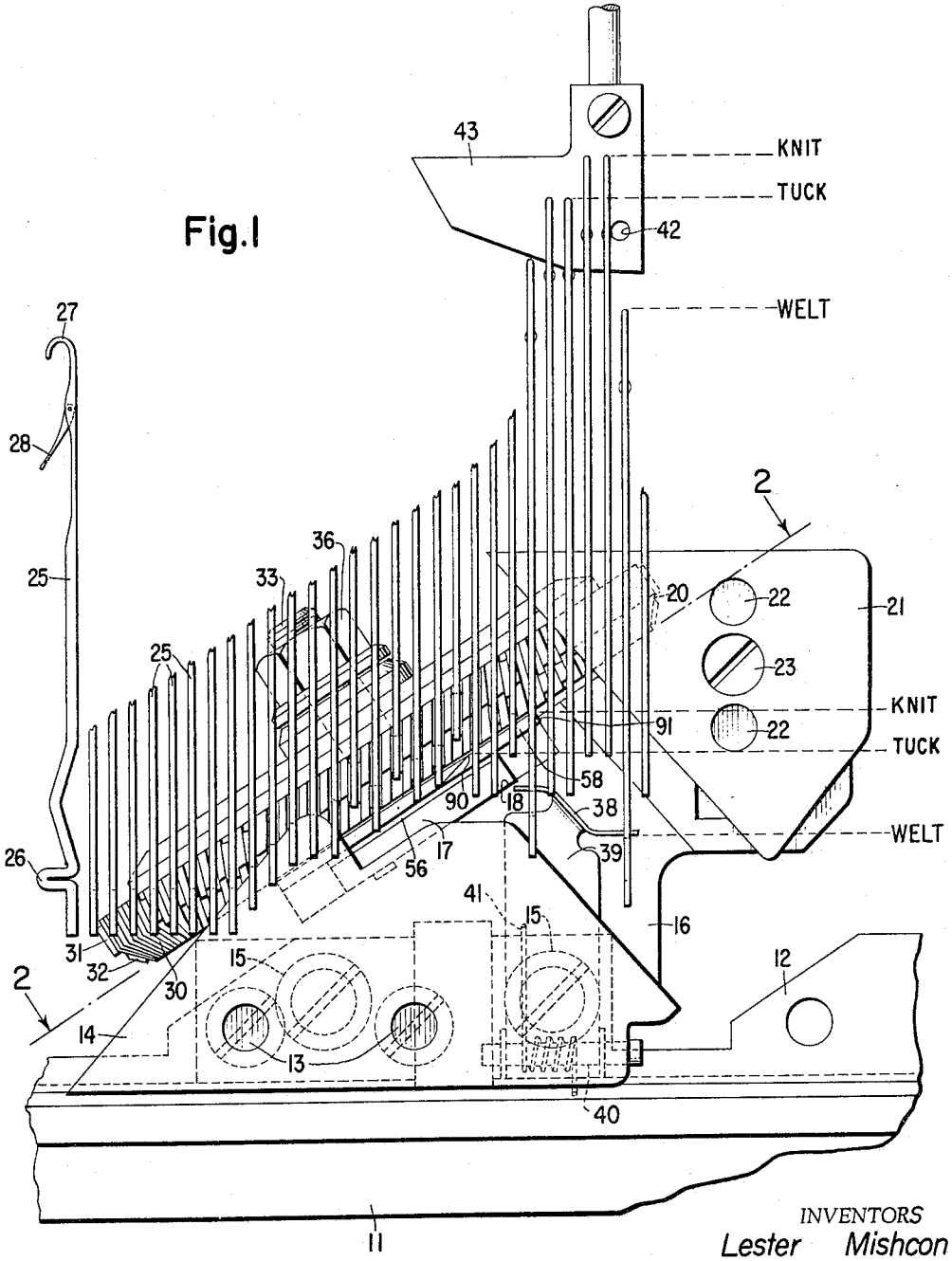
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PATTERN CONTROLLING MECHANISM FOR KNITTING MACHINES

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Fig. 1



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Filed Jan. 4, 1965 2 Sheets-Sheet 2

