

June 6, 1967

E. START ET AL

3,323,332

STRAIGHT BAR KNITTING MACHINES

Filed Dec. 28, 1964

8 Sheets-Sheet 1

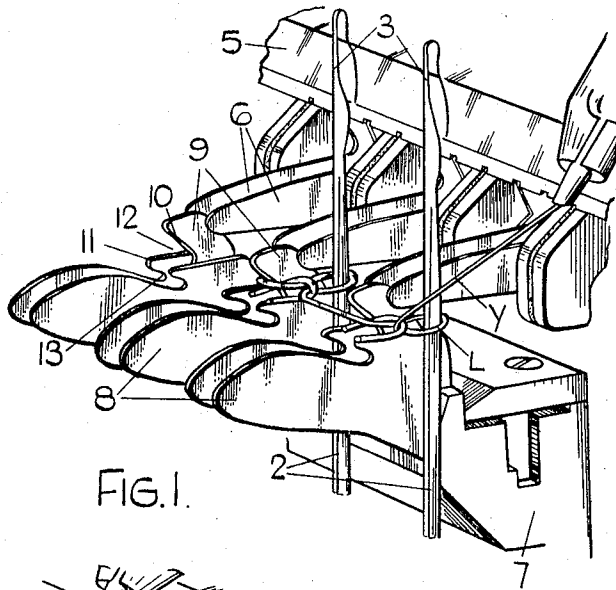


FIG. 1.

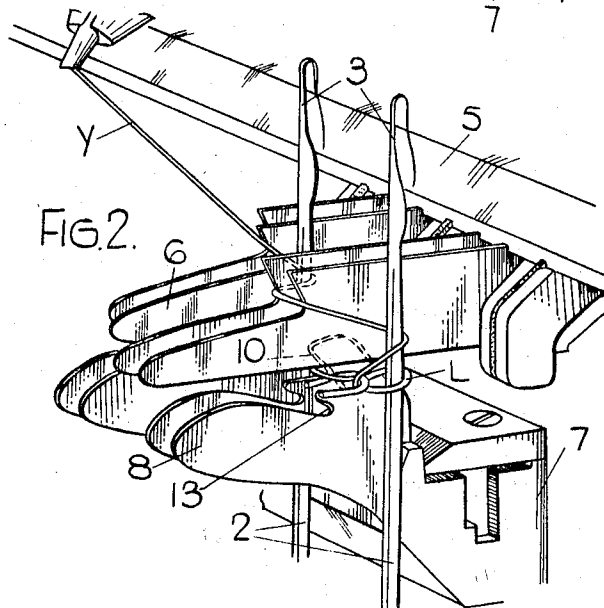


FIG. 2.

