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FLAT KNITTING MACHINE

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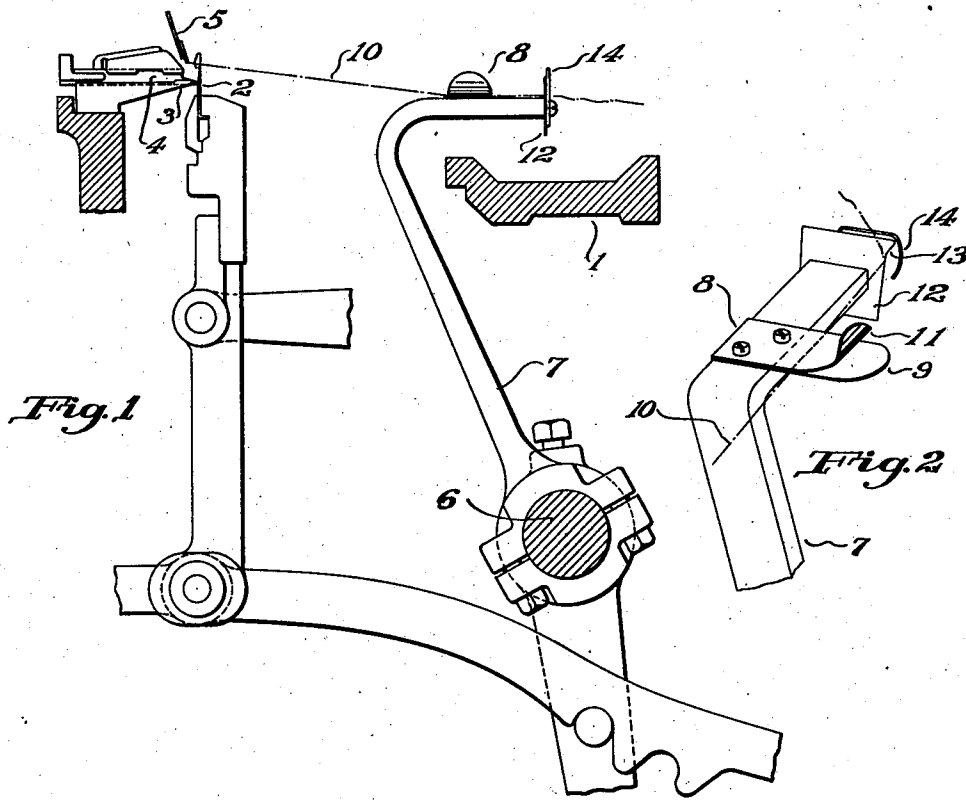


Fig. 1

Fig. 2

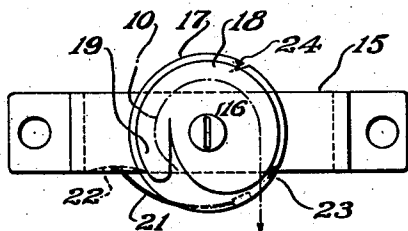


Fig. 3

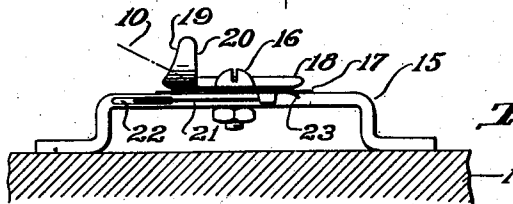


Fig. 4

Witness

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UNITED STATES PATENT OFFICE

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FLAT KNITTING MACHINE

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16 Claims. (Cl. 66—145)

The present invention relates to flat knitting machines and more particularly to a device for securing the free end of a yarn which is to be fed by an active yarn carrier thereof.

5 Machines of this type work, as is well known, with a number of yarns, which are fed into the machine at different times by individual yarn carriers. Before any yarn carrier is thrown into operation, it is necessary to secure the free end of its yarn, and this is frequently done by winding the yarn around a bolt on a stationary part of the machine, and then breaking off the loose end. When the yarn carrier resumes operation the yarn is tautened by the movement of the carrier and by the operation of sinking the loops. 10 Furthermore, during that part of the loop-forming cycle when the needle bar moves toward the press edge an additional tension is placed on the yarn. Consequently, the selvage loop of the first row may be too tight and breakage of the loop or damage to the selvage needle may result.

