of said flanges.

6. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank, said passage extending substantially the entire length of the sliding engagement of the shank and stem and opening to atmosphere at both of its ends wherein said stem and said shank groove are of substantially congruous non-circular cross-section the stem and the shank having each a plurality of flat surfaces, said clearance passage being defined between adjacent portions of the stem and shank.

7. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank, said passage extending substantially the entire length of the sliding engagement of the shank and stem and opening to atmosphere at both of its ends wherein

said stem and said shank groove are of polygonal cross-section, at least one of the longitudinal edges of the polygonal stem being rounded, said clearance passage being defined between said rounded edge and the shank.

8. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank, said passage extending substantially the entire length of the sliding engagement of the shank and stem and opening to atmosphere at both of its ends including means extending through a wall of said shank for connecting said groove with the atmosphere, said last means comprising a slot extending longitudinally of said shank, and disposed medially of said shank wall.

9. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank means extending through a wall of said shank for connecting said groove with the atmosphere, said last means comprising a slot extending longitudinally of said shank, and having a portion offset from the median of said shank wall.

10. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therethrough and a hook at one end thereof, a needle tongue having a stem extending through and slidably received in said longitudinal groove, said tongue and hook having mating surfaces engageable with each other for closing the hook, a portion of the groove forming a longitudinally extending clearance passage between the stem and the shank means extending through a wall of said shank for connecting said groove with the atmosphere, said last means comprising a slot extending longitudinally of said shank, and having portions disposed on opposite sides of the median of said shank wall.

11. A knitting machine needle of the sliding tongue type comprising a shank having a longitudinal groove therein and a hook at one end thereof, a needle tongue having a stem slidable in said groove and a portion engageable with said hook for closing the same, said shank having an opening in one side wall thereof, a lubricant member secured in said opening and extending therethrough into contact with the side of the needle tongue for lubricating the latter.

12. The combination of claim 11 wherein the wall of the shank on opposite sides of the opening has laterally extending portions embracing and retaining said member.

13. The combination of claim 11 comprising a longitudinally extending passage between adjacent surfaces of said needle tongue and said shank, said opening constituting means for admitting air to said passage.

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