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8 Sheets-Sheet 2

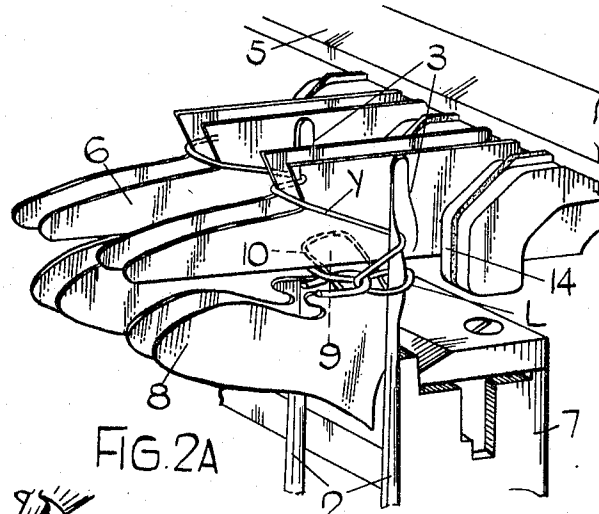


FIG. 2A

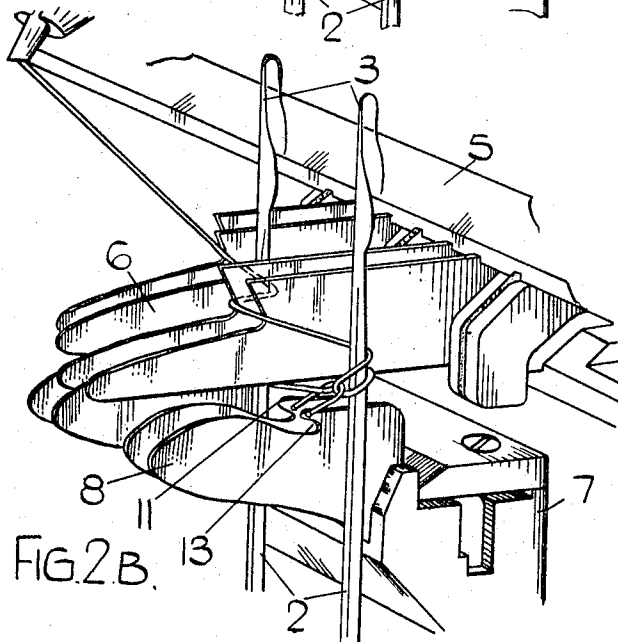


FIG. 2B.

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8 Sheets-Sheet 3

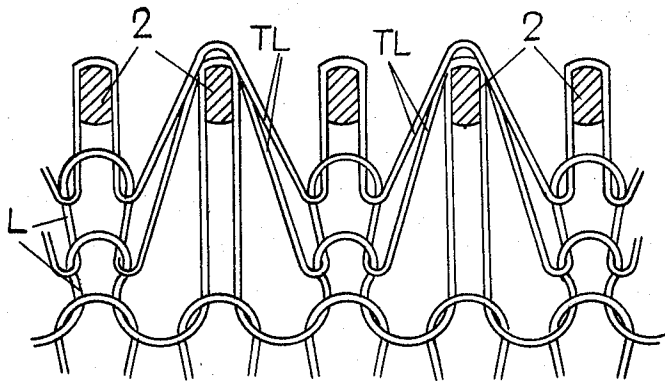


FIG. 3B.

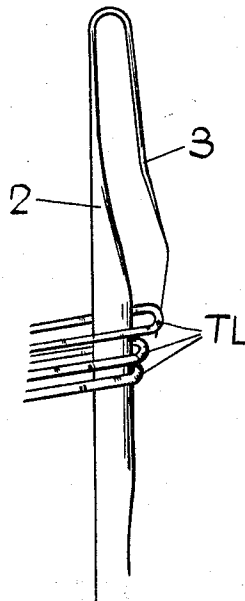


FIG. 3C.

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8 Sheets—Sheet 4

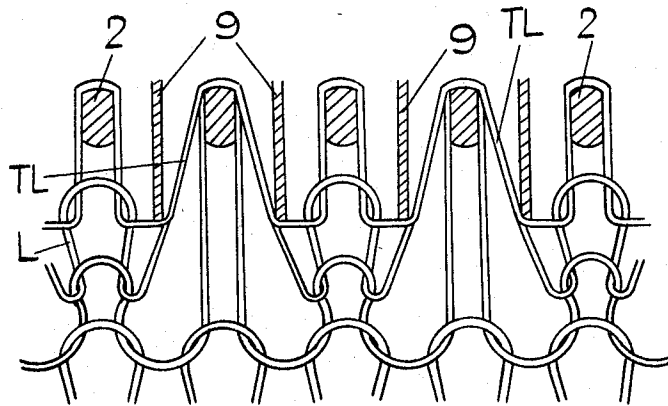


FIG. 3d.

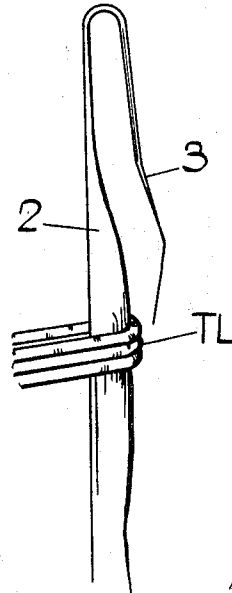


FIG. 3e.