According to the present invention these disadvantages are avoided by a construction in which the free end of the yarn is secured by a device 25 constructed to follow the movement of the needle bar toward the press edge when the first row of loops is being formed. In one form of the invention the securing device is fastened on a movable lever, preferably carried by the needle press rock shaft, and arranged in such a manner that when the needle bar moves toward 30 the press edge the securing device is moved in the same direction.

In a modified form of the invention the securing device is attached to a stationary part of the machine, but is constructed so that the parts which hold the end of the yarn are yieldingly movable under the pull of the yarn. Consequently, during the pressing movement of the needle bar no undesirable additional tension is placed 40 on the yarn.

Another feature of the invention involves the combination with the securing device of a knife associated therewith, by which the remnant end may be conveniently trimmed off as the yarn is introduced into the securing device. 45

In the accompanying drawing illustrating the present invention Fig. 1 is an elevation of the securing device together with such parts of a flat knitting machine as are necessary for an understanding of the invention; Fig. 2 is a detail view of the securing device alone on an enlarged scale; Fig. 3 is a plan view of a modified form of securing device; and Fig. 4 is a side elevation of the device shown in Fig. 3. 50 55

The knitting machine shown in Fig. 1 comprises, as is usual, the stationary table 1, a bank of spring beard needles 2 arranged to be movable as a unit with relation to a press edge 3, a series of individually movable yarn measuring sinkers 5 4, and a plurality of yarn carriers, one of which is shown at 5. The back and forth motion of the needles, that is, the motion with relation to the press edge, is accomplished by a needle press rock shaft 6 connected by suitable linkage with 10 the needle bar.

In the form of the invention shown in Figs. 1 and 2 there is secured at a suitable point of the shaft 6, a lever 7 to which a yarn securing or clamping device indicated generally at 8 is attached. 15 The securing device comprises two spring plates or tongues 9 and 11, the upper plate being curved upwardly at its outer end to facilitate introduction of the yarn. As shown in Fig. 1 the yarn runs from the yarn carrier to the 20 clamping plates. The clamping effect can be adjusted by the use of tongues 9 and 11 which are of different thickness or which are adapted to be adjusted relatively to each other.

At the free end of the lever 7 there is mounted 25 a knife 12 which may be used to sever the free end of the yarn 10 after the yarn has been introduced between the plates. The cutting edge 13 of the knife is protected by a wire stirrup or guard 14 which is open at one side to permit 30 introduction of the yarn.

The operation of the device is as follows: After one of the yarn carriers operating in the knitting frame is thrown out of operation, the loose end of the yarn carried thereby is introduced into the clamp. At the same time the outside end of the yarn is severed on the knife connected therewith. When the yarn carrier for this yarn is subsequently thrown into operation, the yarn is somewhat tautened between the clamp and 40 the yarn carrier by the operation of sinking the loops.

During the subsequent operation of the machine the needles are moved toward the press edge, but in the present invention no additional 45 undesirable tension is placed on the yarn at this time. The securing device, in consequence of its connection to the rock shaft, follows the press movement of the needle bar, thereby avoiding any damage to the selvage loop of the first row. 50 Furthermore, this construction avoids any excessive pull on the sleeve needles themselves so that these needles are subjected to the pressing operation as positively as the other needles of the machine. 55

A modified form of securing device is shown in Figs. 3 and 4, in which a stationary frame or stirrup 15 is secured on a part of the table 1 of the machine. The stirrup carries a bolt 16 on which two clamping disks 17 and 18 of generally circular configuration are pivoted. The disks are secured together at the center. The upper disk 18 is formed with a bent-up flap 19 under which the yarn end 10 may be introduced. The flap is provided with a knife edge 20 to permit cutting of the yarn.

A restoring spring 21 is attached at one end to the lower disk 17 and has a free end to slide in a recess 22 of the stirrup 15. The spring acts in a direction to turn the disks counterclockwise and the disks are normally maintained in the position of Fig. 3 by a stop 23 turned downwardly from the lower disk and engaging the edge of the stirrup 15. The pull of the yarn during sinking of the loops and the press movement of the needle bar is in a direction to rotate the disks clockwise, as shown by the arrow in Fig. 3. A stop 24, similar to the stop 23, may be provided to prevent excessive clockwise movement of the disks. In this construction in which the securing device is attached to a stationary part of the machine, the disks are movable to follow the pull of the yarn during the press movement of the needle bar, and the yarn is merely obliged to overcome the slight tension of the restoring spring 21.

