Aug. 19, 1941. C. D. WOOD 2,253,057

NEEDLE ELEMENT FOR KNITTING MACHINES

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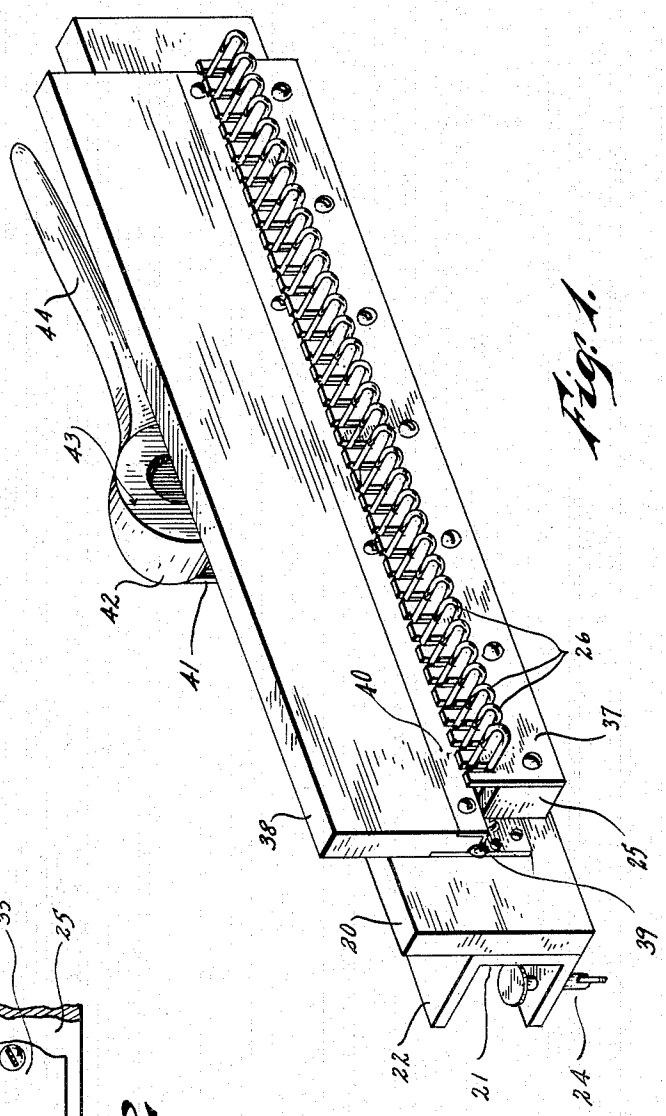


Fig. 1.

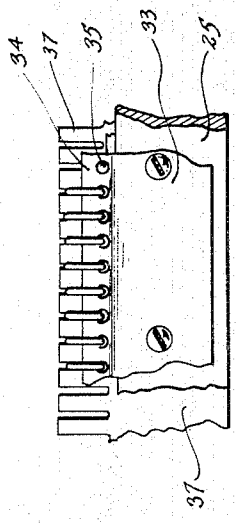


Fig. 2

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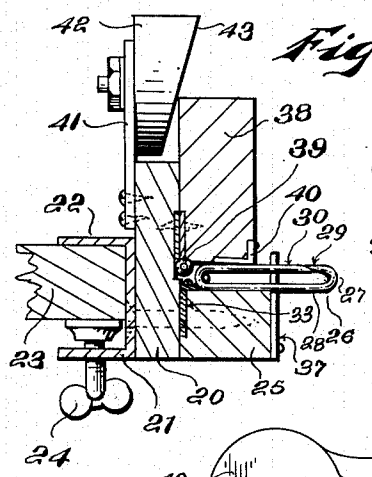


Fig. 4.

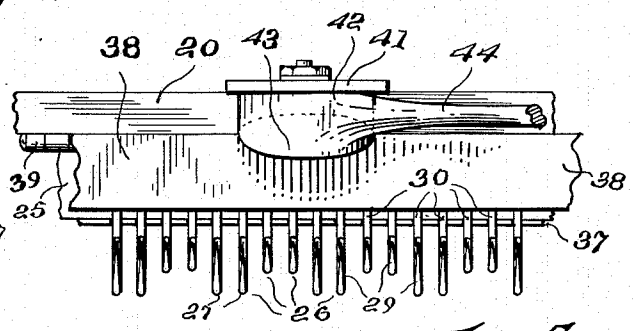


Fig. 5.

