

May 14, 1940.

R. HUG

2,201,092

YARN HOLDING DEVICE FOR KNITTING MACHINES

Filed Jan. 27, 1938

4 Sheets-Sheet 1

FIG. 1.

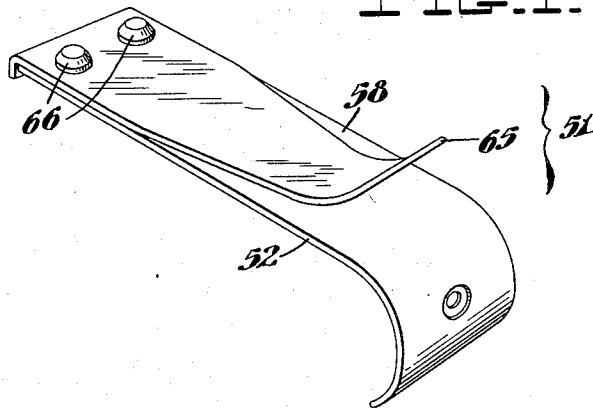


FIG. 2.

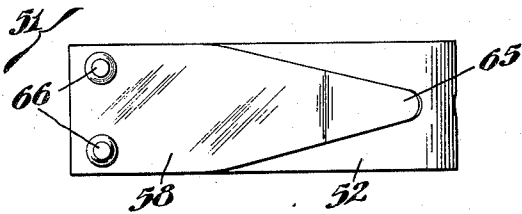


FIG. 4.

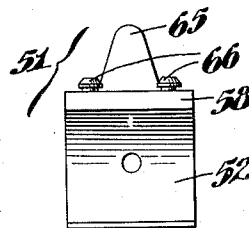


FIG. 3.

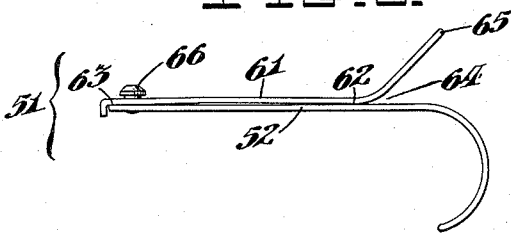
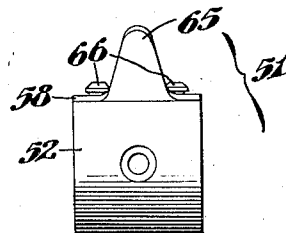


FIG. 5.



INVENTOR:
Rudolph Hug,
BY *Sheep & Co. Schenck*
ATTORNEY.

May 14, 1940.