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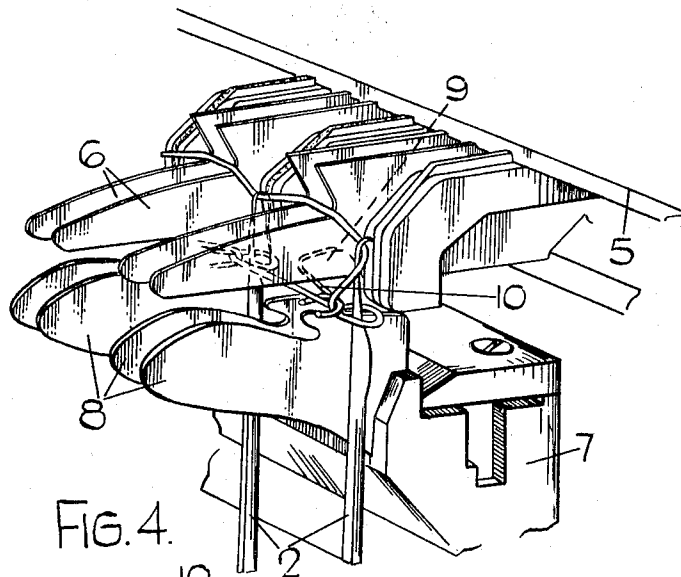


FIG. 4.

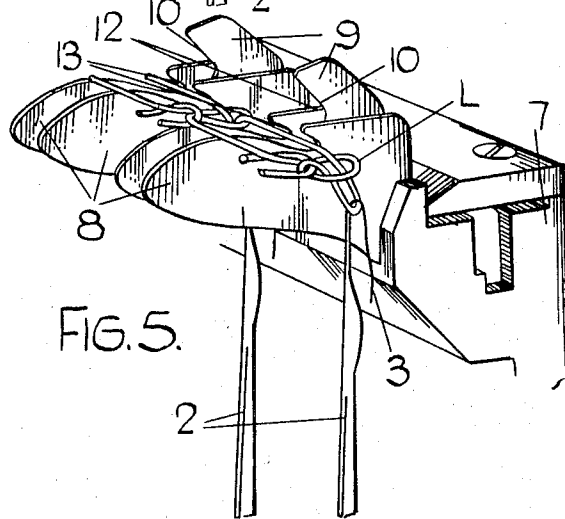


FIG. 5.

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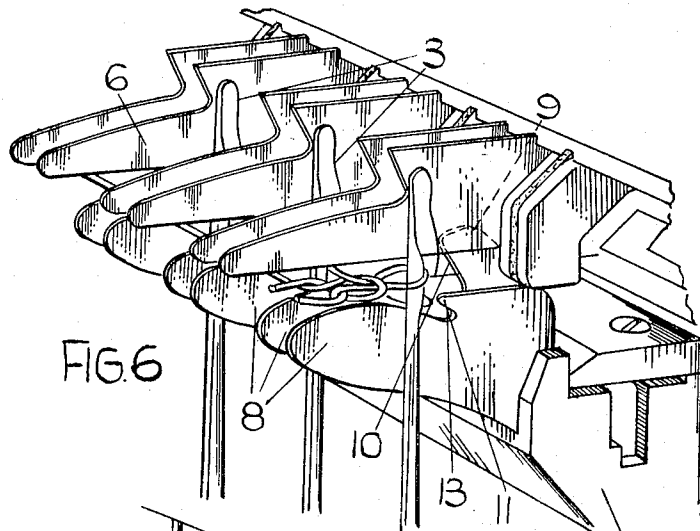


FIG. 6

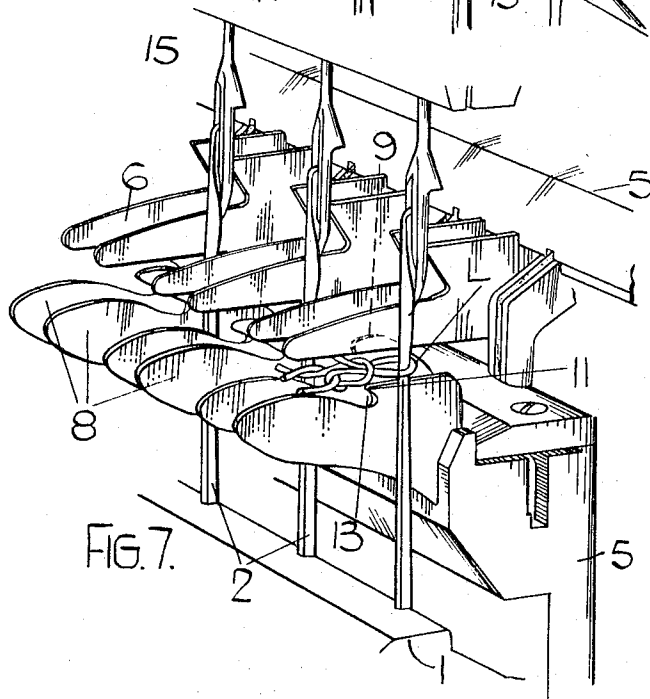


FIG. 7.