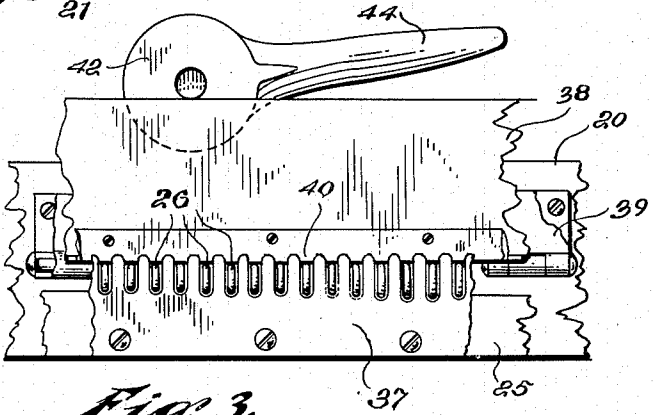


Fig. 3.

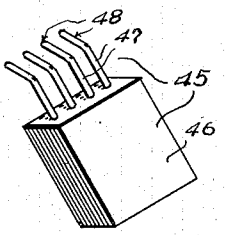


Fig. 18.

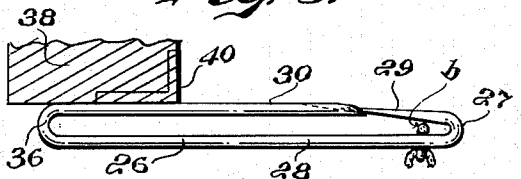


Fig. 6.

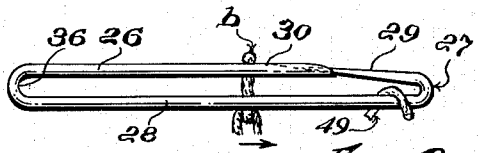


Fig. 9.

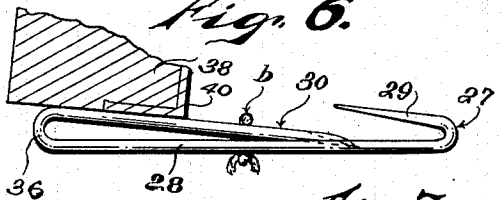


Fig. 7.

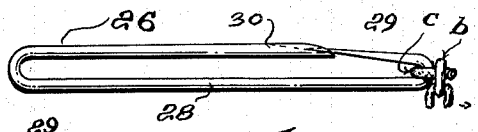


Fig. 10.

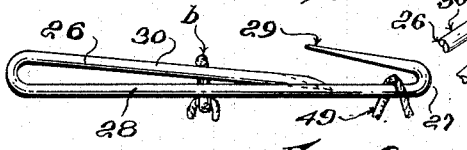


Fig. 8.

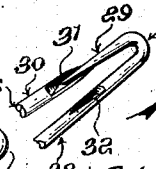


Fig. 11.

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Fig. 12.

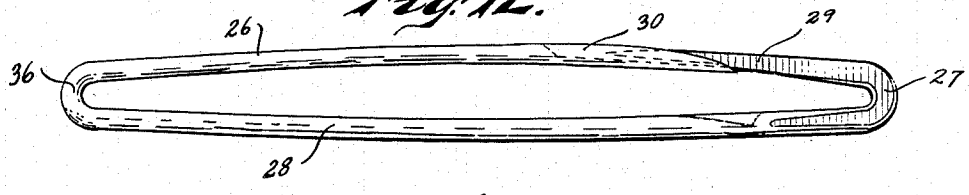


Fig. 13.



Fig. 14.

