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[54] COMPOSITE SLIDERS

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[58] Field of Search 66/14, 123

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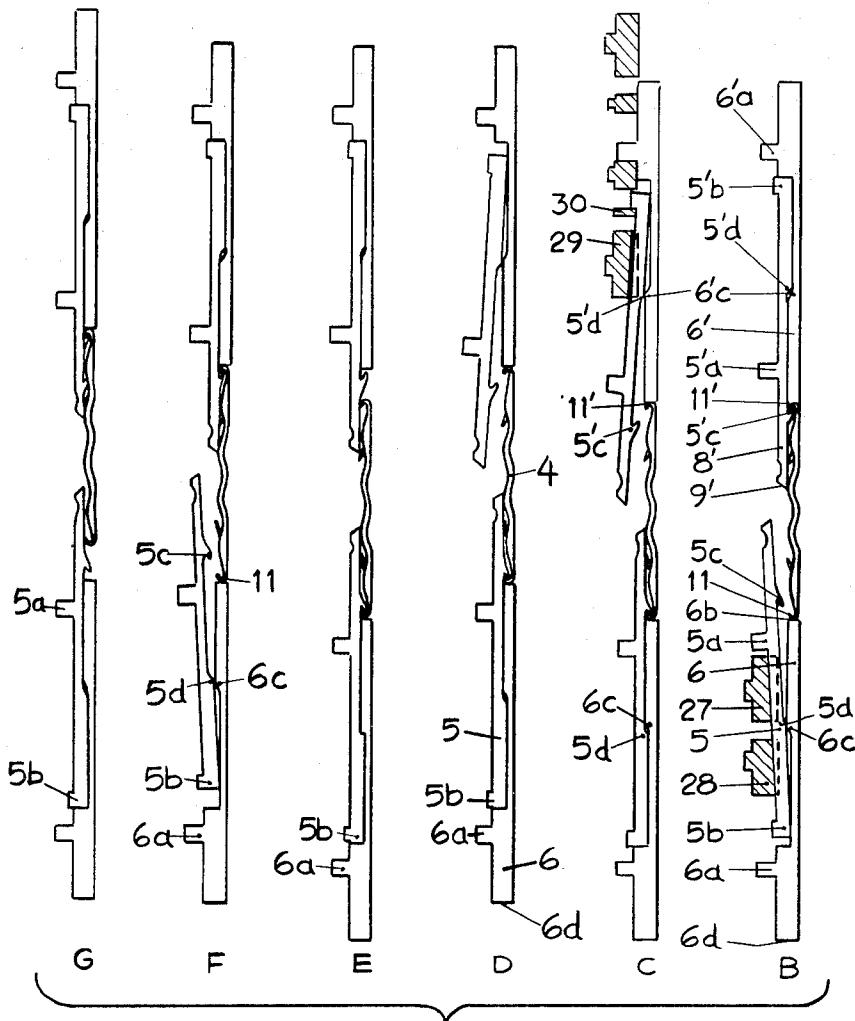
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[57]

ABSTRACT

Slider for superimposed cylinder type knitting machine having an end face for end-wise engagement with a hook of a needle in a trick of the knitting machine and a hook for abutting the hook of the needle from a position masking the hook of the needle. The end face and slider hook are mounted on complementary but separately movable slider parts to enable the needle hook to be closely held by the slider and to be released by moving the end-face and the slider hook apart lengthwise of the slider.