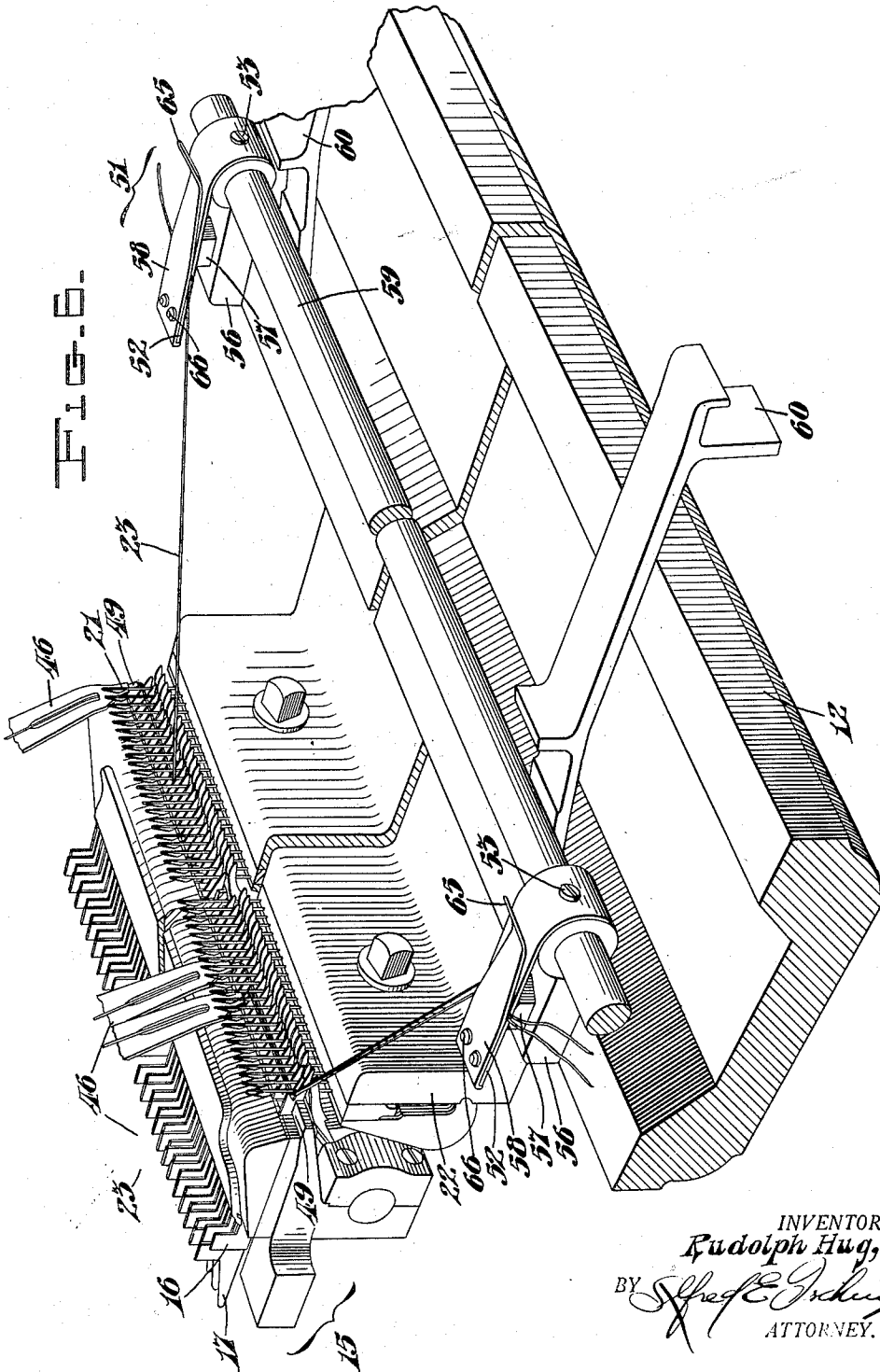
R. HUG

2,201,092

YARN HOLDING DEVICE FOR KNITTING MACHINES

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4 Sheets-Sheet 2



INVENTOR:
Rudolph Hug,
BY *Alfred E. Jenkins,*
ATTORNEY.

May 14, 1940.