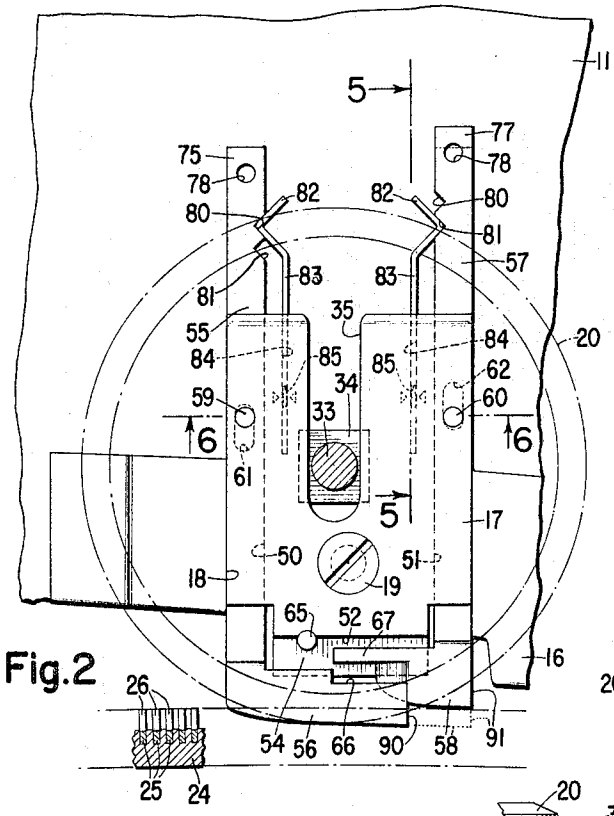
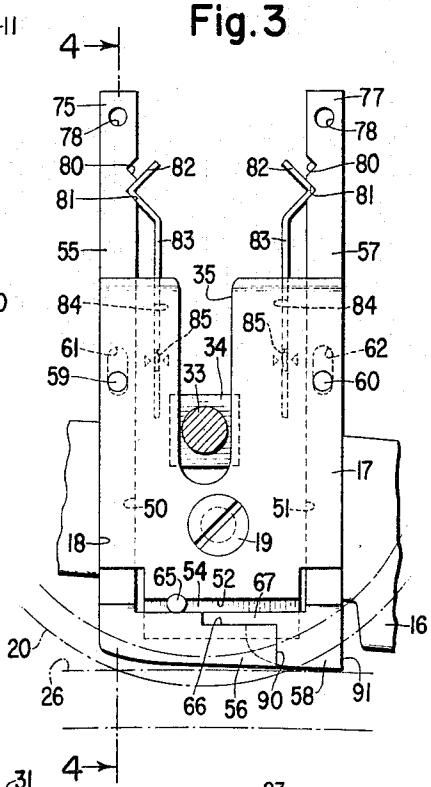


Fig.2

Fig.3



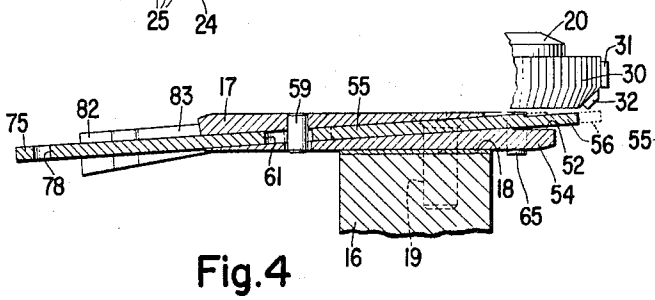


Fig.4

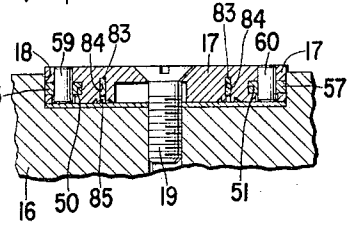


Fig.6

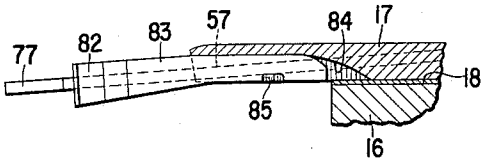


Fig.5

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United States Patent Office 3,274,800 Patented Sept. 27, 1966

3,274,800

PATTERN CONTROLLING MECHANISM FOR KNITTING MACHINES

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Filed Jan. 4, 1965, Ser. No. 423,182
9 Claims. (Cl. 66—50)

This invention relates to independent needle knitting machines having patterning mechanism of the needle selecting variety, and more particularly, to a novel and improved device for at will rendering the patterning mechanism either partially or wholly ineffective.