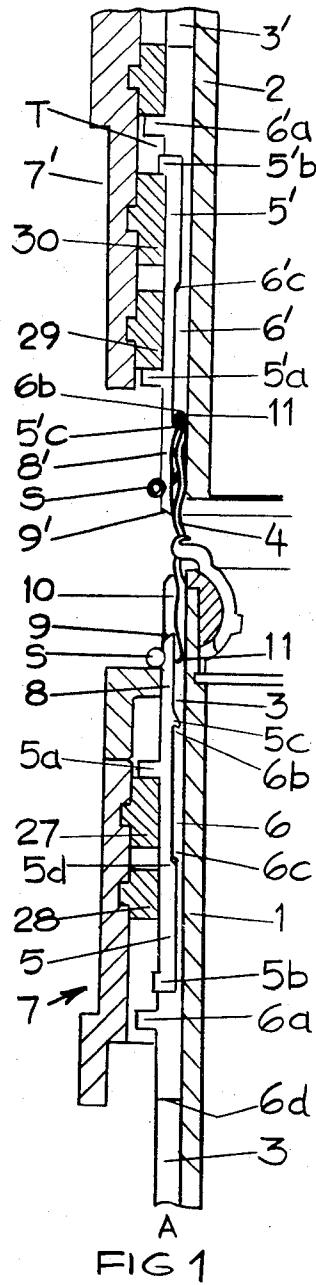
17 Claims, 3 Drawing Figures



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