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8 Sheets-Sheet 7

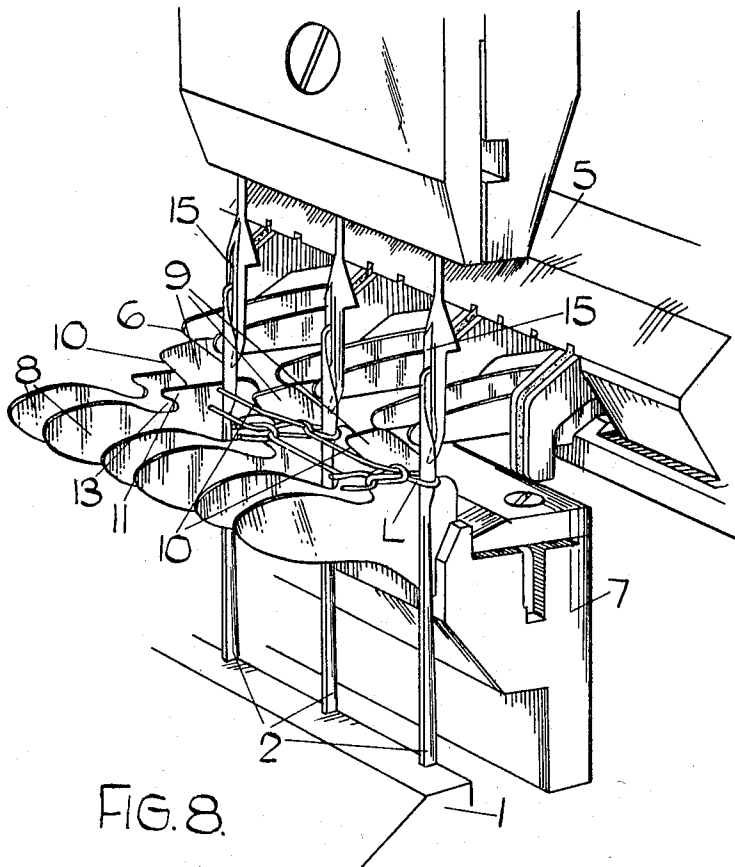


FIG. 8.

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STRAIGHT BAR KNITTING MACHINES