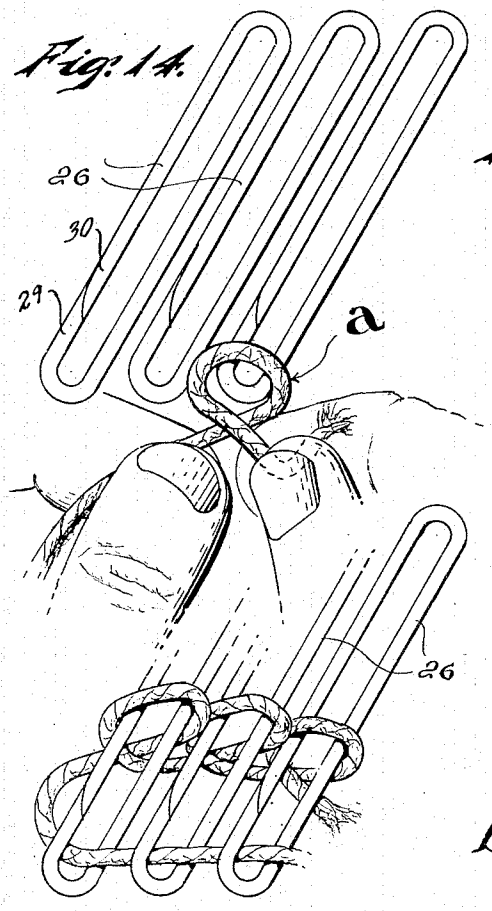


Fig. 15.

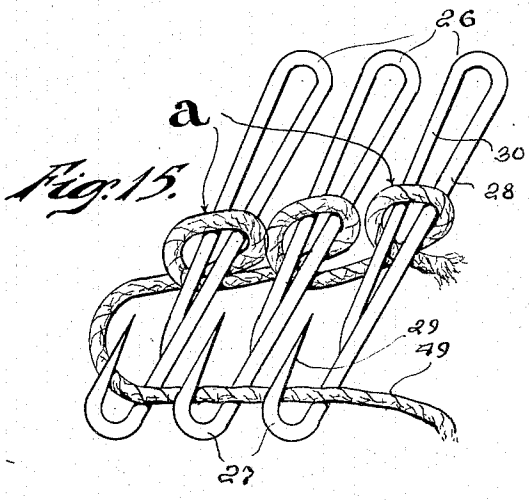
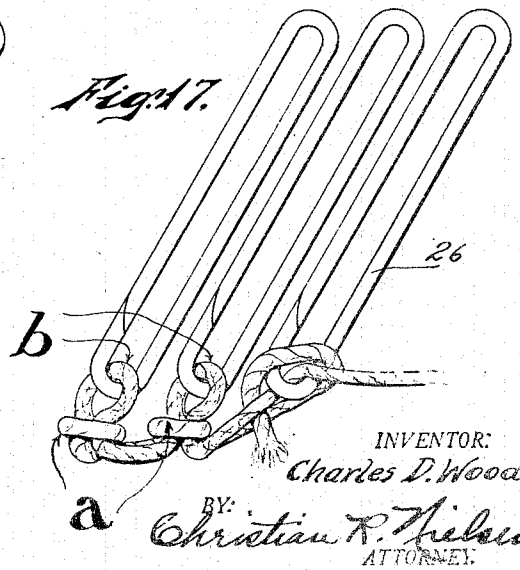


Fig. 16.

Fig. 17.



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UNITED STATES PATENT OFFICE

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NEEDLE ELEMENT FOR KNITTING MACHINES

Charles D. Wood, North Bend, British Columbia Canada

Application January 17, 1940, Serial No. 314,329

4 Claims. (Cl. 66—116)

The invention relates to knitting devices, and the like, and has for an object to present means whereby work similar to that done with the common knitting needles may be produced rapidly and neatly, in identically the same patterns as ordinarily practiced, and to enable fancy stitches, if desired; and to permit the production of a body cloth with a laid-on intermitted pattern to produce a surface design at one side, on distinctive and various colors if desired.

It is an important object of the invention to present a device of an extremely simple construction adapted to be produced at a low cost, and which may be used by persons without special training to effect the rapid knitting of cloth, garments, and the like.

A salient purpose of the invention is to present a device which will enable the production of a very large number of stitches rapidly and with great uniformity, with a minimum liability of dropping of stitches, or miscounts, and other errors common in knitting. A specific object of the invention is to present a novel form of needle used in production of the work. Another important object is to present a novel means for operating the needle in a gang to enable the formation of a multiplicity of stitches in one operation.

Another important aim is to provide a novel mounting for the needles adapted to permit their ready replacement or renewal when required, and to hold them sufficiently and accurately for operation by the gang operating device.