R. HUG

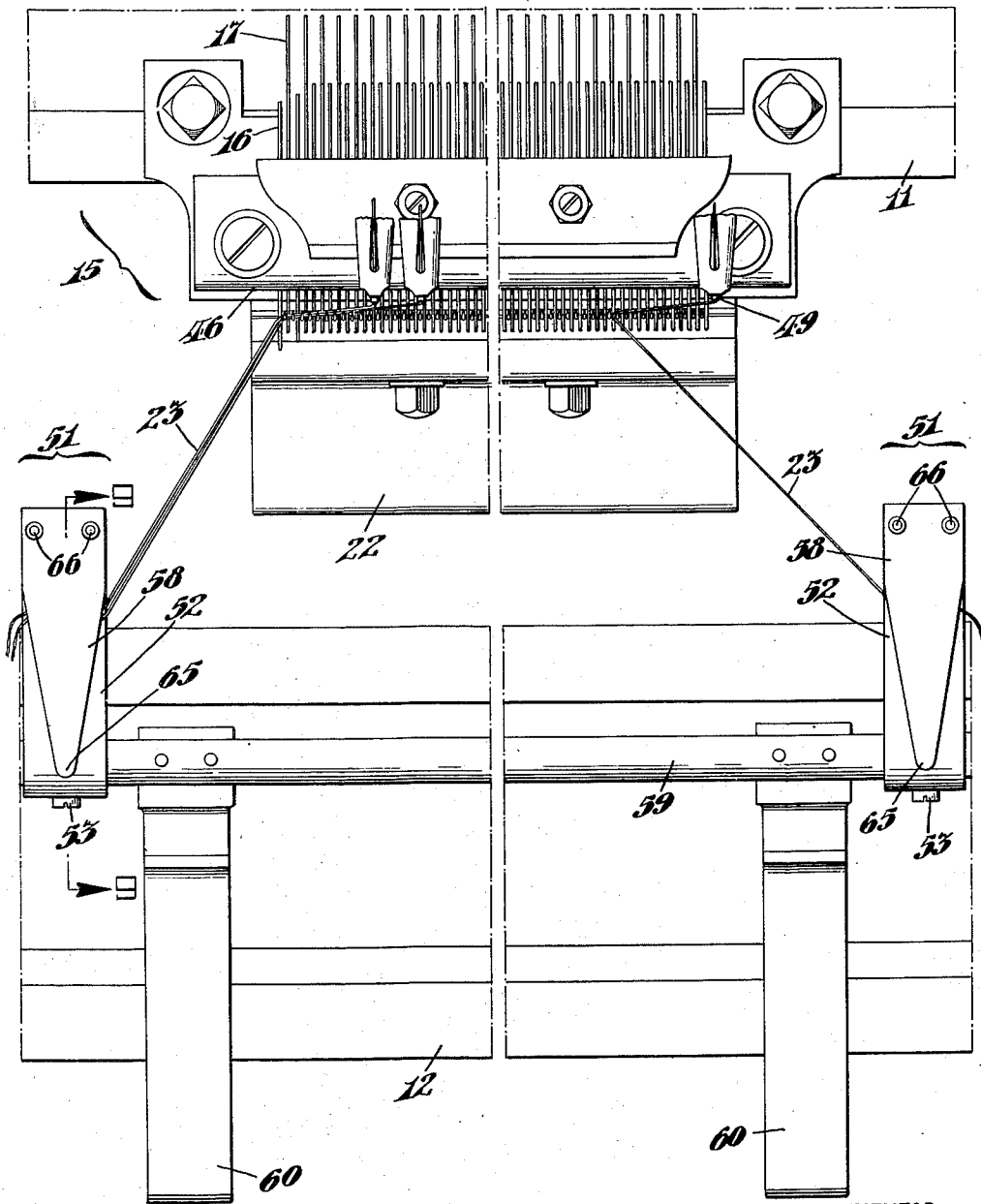
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YARN HOLDING DEVICE FOR KNITTING MACHINES

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FIG. 7.



INVENTOR.
Rudolph Hug,
BY *W. E. Schubert*
ATTORNEY.

May 14, 1940.