It is an object of this invention to provide a novel and effective device for at will cancelling either wholly or partially the effect of a needle selecting mechanism while the needle selecting mechanism remains in otherwise operative relation with the knitting machine and with the knitting needles thereof.

It is also an object of this invention to provide a pattern controlling device for at will cancelling the knitting machine patterning mechanism which device is constrained in a novel and highly advantageous fashion within the conventional support for the patterning mechanism. With this novel arrangement, the pattern controlling device of this invention does not encroach upon the space requirements of other mechanisms in the knitting machine, it can be incorporated on pre-existing knitting machines without conflicting with existing space requirements thereon, and the control device by this arrangement will be positioned in a particularly favorable location on the knitting machine for ready access either for operator influence or for actuation by any known drive connection with the knitting machine.

The pattern controlling device of this invention is particularly well suited for use in combination with a needle selecting mechanism known in the art as a "pattern wheel." It is conventional in the art of circular knitting machines that needle selecting pattern wheels be supported on section blocks about the knitting machine, each section block being associated with such raising cams and stitch cams as are necessary to compliment the pattern wheel, and also having a bifurcated tang formed on or attached to the section block and commonly referred to as a "fork." The fork serves to support the pivot stud of the pattern wheel at the proper altitude and with provision for adjustably fixing the pattern wheel into proper meshing relation with the knitting needles in the machine.

The present invention, as will be described in detail hereinbelow, provides a novel construction whereby the pattern controlling device may be incorporated into the pattern wheel supporting fork thus to attain the aforesaid advantages of space requirements and in addition to provide for an advantageous location of the needle engaging portions of the pattern controlling mechanism contiguous to the active periphery of the pattern wheel.

With the above and additional objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

FIG. 1 represents an elevational view of a section block of a circular knitting machine as viewed from the position of the needle cylinder with a pattern wheel and the pattern controlling mechanism of this invention applied thereto and including a yarn carrier and a plurality of needles of which one is turned substantially at right angles,

FIG. 2 represents a cross sectional view taken substantially along line 2—2 of FIG. 1 particularly illustrating the top plan view of the pattern wheel supporting fork thereof, showing a fragment of the needle cylinder and with the paths of the pattern wheel periphery and of the needle butts indicated in broken lines, with the raising and stitch cams removed and with the pattern controlling mechanism of this invention illustrated in solid lines in the position to raise all needles to the tuck position,

FIG. 3 represents an enlarged cross sectional view similar to FIG. 2 but showing the pattern controlling mechanism of this invention in a position ineffective to influence the operation of the pattern wheel,

FIG. 4 is a cross sectional view taken substantially along line 4—4 of FIG. 3 and includes a fragment of the pattern wheel,

FIG. 5 is a cross sectional view taken substantially along line 5—5 of FIG. 2, and

FIG. 6 is a cross sectional view taken substantially along line 6—6 of FIG. 2.

Referring particularly to FIG. 1, the annular frame of a circular knitting machine is indicated at **11** having formed thereon or secured thereto an upstanding flange **12**. Secured at intervals to the flange **12** as by screws **13** are needle raising cams of which one is illustrated at **14** in FIG. 1. Also secured to the flange **12** as by screws **15** and in association one with each of the raising cams **14** are section blocks of which one is illustrated at **16** in FIG. 1.

Each section block carries a bifurcated tang or fork **17** preferably seated in a recess **18** formed on the section block at an inclination to the machine frame **11** and secured in place by a fastening screw **19**. A needle selecting pattern wheel **20** is rotatably mounted in the fork **17**. Each section block **16** also carries a stitch setting cam **21** which may be secured directly to the section block or, as is conventional in the art, may be secured by pins **22** and a fastening screw **23** to a device in the section block for providing a micrometric adjustment of the vertical position of the stitch setting cam for adjustment of the knitted length.

A conventional needle cylinder **24**, of which a fragment is illustrated in FIG. 2, is arranged concentric with the annular frame **11**. The needle cylinder is vertically slotted and in each slot one of the knitting needles **25** is slidably constrained. Each needle is formed with a lateral butt **26** adapted to protrude radially from the slotted needle cylinder and to be influenced by the raising cam **14**, pattern wheel **20**, stitch cam **21**, and the pattern controlling device of this invention in order to raise and lower the hook **27** and pivoted latch spoon **28** of the latch needle. Such actuation of the needles may be occasioned either by rotation of the needle cylinder relatively to a stationary machine frame, or by rotation of the machine frame relatively to a needle cylinder which is held stationary.