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8 Sheets-Sheet 8

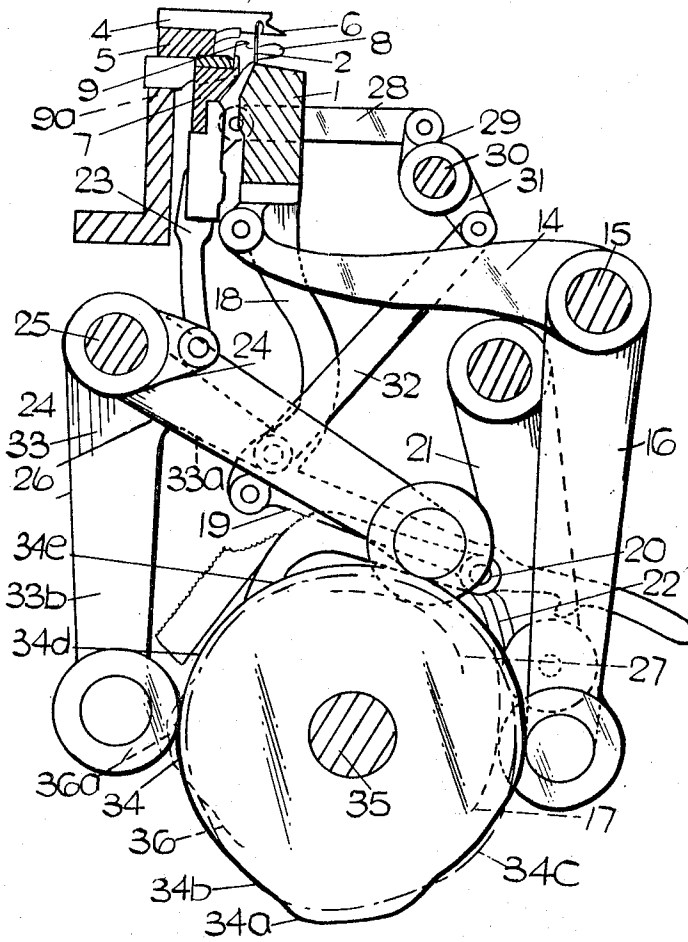


FIG. 9.

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STRAIGHT BAR KNITTING MACHINES

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Filed Dec. 28, 1964, Ser. No. 421,235

Claims priority, application Great Britain, Dec. 27, 1963,

51,074/63

9 Claims. (Cl. 66—109)

This invention is for improvements in or relating to Cotton's patent or similar straight bar knitting machines and concerns the control of needle loops on frame or vertical bearded needles primarily of coarse gauge machines.

In the knitting of fabric on these machines the loops at the selvages tend to rise up the selvedge needles to a position slightly higher than the remaining needle loops, and this alone necessitates critical adjustment of the machine in an endeavour to ensure that all the needle beads press satisfactorily between the old loops and newly laid yarn. Further, as the thread carrier is accelerated from rest there is a tendency to snatch at the yarn causing the selvedge loops to rise further up the selvedge needles thereby rendering the machine adjustment more critical. In addition there can be further raising of the selvedge loops if there is excessive tension or drag on the yarn which may be due to any of a plurality of different causes e.g. a badly wound yarn package.

Because of the possibility of this excessive rising of the selvedge loops, it becomes almost impossible with coarse gauge machines (i.e. 9, 6, 4½ gauge) for any adjustment of the machine to ensure satisfactory selvedging.

Another difficulty encountered in the machines when adapted for tuck stitching is in the control of the tuck loops which tend to lie somewhat loosely about the needles, i.e. they are not pulled back against the needle stems, with a result that the yarn of the tuck loops can become split by descending needle beads or the loops can be cast off the needles when this is not intended. It is further difficult to ensure that fashioning points enter the needle loops without splitting the yarn.

An object of the invention is to provide for control of the frame needle loops in such improved manner, primarily on coarse gauge machines, that selvedging, tucking and fashioning operations can be satisfactorily performed.

The invention provides a Cotton's patent or similar straight bar knitting machine having sinkers and knocking over bits, and yarn control means comprising yarn control elements which are operable in association with the knocking over bits and each of which provides a nose formation projecting upwardly from a side of its associated knocking over bit. Conveniently each nose formation forms with the catch of the adjacent knocking over bit a V shaped notch the upper edge of which is defined by an inclined underside edge of the nose formations for directing needle and/or tuck loops downwardly and firmly against the needle stems.

The nose formations may be secured to the sides of the knocking over bits or formed integral therewith but in offset relation thereto.

The nose formations may be employed in a machine having the duplicate knocking over bits and/or the duplicate sinkers disclosed in our British Patent No. 1,029,400.

The invention also provides a Cotton's patent or similar straight bar knitting machine having yarn control elements associated with knocking over bits and operated by modified "knocking over" cams to hold selvedge loops down

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at the presser stage, also to hold tuck loops down and pulled against the needle stems, and further to hold loops down for penetration by fashioning points.

The above and other features of the invention set out in the appended claims are incorporated in the construction which will now be described as a specific embodiment with reference to the accompanying drawings in which:

FIGURE 1 is a perspective view of loop forming elements in a Cotton's patent straight bar knitting machine according to the invention.

FIGURE 2 is similar view to FIGURE 1 at the start of a course.

FIGURE 2B is a similar view to FIGURE 2 showing usual selvedging arrangement.

FIGURE 3 is a similar view to FIGURE 2 at a later stage.

FIGURE 3B is a face view of tuck fabric on the needles.

FIGURE 3C is a detail view of a needle with tuck stitches thereon in usual manner.