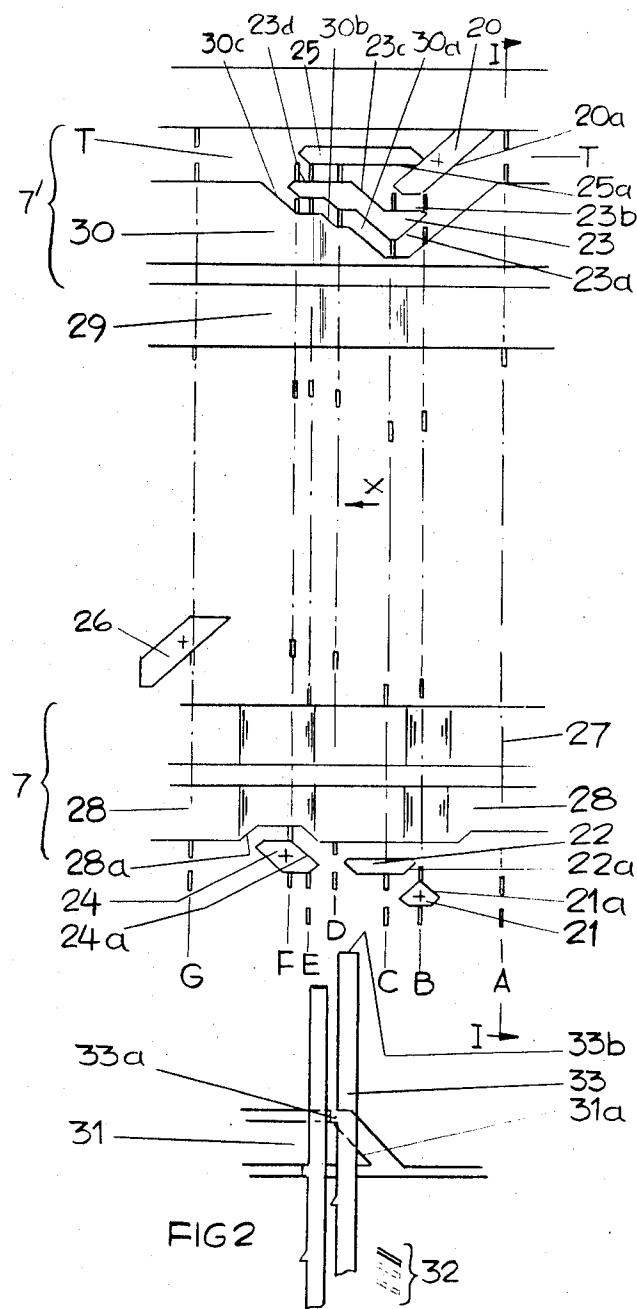
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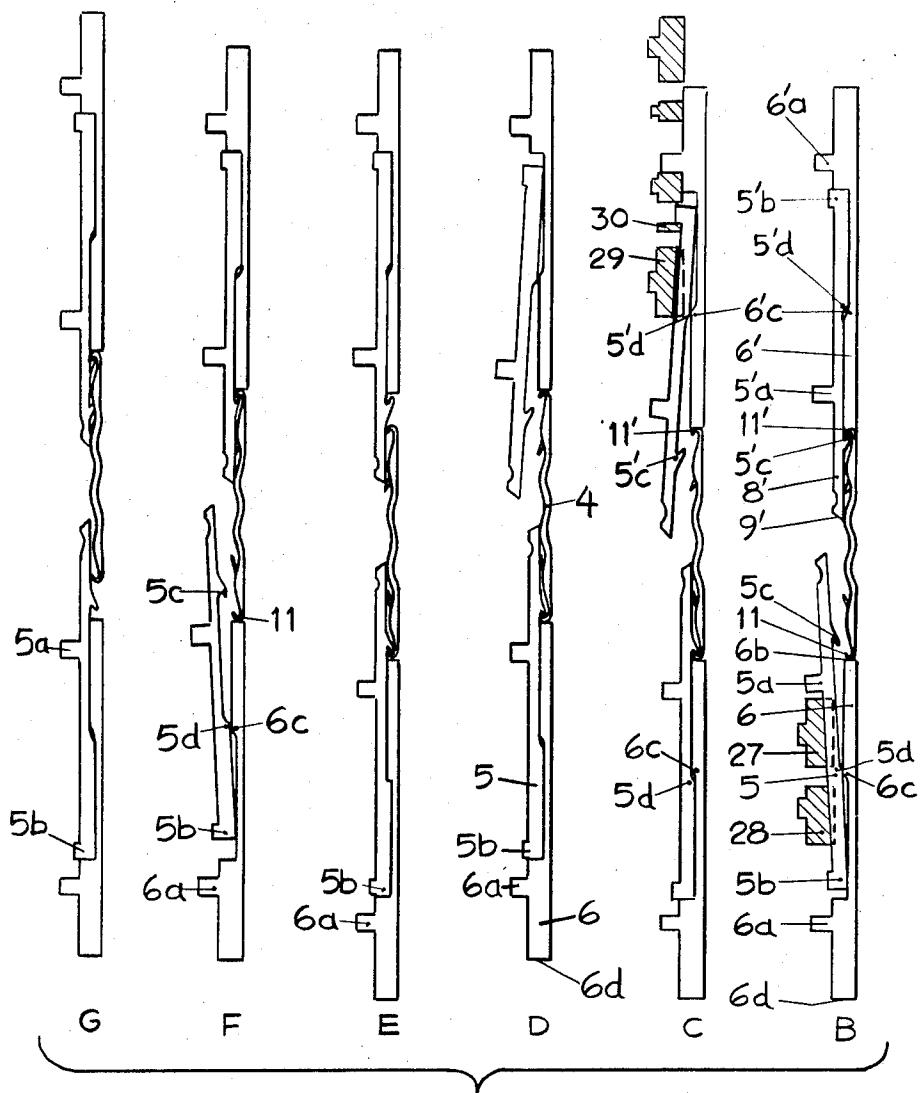