As illustrated in FIGS. 1 and 4, the pattern wheel **20** is formed with radial slots **30** spaced to mesh with the needle butts **26**. The pattern wheel slots may be left empty or may accommodate either a high jack **31** or a low jack **32** in accordance with the pattern of needle selection which is desired. The pattern wheel with its slots **30** filled with the desired sequence of jacks or vacant slots is journaled on the section block **16** by means of a stud bolt **33** formed with an enlarged head **34** which is engaged in a slot **35** in the fork **17** as illustrated in FIGS. 2 and 3 and secured in place by a clamping nut **36** with the pattern wheel positioned such that the slots **30** thereof will mesh with the needle butts **26**.

As the needle cylinder and machine frame revolve relatively, the raising cam **14** will elevate the needle butts successively into mesh with the pattern wheel slots **30**. The

needle butts will pass through those of the pattern wheel slots which are empty without being further elevated, and such unelevated needles will engage a wing cam **38** of which the shank **39** is pivoted on a pin **40** in the section block **16** and biased into a vertical position against the section block by a spring **41**. The wing cam **38** will depress these unelevated needles into a position referred to in the art as the "welt" position in which the needle latch spoon will not be raised clear of the previously knit fabric and the needle hook will not be elevated to the level of a yarn delivery aperture **42** of a yarn carrier **43** carried on the machine frame above the section block **16**. The dashed lines labeled Welt in FIG. 1 indicate the upper limits of the needle butts and needle hooks for needles in the welt position.

Those needles whose butts mesh with pattern wheel slots filled with low jacks **32** will be raised beyond the welt position to the tuck position in which, as indicated by the dashed lines labeled Tuck in FIG. 1, the needle hook will pass above the yarn delivery aperture **42** and engage a yarn. In the tuck position, however, the needle latch spoon will not clear the previously knit fabric and knitting cannot take place.

Those needles whose butts mesh with pattern wheel slots filled with high jacks **31** will be raised to latch clearing position in which the needles upon being subsequently lowered by the stitch setting cam **21** will knit.

Referring to FIGS. 2 to 5, the pattern wheel fork **17** at each side is formed with slots **50** and **51** which are preferably inclined upwardly toward that extremity of the fork which faces the needle cylinder, at which extremity the slots **50** and **51** extend substantially flush with the top of the fork and are joined by an upwardly open recess **52** formed across the fork at substantially the same depth as the slots **50** and **51**. The recess **52** defines a shelf **54** extending across the extremity of the fork **17** beneath the level of the slots **50** and **51**.

Slidable in the slot **50** is the shank **55** of a retractable tucking cam blade **56** which extends laterally from the shank **55** and overlies the shelf **54** on the fork **17**. Similarly slidable in the slot **51** is the shank **57** of a retractable knitting cam blade **58** which extends laterally from the shank **57** and overlies the shelf **54**. When the fork **17** is secured in position in the section block recess **18**, the recess **18** constrains the cam blade shanks **55** and **57** within the slots **50** and **51**. In addition, the slots **50** and **51** may be traversed by pins **59** and **60**, respectively, each pin being accommodated in an elongate aperture **61**, **62** in the respective shanks **55** and **57** so as to constrain the cam blades in place in the fork when the fork is detached from the section block without interfering with the retractability of the cam blades.

Set into the shelf **54** of the fork **17** is a stop pin **65** which provides line contact engagement with the tucking cam blade **56** defining the retracted position of the tucking cam blade which retracted position is not subject to influence by the collection of lint or the like. The tucking cam blade **56** is formed with a notch **66** in which is accommodated a finger **67** extending from the knitting cam blade **58** providing an interengaging connection therebetween so that when the tucking cam blade is shifted into retracted position against the stop pin **65**, the knitting cam blade **58** will also be carried into retracted position. The cooperating finger **67** and notch **66** also interlock the cam blades **56** and **58** for movement together into an extended operative position when the knitting cam blade **58** is shifted out of retracted position. The finger **67** and notch **66**, however, do not prevent the tucking cam blade **56** alone from being shifted into extended position as illustrated in FIG. 2.

For effecting a shift of the cam blades **56** and **58** into retracted or extended position, the shanks **55** and **57**, respectively, are extended at the extremities opposite the cam blades, which extremities **75** and **77**, respectively, may serve as finger grip portions facilitating manual selection of the cam blade positions. Indicated at **78** on the shank extremities are transverse apertures which may accommodate connections to any known mechanical selecting apparatus (not shown) for influencing the cam blade position in accordance with a predetermined program.