R. HUG

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YARN HOLDING DEVICE FOR KNITTING MACHINES

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4 Sheets-Sheet 4

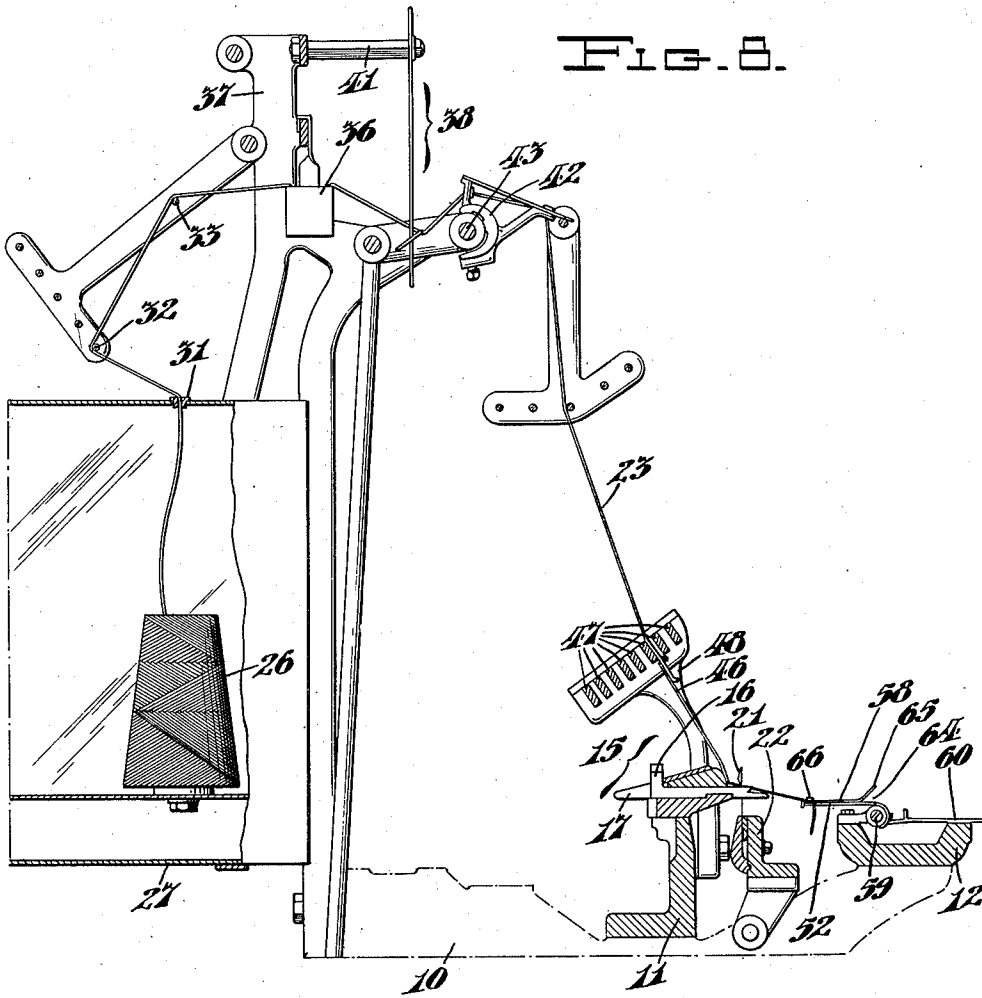


FIG. 8.

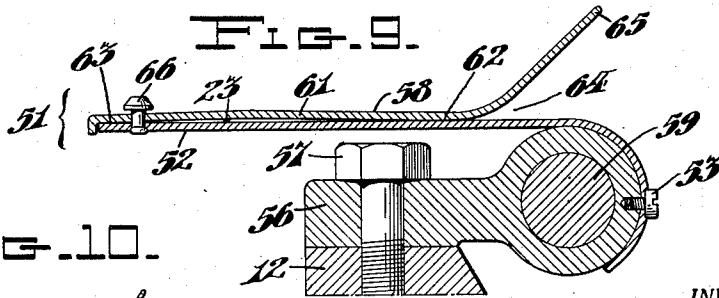
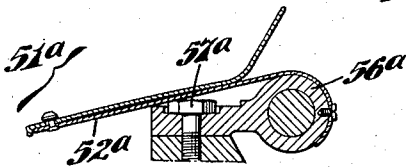


FIG. 9.

FIG. 10.



INVENTOR.
Rudolph Hug,
 BY *Sheff E. Esking,*
 ATTORNEY.

UNITED STATES PATENT OFFICE

2,201,092

YARN HOLDING DEVICE FOR KNITTING MACHINES

Rudolph Hug, West Reading, Pa., assignor to
Textile Machine Works, Wyomissing, Pa., a corporation of Pennsylvania

Application January 27, 1938, Serial No. 187,170

8 Claims. (Cl. 66—145)

My invention relates to an arrangement including yarn holding means and more particularly to a device of this character for facilitating the feeding of yarn to the loop forming elements of a full fashioned knitting machine.