FIG 3

COMPOSITE SLIDERS

The invention relates to sliders for use in knitting machines of the superimposed needle cylinder type, that is to say knitting machines having axially opposed needle cylinders mounted one above the other, a set of double ended latch needles for operation in the tricks of these cylinders, a corresponding set of needle actuating sliders located in the tricks of each cylinder, and bottom and top cam systems for operating the sliders whereby the needles can function in either cylinder, and may be transferred from one cylinder to the other according to knitting requirements.

Heretofore sliders have been constructed in one piece with a recess which serves to engage one of the hooks of a double ended latch needle in order to move a needle up and down as required. To disengage the needle from a slider for transfer to a slider in the opposite cylinder, the sliders are moved axially and radially with respect to the needle cylinders under the control of slider raising and lowering cams for the axial movement and dividing cams or presser cams for the radial movement. To disengage a needle latched to a hook and to receive a needle for latching at speed without damage, clearances have to be provided between the slider recesses and the needle hooks. Thus when the slider and needle are latched together there is some end play between them. The end play reduces the control of the needle to a small extent which is disadvantageous when trying to knit a good quality fabric and also creates some inaccuracy for the insertion of needle latch openers and stop motion devices.

In accordance with this invention there is provided a composite slider for a superimposed cylinder type knitting machine which composite slider comprises a first slider part for sliding in a trick of a needle cylinder of the knitting machine and having an end face for endwise engagement with a hook of a needle in the trick and a second slider part receivable on the first part, movable with respect thereto and having a hook for abutting with the hook of the needle from a position masting the hook of the needle, and means on the first and second part for controlling their movement individually. In this way the needle hook can be latched between said end face and slider hook as required. In this way, the needle can be engaged without any end play yet can be released or received quickly by a slider for transfer purposes. The second slider part may be moved radially outward by a dividing cam engaging a slanted camming surface at the tip of the second slider part.

In a preferred construction opposed faces of the first and second slider parts are adapted to give a camming action so as to move the hook of the slider part away from the first slider part as the end face and hook are moved apart lengthwise of the composite slider. In this way a rocking or outward radial motion is performed by the second slider part along using the camming action between the first and second slider parts when the parts are moved relatively endwise in an axial direction with respect to the cylinders to release or receive a needle. If the needle tricks vary in depth to a small degree, no objectionable differences will occur in the relative position of the hook of the slider and the needle hook in different tricks when the slider hook is rocked outwards.

In this way also the radial movement of the second slider part outward can be effected by axial slider movement and can be controlled by a butt secured to it. This makes the use of any pressing cams or dividing cams superfluous on knitting machines having such sliders.

Conveniently the controlling means comprise a butt on the first slider part spaced from the end face and a butt on the second slider part spaced from the slider hook, the butts being arranged so that the two butts are spaced only a short distance when the two slider parts are in a needle engaging or needle latching position. Advantageously the controlling means are arranged to prevent lengthwise movement of the hook to the end-face when both abut with the needle. Preferably the butt of the second slider part is at the end of that part and spaced by a short edge of the first slider part from the butt thereon, the short edge being of such a length that it prevents crushing of the hook or hooks by the two parts being moved together beyond the needle engaging position of the composite slider. Advantageously the second slider part is provided with a second actuating butt adjacent the slider hook. The camming action aforementioned between the first and second slider parts may be achieved by having the slider parts appropriately shaped along their outer and inner edges respectively. Conveniently the opposed lengthwise edges of the first and second slider parts are stepped and have slanted portions arranged to provide a camming action between the first and second slider parts when the slider parts are moved relatively lengthwise. The two slanted cam portions may each have a concave arcuate shape.

Conveniently the second slider part extends beyond the hook and is provided with a recess for receiving a spring band urging all second slider parts inwards and a wedge shaped tip to act as a latch opener. The slider hook can extend backwards into the needle hook.

The cam system of the knitting machine having composite sliders of the invention is preferably devoid of presser or dividing cams for the purpose of needle transfer. Conveniently the cam system is provided with cams for penetrating between the butts controlling movements of the first and second slider parts to cause relative endwise movement of the slider parts as required for needle transfer.

Conveniently the cam system has a transfer section arranged to transfer all needles in the top cylinder to the bottom cylinder and a selecting system for transferring selected needles up to the top cylinder. The cam system thus preferably comprises cams for controlling the first and second slider parts separately so as to provide for transfer downward of all needles in one cylinder to the other cylinder and a needle selecting arrangement for moving selected sliders in the other cylinder into the path of further cams for controlling the first and second slider part separately so as to provide for transfer of selected needles to that one cylinder.

When assembled together in the same needle cylinder trick the composite slider and the needle engaged by the slider are capable of two way movement without end play, the needle closely following the loop forming movements of the slider when activated by the cams in the cam-box. Disengagement of the needle from the composite slider during needle transfer is brought about in a very simple manner by interposing a cam between the butts on the two slider portions which causes

endwise movement of the outside portion in relation to the inside portion of the slider, to bring the slider hook clear of the end of the needle and to bring the camming faces into contact. Further relative movement produces a camming action between the faces, causing the outside portion of the slider to be rocked outward from its location in the recess moving the slider hook out of the path of the hook of the needle to enable the latter to pass by freely when being retracted by a slider in the opposite cylinder which receives the needle. Clearance between the slider hook and the needle hook will be maintained even if a slight variation exists in the depth of the needle cylinder tricks.