For constraining the cam blades **56** and **58** in either retracted or extended position and preventing accidental shifting of the cam blades, each of the cam blade shanks **55** and **57** is formed at one side with a pair of notches **80**, **81**, and these notches in the shanks cooperate each with the offset detent **82** of leaf springs **83** which are set into slots **84** in the fork **17**. As illustrated in FIG. 5, each leaf spring **83** may be formed with a shallow notch **85** and the sidewalls of the slots **84** may be deformed as illustrated in FIGS. 2 and 3 partially to occupy the space provided by the shallow notch **85** thus crimping the leaf springs securely in place in the slots **84**.

FIGS. 1 and 4 illustrate the position of the cam blades **56** and **58** immediately beneath the pattern wheel **20**. In broken lines in FIG. 4, the extended effective position of the cam blades **56** and **58** is indicated in which the cam blades project into the space which is provided by the beveled relief formed in underside of the pattern wheel.

Referring to FIG. 1, the positions of the cam blades **56** and **58** are illustrated relatively to the levels of elevation of the needle butts **26** required for knitting and tucking. As illustrated in FIG. 1, the free extremity **90** of the tucking cam blade **56** is disposed coincident with the tuck level of needle butt elevation and, therefore, when the tucking cam blade **56** alone is shifted into extended position, those needle butts which find empty slots **30** in the pattern wheel will, after passing through the pattern wheel at the welt level, strike the tucking cam blade **56**, and be urged thereby to the tuck level.

The upper or trailing extremity **91** of the knitting cam blade **58** as illustrated in FIG. 1 is disposed coincident with the knit level of needle butt elevation and, therefore, when both the tuck and knit cam blades **56** and **58** are shifted into extended positions those needle butts which find either empty slots **30** or slots filled with low jacks **32** in the pattern wheel will after passing through the pattern wheel at the welt and tuck levels, respectively, thereafter strike the cam blades **56** and **58** and be raised to the knit level.

It will be appreciated that a single one of the cam blades **56** or **58** may be provided if only a transition to tuck or only a transition to knit position of the needles is desired. The provision of the shelf **54** which steadies the cam blades against the thrust of the needle butts will enable the use of a single cam blade **56** or **58** for such transition. When a cam blade **58** is used alone, however, it should be elongated an amount appropriate to engage needle butts passing in the welt position which needle butts are first engaged by the tucking cam blade **56** in the construction illustrated in the accompanying drawings.

This invention thus provides a compact and effective means for at will rendering a needle selecting pattern wheel either partially or wholly ineffective.

Having set forth the nature of this invention what is claimed herein is:

1. In a pattern wheel supporting section block for a circular knitting machine including a fork adapted to accommodate a bearing stud on which a pattern wheel is journaled, means for at will rendering the pattern wheel ineffective comprising a retractable cam blade formed with a shank, said fork being formed with a slot extending substantially radially of said pattern wheel, means slidably constraining said cam blade shank in said slot for movement substantially radially of said pattern wheel and with said cam blade disposed beneath the level of said pattern wheel.

2. A needle selecting device for a knitting machine having a frame, a needle bed movable relatively to said frame, and a bank of needles lengthwise slidably constrained in said needle bed, a butt carried by each needle

of said bank of needles, said needle selecting device comprising a pattern wheel support carried by said frame, a cylindrical pattern wheel having a periphery formed with jack accommodation slots adapted to mesh with said butts of said bank of needles constrained in said needle bed, means for journaling said pattern wheel on said pattern wheel support on an axis inclined relatively to lines perpendicular to the needles of which said butts are in mesh with said pattern wheel jack accommodating slots, a needle selecting cam blade disposed substantially parallel to said pattern wheel, and means in said pattern wheel support for constraining said cam blade beneath that portion of said pattern wheel periphery adapted to mesh with said butts of said bank of needles, said constraining means shiftably supporting said cam blade for movement selectively into and out of an extended position in engagement with said butts of said bank of needles.