In preparing the knitting machine for producing a stocking fabric, it has been customary to draw a short section of yarn from the yarn guide finger, prior to its introduction into the fabric, and to suspend the free end of the yarn from the yarn guide finger or to pass it through an eyelet provided for this purpose, without securing the yarn thereto. However, with these methods for preparing the machine for operation, feeding of the yarn to the full width of fabric or area being produced has been uncertain, and in many instances, the free end of the yarn has been partially carried across the knitting field before being caught by the sinkers around the needles of the machine.

Another difficulty has occurred in the use of high twist yarn, in that the free end, if not secured, has a tendency to curl or twist to such an extent that in some instances the yarn has twisted above the throats of the sinkers. Consequently, no yarn has been fed to the first few sinkers.

Other objections to leaving the free end of the yarn suspended from the yarn guide finger have been, where no tension was applied to the yarn, the first loops formed in the course were of a much looser construction, usually greatly enlarged relative to the remaining loops of the course, or the free end of the yarn became untwisted. At other times the free end of the yarn suspended from the yarn guide finger has become entangled with the free ends of yarns hanging from idle yarn guide fingers, carrying these idle yarns into the fabric to be interknitted therewith. This is particularly apt to happen in knitting with several body yarns according to the ringless or alternating carrier principle. All the above actions of the yarn cause noticeable line effects and other blemishes in the fabric, which are especially objectionable in view of the trend toward sheerness and beauty in stocking fabrics.

However, securing the free end of the yarn to the machine also has certain disadvantages in that the secured end of yarn, if not released or severed at the selvage edge of the fabric shortly after the start of the knitting operation will cause a tightening and bunching of the loops at the selvage resulting in a defective fabric.

It is therefore an object of my invention to provide a device of simple construction which

will be cheap to manufacture and efficient in operation and which will overcome the above objections.

It has been found further that unless the yarn leading from the point at which it is held to the lower end of the yarn guide finger is entirely below the lower end of the finger, the yarn will not enter the throats of all the sinkers and the first course will be one or more loops short. This is especially serious in footers, as the resulting defect falls at the instep of the stocking.

Another object of my invention is to provide an arrangement by means of which the yarn will be held below the tops of the sinkers so that the yarn in being moved across the knitting field for a first course will readily enter the throat of the first sinker and will be fed to the throats of all of the remaining sinkers across the full width of the fabric being knitted.

In addition to difficulty which has developed in the portion of the yarn extending freely from the yarn guide finger, high twist yarns have caused difficulty by forming a snarl between the yarn guide and the snapper which has been carried into the fabric causing a double strand in certain loops thereof.

Another object of the invention is to provide means whereby twisting and snarling of the yarn between the yarn guides and the snappers may be prevented, but which will hold the yarn lightly enough to permit it to pull loose without causing damage or other difficulty in the knitting.

With these and other objects in view which will become apparent from the following detailed description of the illustrative embodiment of the drawings, my invention resides in the novel elements, features of construction and arrangement of parts in cooperative relationship as hereinafter more particularly pointed out in the claims.

In the drawings:

Figure 1 is a perspective view of a thread holding device of my invention;

Fig. 2 is a top plan view of the device of Fig. 1;

Fig. 3 is a side elevational view of Fig. 2;

Fig. 4 is an end elevation as viewed from the left of Fig. 3;

Fig. 5 is an end elevation as viewed from the right of Fig. 3;

Fig. 6 is a perspective view of certain of the loop forming elements of a full fashioned knitting machine and showing the thread holding device in operative position relative thereto;

Fig. 7 is a top plan view of the mechanism of Fig. 6;

Fig. 8 is a partial cross sectional view through

a full fashioned knitting machine having the thread holding device applied thereto;

Fig. 9 is a cross sectional view taken substantially along the line 9—9 of Fig. 7 and enlarged relative thereto; and

Fig. 10 is a view similar to Fig. 9, but showing a modified arrangement.

In the drawings and description, only those parts necessary to a complete understanding of the invention have been set forth; further information as to the construction and operation of other elements not herein specifically pointed out, but which are usual and well known, being available in the pamphlet entitled "Full Fashioned Knitting Machines," copyright 1920, and in the "Reading" Full Fashioned Knitting Machine Catalogues, copyright 1929 and 1935, published by the Textile Machine Works, Reading, Penna., and a pamphlet entitled "Knitting Machine Lectures," published in 1935 by the Wyoming Polytechnic Institute, Wyoming, Pennsylvania.