This invention is particularly described with reference to the drawings wherein:

FIG. 1 is a vertical section at position I—I of FIG. 2 through the knitting head of a circular knitting machine of the superimposed needle cylinder type according to the invention.

FIG. 2 is a development of a transfer section of the top and bottom cam systems of the machine of FIG. 1 as seen from the inside; and

FIG. 3 shows part sectional views of a needle and the relevant top and bottom sliders at successive stages of transfer in the transfer section of FIG. 2.

With reference to FIG. 1 a double cylinder machine has a rotary bottom or plain needle cylinder 1 and an axially opposed and similarly rotatable top or rib needle cylinder 2. The superimposed cylinders 1 and 2 have longitudinally extending tricks 3 and 3' respectively in which are arranged double ended latch needles 4. For each needle 4 there is provided in the corresponding axially aligned cylinder tricks 3 and 3' above and below the needle 4, a bottom cylinder slider comprising two composite parts 5, 6 and an opposed top cylinder slider comprising two composite parts 5', 6'. The composite sliders in the top and bottom cylinders are of identical construction. Each slider comprises an inside or rear portion 6 which has a flat inside edge resting in the trick and an outside or front portion 5 which is received on the rear portion 6. The rear portion 6 at one end has a face 6b for abutting with the needle hook and at the other end has a raised portion with a flat edge 6d which carries an actuating butt 6a on the slider portion 6. The slider portion 6 has between the face 6b and the raised portion an outside face which is terraced into two edges substantially parallel to the trick surface and connected by a concave arcuate shoulder 6c which faces the raised portion. The raised portion has a section extending from the butt 6a and connected by a square shoulder to the lower terraced edge of the outside face. The front portions 5 have a wedge shaped tip 9 mounted on an extension 8 at one end and a low actuating butt 5b at the other end. The inside face of the front portion 5 which rests on the outside face of the rear portion 6 has formed on its terraces connected by a concave arcuate shoulder 5d complementary to the outside face of the rear portion 6. When the low butt 5b abuts with the square shoulder of the raised portion the outside face of the rear portion 6 contacts the inside face of the front portion 5 over its whole length apart from where the concave arcuate shoulders are spaced opposite one another. The inside face of the front portion 5 has formed on it a hook or tongue 5c at a position opposite the face 6b. The outside face of the front portion 5 apart from the low actuating butt 5b also has a further high actuating

butt 5a adjacent the hook 5c and a recess for a band spring S near the wedge tip 9. The hook formation 5c serves and is shaped to interengage the hook 11 of the relevant double ended needle 4. The tip or extension 8 is adapted to retain the engaged needle in position at the back of its trick, and terminates with the wedge tip 9 which serves to open and guard the latch 10 of the associated hook. The band spring S received in the recess near the wedge tip 9 encircles all sliders in a particular cylinder to provide control by urging them inwards. The face 6b of the rear slider portion 6 serves to contact the opposed hook 11 of the engaged needle, thus ensuring that the needle closely follows the movements of the composite slider when actuated by the cams in the cams in the cam-box. The two arcuate shoulders 5d and 6c serve to provide the camming action when it is necessary to disengage the hook 5c of the slider from the hook 11 of the needle.

Surrounding the bottom cylinder 1 is a stationary 20 bottom cam-box or shell 7 to which are fitted the cams of a bottom cam system for operating the composite slider 5, 6 whilst a stationary top cam-box 7' surrounds the top cylinder 2 and carries the cams of a top cam system for actuating the composite sliders 5', 6'. The 25 cam boxes comprise a transfer section which serves to transfer all needles to the bottom cylinder and then to raise selected needles to the top cylinder and a knitting section.

The transfer section of the cam box for the top cylinder 30 comprises a transfer control bolt cam 20 which acts on the butt 6'a of the sliders to lower them after emerging from a continuous cam track T, both the butt 6'a and the butt 5'b passing through a downward extension of the cam track T which is defined by the cam 20 and 35 by a continuous cam 30 opposite. The transfer section further is provided below and aside of the cam 20 and above the cam 30 with a cam 23 for penetrating between the butts 6'a and 5'b to divide them into separate cam tracks. These cam tracks are formed by the cam 23 and 30 to move the butts 6'a and 5'b apart and then to keep them apart whilst the composite slider as a whole is moved up. The top transfer section further has a cam 25 which with the cams 23 and 30 serves to move the butts 6'a and 5'b together and further upward back into the horizontal section of the cam track T.