It will be understood that the invention is not limited to the specific embodiments shown, and that various deviations may be made therefrom without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device for securing the loose end of a feeding yarn for the laying of the yarn by the carrier, said device having means yieldable under the influence of an increase in the tension on said secured portion of the yarn to permit that portion of the yarn leading from said device to follow freely the forward and back movements of the needles and fabric produced thereby.

2. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device for securing the loose end of a feeding yarn for the laying of the yarn by the carrier, said device having means to permit rearward movement of the secured end with the needles toward the press position.

3. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device for securing the loose end of the feeding yarn for the laying of the yarn by the carrier, said device including a part yieldably arranged to permit rearward movement of the secured end with the needles toward the press position.

4. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device for securing the loose end of a feeding yarn for the laying of the

yarn by the carrier comprising a yarn clamp and a yielding support for said clamp yieldable with the needles during their rearward movement to press.

5. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device located on the machine substantially in front of the needle series for securing the loose end of a feeding yarn for laying by a carrier, and spring supporting means for said device yieldable to permit movement of the secured end rearwardly with the needles to press.

6. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine which comprises a clamp support, a yarn clamp pivotally mounted thereon, means for limiting the movement of the clamp in one direction, and a spring acting on the clamp against the pull of the clamped yarn to maintain the clamp yieldingly in said limiting position.

7. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a device for securing the loose end of a feeding yarn for the laying of the yarn by the carrier, and a support for said device connected to move with the needles toward and away from the press.

8. In combination with a full-fashioned knitting machine including a presser shaft, a thread end holder to which the ends of threads are to be fastened, and means connected with the presser shaft for reciprocating the thread end holder.

9. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a needle press motion including a needle press rock shaft, a support carried on said shaft, and a device for securing the loose end of the feeding yarn for the laying of the yarn by the carrier carried on said support to move with the needles toward and away from the press.

10. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a cutting and clamping device for securing and trimming the loose end of a feeding yarn for the laying of the yarn by the carrier, said device having means to permit rearward movement of the secured end with the needles toward the press position.

11. In a flat knitting machine having a series of spring beard needles movable as a unit with relation to a press edge, yarn feeding carriers and individually movable yarn measuring sinkers cooperating therewith, a cutting and clamping device for securing and trimming the loose end of a feeding yarn for the laying of the yarn by the carrier comprising a yarn clamp, a cutter associated therewith, and a support on which said clamp is mounted for movement with the needles during rearward movement to press.

12. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine, which com-

prises a clamp support, a yarn clamping and cutting unit pivotally mounted thereon, means for limiting the movement of said cutting and clamping unit in one direction, and a spring means acting on said unit to maintain said unit yieldingly in said limiting position.

5 13. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine, which comprises 10 a member adapted to be connected with the needle press motion and movable therewith, and a clamp attached to said member and including two plates, one of which is a spring plate curved at the outer 15 end to facilitate introduction of the yarn between the plates.

14. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine, which comprises 20 a member adapted to be connected with the needle press motion and movable therewith, a clamp attached to said member and including two plates, one of which is a spring plate curved 25 at the outer end to facilitate introduction of the yarn between the plates, and a cutter attached to said member in front of the clamping plates.

15. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine, which comprises a support, a clamping unit including lower and upper disks connected together and pivotally 5 mounted on the support, the disks being constructed to facilitate introduction of the yarn end between them, and a restoring spring connected with the disks acting to move the disks in a direction 10 opposite to the pull of the clamped yarn.

16. A clamping device adapted for securing the loose end of a feeding yarn for the laying of the yarn by the carrier to the yarn measuring sinkers of a flat knitting machine, which comprises 15 a support, a yarn clamping device pivotally mounted on the support and including a lower disk and an upper disk, the upper disk having a bent-up flap to facilitate introduction of a yarn 20 end to be clamped by the disks, a restoring spring acting to rotate the disks in a direction opposite to the pull of the clamped yarn, and a stop to determine the normal position of the disks. 25

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