The arrangement within my invention comprises a knitting machine and a device permitting yarn to be readily inserted therein and adapted to hold the yarn with a certain rather light tension, and positioned on the machine substantially transversely thereto, but somewhat outside a knitting field having a bed of vertical needles, so that a yarn stretched between the device and the lower end of the yarn guide finger runs below the upper corner and above the nose or lower tip of the end sinker of the group associated with said bed at the point the yarn intersects the plane of the needle, so that the end sinker is sure to catch the yarn at the formation of the first course. The yarn holding means or device within the invention applies friction to the yarn to hold it, but preferably without any spring action and without any rotative movement between the opposed yarn contacting surfaces, experience showing that both spring action and rotation of the surfaces often cause uneven tension in the thread or yarn in use. It is important further that the yarn holder have a flared portion to facilitate introduction of the yarn between the holding surfaces.

Referring to the drawings and particularly to Fig. 8, there is shown in this figure the upper portion of a full fashioned knitting machine of known type comprising a center frame 10 which supports in transverse relation thereto a center bed 11 and a front bed 12. A sinker head 15, secured to the center bed 11, has horizontal sinkers 16 and dividers 17 which cooperate with a bank of vertical needles 21, carried by a needle bar or bed 22, the sinkers, dividers and needles cooperating with other well known implements to form a knitting field. A yarn 23 is fed to the sinker head 15 and the needles 21 from a supply bobbin 26 in a yarn box 27, through an eyelet 31, over rods 32 and 33 into a moistening trough 36 suspended from a bracket 37 fixed to the center frame 10 in well known manner.

From the moistening trough 36 the yarn 23 passes through a ring tension device 38 of usual type, carried by the bracket 37 by well known means including a stud 41. After passing through the ring tension device 38, the yarn passes through a usual snapper 42, which is fixed to and operated by a rod 43 to alternately open to release the yarn 23 during the feeding thereof to the needles 21, and to close to maintain the yarn taut between the snapper and the needles.

The yarn, after passing through the snapper

42 passes through one of the yarn guides 46, each of which has a finger 49 at its lower end and is fixed to one of a usual series of carrier rods 47. The carrier rods 47 are slidably mounted in a bracket 48, secured to the center bed 11 and are reciprocated in the customary manner by friction boxes (not shown) to feed the yarn 23 to the needles 21 to form loops in a knitted fabric.

Prior to feeding yarn 23 to the needles 21 for forming a first course of loops, a short length of the yarn is drawn through the yarn guide finger 49 and placed around the first effective needle. In accordance with the present invention, the short length drawn through the finger prior to the forming of the first course is placed in a yarn holding or clamping device 51, which holds the free end of the yarn sufficiently tight to ensure that the loops of the first course shall be of uniform length, but which permits the yarn to draw through it under the draw-off tension without damage to the fabric and without drawing the selvage loops of the initial courses too tight.

The yarn holding device 51, Figs. 1 to 9, inclusive, comprises a lower plate 52 having one end secured by a screw 53 to a bracket 56 which is fixed to the front bed 12 by means of a screw 57. The brackets 56 carry a shaft 59 to which are secured brackets 60 arranged to align a transfer bar (not shown) with the needles 21, said transfer bar being of usual construction and used in well known manner in transferring the leg blank of a stocking fabric from a legger machine to a footer machine. Cooperating with the lower plate 52, to hold the yarn 23, is an upper plate 58 having a portion 61 slightly raised at the center to provide a space between it and plate 52 tapering toward the ends, plate 58 forming only line contacts along transverse lines at 62 and 63 with the lower plate. A plate 58 of polished mild steel having a weight of about three fourths ounces has been used successfully in a large number of installations, although lighter plates have also been used successfully. By providing line contacts between the upper plate and the lower one, varying tension may be obtained in the yarn by moving the yarn toward either of the lines of contact or several yarns may be placed between the plates without affecting the holding action on the yarns. The upper plate 58 is also provided with an upturned end 65 forming a flaring mouth 64 with plate 52, so that the yarn 23 may readily be passed between and positioned between the plates 52 and 58. Further, the flaring space between end 65 and plate 52 opens toward the front of the machine so that it is readily accessible to the operative standing in front of bed 12.