Another important aim of the invention is to provide a device of this kind which may be mounted upon the edges of an ordinary table or desk in a secure manner to enable its rapid and effective operation and utilization.

Another important attainment and object of the invention is to present a novel tensioning construction whereby the closeness of the material may be readily regulated.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will be readily understood from the following description and accompanying drawings, wherein—

Figure 1 is a perspective view of a machine constructed in accordance with my invention.

Figure 2 is a fragmentary detail of the rear side of the needle pallet.

Figure 3 is a fragmentary front elevation of the central part of the machine.

Figure 4 is a cross section of the machine.

Figure 5 is a fragmentary top view of the machine.

Figures 6 to 10 are detail views of a needle and the work, showing the successive stages in the knitting operations.

Figure 11 is a detail of the needle points and recesses.

Figure 12 is a side elevation of a needle double the actual size.

Figure 13 is a similarly enlarged top view of a needle.

Figure 14 is a formal perspective view of three needles, showing the method of starting a piece of work, the formation of the first loop on a needle.

Figure 15 is a similar view showing a second stage of the operation of starting, the three needles being looped, and any number would be looped by a continuation of the arrangement shown.

Figure 16 shows a third stage with the needles opened and the yarn laid through the outer parts of all.

Figure 17 shows a further stage in the closing of the needles.

Figure 18 is a perspective view of an auxiliary drawing tool.

There is illustrated a machine comprising a body board or back plate **20** having two yokes **21** fixed on the back side thereof, upper and lower arms projected horizontally at right angles to the plate so as to receive the edge of a table top, board or the like, one of the arms having a thumb-screw **23** engaged therethrough, suitably knobbed at its inner end to press against one side of an inserted table edge or the like, so that the machine may be mounted quickly upon such table edge and quickly removed when desired. When so mounted, the lower edge of the plate **20** extends horizontally adjacent the level of the table top **21**. The plate **20** is substantially rectangular in form, both in plan, elevation and transverse section, and its upper edge preferably extends a distance above the yokes **21**. Secured to the front face of the plate **20** there is a needle mounting bar or pallet **25**, and this bar may be removable from the plate **20** if desired. Mounted transversely on the bar pallet **25** there is a multiplicity of needles, hooks, or loopers **26**, all of identical shape and function indicated which may be arranged in alternated pairs of long and short needles. These needles are substantially rings of steel wire, elongated and resembling in form and function the common "safety" pin, although

a point is located at the end instead of a keeper, the point being inwardly turned as at 27, to form an outwardly presented hook bight, a bill portion of which extends nearly parallel to the shank portion or the lower part 28 of the needle, is tapered so as to form the point 29 of the needle, which is inwardly presented. In practice, this point is formed approximately ⅞ of an inch in length, although this measurement is not arbitrary and they may be made shorter or longer, as the nature of the work may require, or as experience in use may dictate. The opposite end portion of the wire of which the needle is formed slightly overlaps the part 29 and extends therefrom rectilinearly and parallel to the lower side 28 of the needle, forming a combined inner point and keeper 30, which may be readily depressed against the bottom part 28 to open the needle. The outer bight portion 27 of the needle is flattened at the sides so as to give greater rigidity to the point 29 in relation to the bottom bar 28. The point 30 is grooved on its upper sides so as to receive the point 29 in the groove portion, permitting the two needle portions to lie in alinement with each other, so that loops of yarn may be readily moved slidably over the bight 27 and inwardly or outwardly in the knitting of the work, as will be described. The shank or bottom bar 28 is formed with a recess 32 in its upper side, positioned so that the point 30 may be depressed thereinto at times, to permit a loop engaged around the shank or bar 28 within the bight 27 to be moved slidably inward and over the point 30, so that the loop will then embrace both the point 30 and the shank 28, as will be described.