3. A needle selecting device for a knitting machine having a frame, a needle bed movable relatively to said frame, and a bank of needles lengthwise slidably constrained in said needle bed, said needle selecting device comprising a pattern wheel support carried by said frame, a cylindrical pattern wheel having a periphery formed with jack accommodating slots adapted to be left vacant to pass needles meshing therewith in welt position, adapted to be filled with low jacks to elevate needles meshing therewith into tuck position, and adapted to be filled with high jacks to elevate needles meshing therewith into knit position, means for journaling said pattern wheel on said pattern wheel support with said peripheral slots in mesh with needles in said needle bed and on an axis inclined relatively to the needles in mesh with said pattern wheel, a tucking cam blade and a knitting cam blade extending in substantially parallel relation beneath said pattern wheel, means in said pattern wheel support for constraining said cam blades parallel to said pattern wheel and beneath that portion of said pattern wheel periphery adapted to mesh with said bank of needles, said constraining means shiftably supporting said cam blades for movement selectively into an extended position in engagement with said bank of needles and a retracted position out of engagement with said needles.

4. A needle selecting device as set forth in claim **3** including interengaging means on said tucking and knitting cam blades coupling said tucking cam blade for movement with said knitting cam blade when said knitting cam blade is shifted into extended position, and coupling said knitting cam blade for movement with said tucking cam blade when said tucking cam blade is shifted into retracted position.

5. In a pattern wheel supporting section block for a circular knitting machine including a fork adapted to accommodate a bearing stud on which a pattern wheel is journaled, means for at will rendering the pattern wheel ineffective comprising a retractable cam blade disposed beneath the level of said pattern wheel, a shank formed on said cam blade, said fork being formed at one side with a slot extending substantially radially of said pattern wheel, said cam blade shank being disposed in sliding engagement with the bottom of said slot, a pin fixed in said fork spanning said slot, said cam blade shank being formed with a clearance aperture elongate substantially parallel to the bottom of said slot and embracing said pin.

6. In a pattern wheel supporting section block for a circular knitting machine including a fork adapted to accommodate a bearing stud on which a pattern wheel is journaled, means for at will rendering the pattern wheel ineffective comprising a pair of retractable cam blades disposed beneath the level of said pattern wheel, a shank

formed on each of said cam blades, said fork being formed with slots one at each side extending substantially radially of said pattern wheel, said cam blade shanks being disposed one in each slot in sliding engagement with the bottoms of said slots, pins fixed in said fork spanning each of said slots, said cam blade shanks each being formed with a clearance aperture elongate substantially parallel to the bottoms of said slots and embracing said pins, said pair of cam blades formed with overlapping portions interlocking said cam blades for movement in unison into extended position when one of said cam blade shanks is slidably shifted in said slot and for movement in unison into retracted position when the other of said cam blade shanks is slidably shifted in said slot.

7. In a pattern wheel supporting section block for a circular knitting machine including a fork adapted to accommodate a bearing stud on which a pattern wheel is journaled, means for at will rendering the pattern wheel ineffective conmprising a retractable cam blade formed with a shank, said fork being formed with a slot extending substantially radially of said pattern wheel, means slidably constraining said cam blade shank in said slot for movement substantially radially of said pattern wheel and with said cam blade disposed beneath the level of said pattern wheel, a leaf spring secured in said fork and formed with a detent, and spaced notches formed in said cam blade shank defining with said spring detent stop means limiting said cam blade in extended and retracted positions.

8. In a pattern wheel supporting section block for a circular knitting machine, a bifurcated rectangular fork detachably secured to said section block, said bifurcation adapted to accommodate a bearing stud on which a pattern wheel is journaled, means for at will rendering said pattern wheel ineffective comprising a retractable cam blade extending laterally from a cam blade shank, said fork being formed at one side with a slot extending substantially radially of said pattern wheel, an upwardly open shelf merging with said slot and extending across that end of said fork disposed beneath the periphery of said pattern wheel, and means carried by said fork slidably constraining said cam blade shank in said slot for movement substantially radially of said pattern wheel with said cam blade disposed on said shelf.

9. In a pattern wheel supporting section block for a circular knitting machine, a bifurcated rectangular fork formed with a substantially flat upper surface and detachably secured to said section block, said bifurcation adapted to accommodate a bearing stud on which a pattern wheel is journaled contiguous to said fork and on an axis normal to the flat upper surface of said fork, means for at will rendering said pattern wheel ineffective comprising a retractable cam blade formed with a shank, said fork being formed at one side with a slot extending substantially radially of said pattern wheel and inclined upwardly toward said flat upper surface, and means carried by said fork slidably constraining said cam blade shank in said slot for movement substantially radially of said pattern wheel, with said cam blade disposed at the upwardly inclined extremity of the shank beneath the periphery of said pattern wheel.

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