The upper plate 58 is secured to the lower plate 52 by means of headed pins 66 which are fixed in the lower plate but are loose in the upper plate to permit a slight hinge-like movement between the plates. The use of two pins 66 prevents any rotation between the plates 52 and 58 and so also prevents any rolling action on the yarn, an action causing it to twist and to thereby change the tension required to pull it out from between the plates. Further, the rearward contraction of the space between the plates with the looseness of plate 58 on pins 66 causes the rearward pull on yarn 23 from the sinkers and yarn guide to wedge the yarn tighter if needed between the plates. With the hinge-like movement between the plates, and the upturned end of the plate 58, the yarn may readily be positioned be-

tween the plates by simply passing a strand rearwardly between the plates until it becomes wedged at the rear of the widest spacing therebetween, as shown in Fig. 9.

5 The plate 58, although normally clamping the yarn against the lower plate 52 during feeding thereof to the needles, is light enough to permit the yarn to be withdrawn from between the plates, when the drag on the yarn exceeds the clamping
10 action of the plates, without distorting the fabric.

In the illustrations of Figs. 6 and 8, the free ends of the yarns used at the start of the foot knitting are shown being held by the respective devices 51, thereby effecting positive feeding of the yarns
15 to the needles during the production of the first course of loops. The leg blank has been purposely omitted from this illustration in order to more clearly show the position occupied by the yarns as effected by the holding devices. Thus, by
20 means of this arrangement, the free ends of the individual yarns are separately anchored thereby preventing the production of defective fabric, as for instance would be occasioned if the yarn would not be in position to be caught by certain
25 of the sinkers during the loop forming operation thereof, which action might possibly be occasioned if the ends of the yarns were free.

The holder 51 according to the invention is shown in Figs. 8 and 9 as mounted to be horizontal, but it often occurs that better results can be obtained by inclining the holder downwardly
30 from front to rear as shown in Fig. 10. For this purpose a holder 51a including brackets 56a, bolts 57a and plate 52a are all modified slightly so that plate 52a can incline downwardly from brackets
35 56a passing close above the heads of bolts 57a.

As will be immediately apparent to those familiar with such machines, the knitting machine illustrated in part herein is essentially a standard
40 "Reading" footer machine. In legger machines, which have no shaft 59, plate 52 or 52a is modified so that it may be attached readily directly to the front bed 12. The modification necessary for this purpose being obvious to those skilled in
45 the mechanical arts, it is not illustrated herein.

The plates 52 and 58 are arranged on the front bed 12 so that the line of the yarn 23, extending from the clamping device 51 to the yarn guide 46, will be below the tops of the sinkers 16, but
50 above their lower tips or noses at the line of the needles ensuring that the first sinker will catch the yarn and providing yarn for all of the needles for producing a first course the full required width of fabric. To ensure this action of the parts, holder 51 is placed as shown in Fig. 7 somewhat
55 outside the vertical transverse planes extending through the ends of the knitting field, whereas the yarn is held below the lower end of the finger 49 of its respective yarn guide 46, at the point of leaving the holder.

In using my invention, prior to starting the stocking fabric, or prior to starting a portion of the fabric where a different yarn is required, a short length of the yarn 23 is drawn from the
65 yarn guide 46 and the free end of the yarn placed between the plates 52 and 58 of the clamping device 51, thus eliminating untwisting and kinking of the yarn as well as the accidental entering of an idle yarn into the fabric, causing defective
70 fabric. Furthermore, the clamp device 51 will function to prevent the first loops of the initial course from becoming loose and will thereby be effective to produce a substantially uniform length of loops throughout the width of the fabric. In
75 legger machines the clamp device will permit

gradual withdrawal of the free end of the yarn, if for any reason the operator fails to release or sever the yarn, thus preventing a tightening of the selvage loops of the fabric.