The needles are mounted over the pallet bar 25 in such manner that they are held at right angles thereto, and in vertical planes, as well as being readily removable individually, or all as a unit. The unit consists of an anchorage plate 33, attached to the back side of the bar 25, and having an upper portion set horizontally forward at right angles over the top side of the bar and then turned upwardly, as at 44, forming a vertical flange. This flange is provided with a multiplicity of unformly spaced apertures 35, somewhat larger than the cross sectional measurement of the wire of which the needles are formed, each needle being engaged through a respective aperture of the plate and extended forwardly, the junction of the inner point portion or shank 30 and the lower shank 28 being a recurved portion of the shank 28 in the form of a semi-circular bight 36, the lower part of which extends through the aperture and the upper part of which extends over the upper edge of the flange 34. The dimensions of the pallet bar 25 between its front and rear faces is much less than the length of the needles between the bights 27 and 36, so that the needles when adjusted forwardly in the flange 34 all project a considerable distance in front of the pallet bar. On the front face of the pallet bar there is attached a comb plate 37, having a multiplicity of upwardly projected rectilinear teeth at intervals the same as the intervals at which the apertures 35 are located, and spaced from each other a distance, to receive slidably therebetween the respective needles, one between each two teeth. In this manner, the needles are securely held in vertical planes and parallel relation. The needles are free to move vertically from the comb plate when the pallet bar is detached from the back plate 20, but in the machine completely assembled, they are held against vertical movement by a pressure lever 38 or opener, which in the present instance consists of a rectilinear bar of suitable material, having a flat rear face and a bottom face at right angles thereto, and projecting a distance above the back plate 20, for a purpose to be explained. This shank 38 is connected hingedly at 39 to the plate 20 at such level that it may lie against the front face of the plate 20 with its lower edge disposed over the needles while the latter are in closed position, as shown in Figure 1. On forward movement of the bar 38 at its upper part, its forward lower edge portion, constituting a heel 40, will press upon the inner needle 30, depressing the latter so as to clear the point 29. When sufficiently depressed, the points 30 of the needles enter the recesses 32. Means is provided for operating the needles as last mentioned, consisting of a mounting bracket 41 secured to the plate 20 and projecting a distance thereabove, a cam 42 being revolubly mounted on the forward side of this bracket, having a low part normally located adjacent the upwardly projecting edge portion of the bar 38, and a high portion 43 which upon proper rotation of cam will bear forwardly upon the bar 38, full movement of the cam causing the heel 40 of the lever or bar 38 to move the needle portions 30 to full open position, with their points engaged in the recesses 32. As a formal showing of means to operate the cam 42, an integral lever arm 44 is shown extended therefrom, which may be operated manually, or may be connected to any usual treadle or knee-actuated means, not shown, these being well known mechanical expedients requiring no special disclosure in this application. In the present instance, friction between the cam 42 and bar 38 is contemplated to hold the cam in needle-opening position until manually returned, or until otherwise returned, for reasons which will appear hereinafter.

As shown in Figure 1, the needles are of uniform length, which is found desirable for use with coarse yarn, and may also be used for finer yarns, as will be hereinafter explained. In Figure 5, however, needles are arranged in alternated pairs of long and short needles, so that in the manual use of the device as hereinafter described, the yarn will be caused to be drawn to a proper length in the stitches automatically, to regulate the tension in the finished goods, and especially to avoid excessive tightness in the weave.

In the use of the machine, the construction being assembled as shown in Figures 1 and 4, and attached to a table as indicated, the user may sit in front of the machine with a ball of yarn, either loose or held in a convenient holder, preferably at the right hand side of the machine. The yarn is started upon the needles by a series of loops *a* being formed on the needles, one loop being arranged on each needle, so that the series has the appearance of a scroll or a winding in the same direction. However, the loose end of the yarn should preferably be at the outer side of the loop on the right hand needle in one method of application, and the remaining loops have the same arrangement on the respective needles. At the completion of the placement of all of the loops in this manner, the yarn 49 from the hank or ball will extend downwardly between the extreme needle at the left hand side of the series and nearest to the comb plate 37, so that this downwardly extend-