FIGURE 3d is a similar view to FIGURE 3B modified according to the invention.

FIGURE 3e is a similar view to FIGURE 3C modified according to the invention.

FIGURE 4 is a similar view to FIGURE 3 at a still later stage.

FIGURE 5 is a similar view to FIGURE 4 at a later stage.

FIGURE 6 is a similar view to FIGURE 4 at a further later stage.

FIGURE 7 is a similar view to FIGURE 4 showing fashioning.

FIGURE 8 is a similar view to FIGURE 7 showing fashioning at a later stage.

FIGURE 9 is a cross sectional view of the machine showing relevant parts thereof.

Referring to FIGURES 1 and 9 the machine is represented by a needle bar 1 having needles 2 with beads 3, thread carrier 4 with yarn Y, sinker bar 5 with sinkers 6, and knocking over bits 8.

The sinkers 6 and the knocking over bits 8 are in this example in duplicate according to said British Patent No. 1,029,400 to which reference is directed for full details. Alternatively the knocking over bits may be provided singly.

In addition there is provided projecting upwardly from between the knocking over bits of each pair thereof nose formations 9 of yarn control elements.

In this example the elements are secured to the inner side of one knocking over bit of each pair thereof, although the elements may be separate and mounted in the same trick 9a as the knocking over bit.

Further the elements can be formed if desired integrally with knocking over bits but in an offset relation thereto.

The nose formations extend in a vertical plane alongside the vertical plane containing the knocking over bits and respective sinkers, so that the nose formations project up between the sinkers of each pair thereof.

The nose formations 9 have inclined underside edges 10 forming with the catches 11 of the knocking over bits 8 V shaped notches 12 at a higher level than the notches 13 in the knocking over bits.

The needles 2 are in the usual manner operable by the needle bar being pivoted on arms such as 14 which are secured on a shaft 15. Also secured on this shaft 15 is the usual cam follower 16 engaging the usual cam 17 on the machines main cam shaft 35 for imparting up and down movements to the needles. Secured to the nee-

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dle bar 1 is an arm 18 pivotally connected to an arm 19 which is connected at 20 to a cam follower 21 engaging the usual cam 22 on the shaft 35 for imparting to the needles a horizontal motion.

The knocking over bits 8 are operable by the knocking over bar 7 being connected by an arm 23 to an arm 24 secured on a shaft 25. Also secured on this shaft 25 is a cam follower 26 engaging the usual cam 27 on the shaft 35 for imparting to the knocking over bits the usual up and down motion.

For the horizontal motion of the knocking over bits a link 28 is pivotally connected to the knocking over bar 7 and to an arm 29 on a shaft 30 on which there is also secured an arm 31 connected by a line 32 to one arm 33a of a bell crank lever 33. The other arm 33b of the bell crank lever 33 is a cam follower engaging a cam 34. The usual shape for the cam 34 is indicated in broken lines.

According to the invention the shape of this cam 34 is modified as indicated in full lines by being enlarged at the usual nose 34a of the cam, and except for two trimmed back portions 34b, 34c at opposite sides of the nose 34a, also enlarged for the remainder of the cam as at 34d. A portion 34e which is usually flattened is part circular.

This modified cam 34 operates the knocking over bits in the modified manner now to be described.

In FIGURE 1 the knocking over bits 8 are shown advanced by cam portion 34d just prior to the start of the draw so that the inclined edges 10 of the advanced nose formations 9 direct all the loops L down to a common low level.

FIGURE 2 shows the start of the draw during which the nose formations 9 remain advanced by cam portion 34d so that particularly the selvedge loop L remains firmly held down, i.e., without rising up the needle stem as in the conventional arrangement shown in FIGURE 2B.

FIGURE 3 shows the needles advancing to press against presser edges 14 during which all the loops L continue to be held down by the advanced nose formations 9 spaced from the new yarn Y to provide ideal conditions for pressing of the needle beards 3 between the new yarn and old loops. This enables satisfactory selvaging for plain or tuck fabric.

In tuck fabric the tuck loops TL in the example of FIGURE 3B are on every alternate needle. Since the tuck loops are held on the needles for one or more courses there is usually a tendency for the tuck loops to become slack, i.e., without being pulled firm against the needle stems. Consequently as the needles lower, FIGURE 3C, there is a tendency either for the needle beards 3 to split the yarn as indicated, or for tuck loops to become cast off the needles when this is not intended.