Of course, the improvements specifically shown
5 and described by which I obtain the above results, can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

What I claim is:

1. In a straight knitting machine, loop forming means including a bank of needles, a yarn guide finger for feeding yarn to the needles, sinkers for pressing the yarn around the needles, means for yieldably holding the yarn below the
10 tops of the sinkers including a lower stationary member and an upper member hinged to the lower member, one of said members being bowed to provide substantially line contact between said members.

2. A thread holder for knitting machines having an upper plate resting on a lower one along spaced lines, retaining means near one of said lines having loose engagement with said upper
15 plate for holding it on the lower one but arranged to prevent substantial relative horizontal turning movement between the plates, said plates spaced apart between said lines but arranged so
20 that the space between them tapers from the point of widest spacing toward said retaining means.

3. A thread holder for knitting machines having an upper plate resting on a lower one along spaced lines, retaining means near one of said lines having loose engagement with said upper
25 plate for holding it on the lower one but arranged to prevent substantial relative horizontal turning movement between the plates, and said plates spaced apart between said lines but arranged so that the space between them tapers from the
30 point of widest spacing toward said retaining means, the holder having a flaring mouth to receive thread to be passed beneath the upper plate.

4. The combination with a full fashioned knitting machine having a bank of needles and sinkers for kinking yarn about said needles, of a thread holder arranged to maintain the free end of a yarn being laid along the needles at a level
35 below the tops of said sinkers, and including a pair of plates extending generally between planes at right angles to the plane of the needle bank, one of said plates resting on the other, retaining means near the ends of said plates closer to the
40 needles permitting the upper plate to lift from the lower with angular movement between the two in the vertical plane but substantially preventing relative angular movement of the plates in the horizontal plane, the holder having a flaring mouth at the end farther from the needles
45 to receive thread.

5. The combination as set forth in claim 4 and in which the plates are arranged to provide space
50 between the plates for a portion of their length but so that the space between them tapers from the point of widest spacing toward the retaining means.

6. In a straight knitting machine, loop forming means including a bank of needles, a reciprocating yarn guide finger for feeding yarn to the
55 needles, sinkers for pressing the yarn around the needles, and means for yieldably holding the free end of the yarn from said finger including a lower stationary member and an upper member hinged to the stationary member at a point relatively
60 near said bank, said members being formed to

facilitate the introduction of thread therebetween at a point relatively removed from the hinge between the members and to rest one on the other at points adjacent said hinge and said point and to provide space between them tapering toward the hinge whereby thread introduced between the members is wedged between the members by the action of the yarn guide finger, said hinge, however, permitting the movable member to lift enough so that thread which has wedged between the members may draw between them in response to a movement of said needle bank.

7. In a knitting machine, means for yieldably holding the free end of the yarn to be knitted including a lower stationary member and an upper member hinged to the stationary member at a point relatively near said bank, said members being formed to facilitate the introduction of thread therebetween at a point relatively removed from the hinge between the members and to rest one on the other at points adjacent said hinge and said point and to provide space between them tapering toward the hinge whereby thread introduced between the members is wedged between the members by the action of the yarn

guide finger, said hinge, however, permitting the movable member to lift enough so that thread which has wedged between the members may draw between them.

8. In a straight knitting machine, loop forming means including a bank of needles, means for yieldably holding the free end of the yarn to be knitted including a lower stationary member and an upper member hinged to the stationary member at a point relatively near said bank, said members being formed to facilitate the introduction of thread therebetween at a point relatively removed from the hinge between the members and to rest one on the other at points adjacent said hinge and said point for introduction of the thread but to provide space between them tapering toward the hinge whereby thread introduced between the members is wedged between the members by the action of the yarn guide finger, said hinge, however, permitting the movable member to lift enough so that thread which has wedged between the members may draw between them in response to a movement of said needle bank.

RUDOLPH HUG. 25