ing portion of yarn lies behind the thread from the loop *a* of the next needle to the right. All of the loops *a* thus placed are then pressed rearwardly toward or against the comb plate, and the lever **44** then operated to open the needles. The yarn **49** is then brought upwardly at the left hand side of the entire series and moved toward the right over the series of needles, and laid in the open needles, so that it passes under the points **29**, extending rectilinearly in all of the bights **27**. The needles are then released and permitted to close by moving the lever **44** to released position, whereby all of the needles are closed again, as shown in Figure 17. The loops *a* on the needles are then drawn forwardly over the closed needles and therefrom, so that a loop *b* is formed in the thread laid in each of the needle bights, the yarn feeding from the right toward the left as these loops *b* are formed on the successive needles. As shown in Figure 10, the body of the work is then swung downwardly to a position shown in Figure 6, after which the lever **44** is operated to open the needles again, and the newly formed loop *b* which is then disposed in the bight under the point **29** is forced rearwardly, passing over the point of the depressed needle part **30** to a position as shown in Figure 7. The yarn at this time will be hanging from the right hand side of the work, and is now swung to the left laid in the open needles as before described, and the needles then permitted to close as shown in Figure 9. This expands the loops *b* which have been previously moved over the inclined rear points **30**, and those expanded loops *b* are now drawn forwardly over and from the needles as first mentioned, forming a new set of loops *c*, the loops *b* being drawn forwardly successively from right to left. The operation of Figure 6, and Figure 7 are now repeated, at the completion of which the yarn will be handing from the left hand edge of the work again, and the operations previously described, except the formation of the initial loops, are then repeated and the work carried to the size desired.

Various patterns and designs in color may be worked into the product, as, by using double thread or yarn, and by using different colors of yarn applied to respective needles on each transverse series of "eyes" or loops formed with the device, and also by the application of fancy knitting which may be formed and applied at the same time as the regular knitting, with or without the use of auxiliary needles.

Various other methods of procedure and operations of the device will be understood by those versed in the art, from the specific description heretofore given, and it will be understood that this is purely exemplary, as well as the structure of the machine, the specific details and arrangements of parts in which may be varied considerably from that shown without departing from the spirit of the invention, as more particularly set forth in the appended claims.

It has been found practicable to form the larger pieces of my machine in wood, but it is also adapted to be embodied in metal throughout, if so desired.

In the operation of the machine, where the needles are all of uniform length, an auxiliary comb or drawing tool **45** may be employed, if desired, consisting of a handle portion **46**, in which there are set a suitable number of steel tines **47**, which at a distance from the handle are bent at right angles to form teeth **48** spaced the same as the needles previously described, and adapted to be inserted between the needles to draw the work outwardly. By the use of this tool a number of loops on the needles may be drawn outwardly at one time, to form new eyes in the parts which extend through the bights **27** of the needles. As these eyes are formed, the yarn is drawn slidably through the remainder of the needles. By the use of the alternated pairs of long and short needles as shown in Figure 5, it will be noted that when the loops on the closed needles are drawn outwardly, so as to form new eyes in the yarn laid in the bights of the needles, diagonal portions of the yarn will be found extending between the eyes on the long needles and those on the short needles, affording a certain excess of yarn, which, when the eyes are pressed inwardly after opening of the needles, as shown in Figure 7, will be taken up by the enlargement of the eyes due to the wedging action thereof on the parts **28** and **30**. With this form of the device the work may be done manually more readily without use of the tool **45**.

I claim:

1. A needle element for knitting machines, a substantially hook shaped needle element having an outwardly extended shank and outwardly presented bight portion and an inwardly presented point extended therefrom, and a movably mounted inner needle element having an outwardly presented point constructed to register with the first named point at times, to permit movement of an eye of yarn and the like, from one over the other, the last named point element being movable into close relation with the shank of the first named needle element, whereby an eye through which the bight is engaged may be moved slidably inward to encompass both said shank and said inner needle.

2. The article of claim 1 in which said inner needle element is resiliently supported in alined relation to the first named point.

3. As an article of manufacture, a needle element for knitting machines of the general character indicated, consisting of a wire having an intermediate rectilinear shank, and an end portion tapered to a sharp point and bent at a distance from said point into recurved close relation to the shank, and having an opposite end portion similarly recurved and extended in close relation to said intermediate portion and formed with a recessed point adapted to receive the first named point at times, and movable from the first named point inwardly.

4. A needle device for the purposes described, comprising a bar element having a central rectilinear shank and a short point portion bent into recurved relation and extending a distance in close spaced relation to the shank to receive a portion of yarn thereunder, and having an opposite end point portion extended rectilinearly parallel to the said shank normally, but depressible against the shank portion and having a recessed point normally tending to spring outwardly against the first named point, for the purposes described.

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