FIGURE 3d shows the use of the advanced nose formations 9 which act at least on the tuck loops TL last formed and press them firmly against the needle stems. The effect of this, as shown in FIGURE 3e, is that the tuck loops TL are clear of the needle beards when the needles are lowered.

FIGURE 4 shows that the control of the loops L by the advanced nose formations 9 continues through the landing position, i.e., while the old loop is safely landed on the closed needle beard 3 followed by the knock-over bits easing back by the cam portion 34b.

The usual knock over is shown in FIGURE 5 where the knock over bar has been retracted by cam portion 34b and re-advanced by cam portion 34a with the fabric held by the usual notches 13 of the knocking over bits.

Following the knock over the needles 2 rise carrying the loops L with them after retracting the knocking over bits by cam portion 34c as far as the undersides of the sinkers 6 as shown in FIGURE 6. Thereafter the continued rise of the needles is accompanied by advance of the knocking over bits by cam portion 34d so that the

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nose formations 9 direct the fabric down to the starting position of FIGURE 1.

FIGURE 7 shows that when fashioning, the boxing of the fashioning points 15 is accompanied by the knocking over bits 8 advancing by the usual fashioning cam 36 having an appropriate enlargement 36a so that eventually the nose formations 9 hold all the loops L at a common low level which is ideal to ensure that the fashioning points pick up the loops satisfactorily without the points splitting the yarn.

FIGURE 8 shows a stage slightly later than FIGURE 7, where the knocking over bits have fully advanced by said cam portion 36a so that the nose formations 9 urge the loop L tightly against the needle stems. This is particularly important when fashioning tuck fabric, since the fashioning motion is without newly laid yarn, and if tuck loops are not held firm against the needles in the fashioning motion, there loops could mast off the needles and lay as float bars of thread on the fabric.

What we claim is:

1. A Cotton's patent or similar straight bar knitting machine having sinkers and knocking over bits, and yarn control means comprising yarn control elements which are operable in association with the knocking over bits and each of which provides a nose formation projecting upwardly from a side of its associated knocking over bit.

2. A machine according to claim 1 wherein each nose formation has an inclined underside edge for directing stitches downwardly on the knitting instrumentalities of the machine, and for forming with the upper horizontal surface of the catch of the adjacent knocking over bit and V-shaped notch for maintaining the stitches firmly against the instrumentalities.

3. A machine according to claim 1 wherein the nose formations are secured to the sides of the knocking over bits or formed integral therewith but in offset relation thereto.

4. A machine according to claim 1 having the duplicate knocking over bits for each pair of next adjacent needles, and one of said yarn controlling elements in operable association with one knocking over bit of each of the duplicate knocking over bits.

5. A Cotton's patent or similar straight bar knitting machine having yarn control elements associated with knocking over bits and operated by "knocking over" cams modified by an enlarged nose flanked by reduced diameter portions of the remainder being of enlarged diameter to hold selvedge loops down at the presser stage, also to hold tuck loops down and pulled against the needle stems, and further to hold loops down for penetration by fashioning points.

6. A straight bar knitting machine having a row of simultaneously operable needles, a row of sinkers, a row of knocking over bits in the same vertical planes as the sinkers, yarn control elements operable in association with the knocking over bits, a nose formation on each control element projecting upwardly from a side of its associated knocking over bit, and cam operated means for operating the knocking over bits.

7. A machine as claimed in claim 6 wherein the cam operating means includes a "knocking over" cam having a nose flanked by reduced diameter portions, and the remaining part of enlarged diameter.

8. A Cotton's patent or similar straight bar knitting machine wherein knocking over bits are operable in horizontal direction by a knocking over cam, characterized by having yarn control elements operably associated with the knocking over bits, and nose formations on the yarn control elements projecting upwardly from a side of their associated knocking over bits.

9. A machine as claimed in claim 8 having the "knocking over" cam modified by an enlarged nose flanked by reduced diameter portions, and the remainder being of enlarged diameter.

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5

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MERVIN STEIN, <i>Primary Examiner.</i>		
R. FELDBAUM, <i>Assistant Examiner.</i>		