The transfer section of the bottom cylinder cam box 50 has a bolt cam 21 which causes the butts 5b and 6a of the sliders in the bottom cylinder emerging from a horizontal cam track to be separated and to be moved apart. A cam 22 is positioned after cam 21 to move the butts 5b and 6a together again into the horizontal track. Below and after the cam 21 there is provided a slider selection mechanism to move the sliders into either of two different tracks. The slider selection mechanism 55 comprises a pattern selecting device 32 which acts on selected pattern jacks 33 only. Certain jacks are not raised whilst others have their butt 33a raised to enter a track which causes the jacks to rise over a jack raising cam 31. The jacks have upper edges 33b which serve to engage the edge 6d of the selected sliders to raise them. Thus the butts 5b and 6a of certain composite sliders remain in the horizontal cam track after passing the cam 21, whilst the butts 5b and 6a of other sliders i.e. those which are raised by the jacks, enter separate cam tracks defined by a transfer control cam 24 and a continuous cam 28 mounted above it. After passing the cam 24, the sliders are lowered to the horizontal cam

track by a slider lowering cam 26 which acts on the butt 5a.

Underneath the cam 30 and above the cam 28 are provided further continuous cams 29 and 27 respectively. All continuous cams 27 to 30 are provided with recesses or relieved portions to allow the front slider portions 5 and 5' to rock as required.

In operation a needle 4 and its associated sliders 5, 6 and 5', 6' passes through the cam-box sections 7 and 7' moving from right to left in the direction of the arrow X in FIG. 2. The position A represents a stage of the knitting process wherein the needle 4 is latched by its hook 11' to its slider 5', 6' in the top cylinder 2 with the slider 5, 6 disengaged in the bottom cylinder 1 as also shown in FIG. 1. Further rotation of the needle cylinders 1 and 2 causes the butt 6'a contained in the track T to move down the angular face 20a of the transfer control bolt cam 20 carrying the composite sliders 5', 6' and needle 4 with it. This continues until at stage B the butt 6'a abuts the cam face 23b whilst the butt 5'b is free to move down the cam face 23a. At the same time the butts 5b and 6a of the composite sliders 5, 6 in the bottom cylinder 1 pass respectively over and below the bolt cam 21. Passage of the butt 5b up the face 21a of the bolt cam 21 causes a displacement of the portion 5 of the slider with respect to the portion 6. Thus a camming action occurs between the two acute shoulders 5d and 6c and the hook portion 5c of the slider 5 is moved outward into a needle receiving position shown at B in FIG. 3. The shape of the shoulders is such that the slider portion 5 describes a virtual axial movement until the opposed shoulders meet. Then the portion 5 undergoes a substantial radial movement until the shoulders rest on the terraced faces of the portions 5 and 6. Further movement of the slider portions will only have a marginal effect on radial movement. Thus by raising the portions 5 only slightly with respect to the portions 6, the portions 5 make all movements necessary to cause the slider hooks to clear the needle hooks.

The cams 27 and 28 in the bottom cam-box 7 are relieved on the inwardly directed face to permit the displacement of the portion 5 of the composite sliders when transfer of the needle 4 takes place from the top cylinder 2 to the bottom cylinder 1. As the sliders advance past stage B through the cam boxes the slider butt 5b on the slider 5 in the bottom cylinder engages the cam 22 on face 22a, thus lowering this portion of the slider until the tongue 5c engages the hook 11 of the needle 4 between stage B and C. The needle 4 is then latched to the top slider 5' and the bottom slider 5. Further movement through the cam boxes brings the butt 5'b into contact with the cam 23 in the top cam box 7'. The butt 5'b then passes down the face 23a of the cam, whilst the butt 6'a remains above the cam on the cam face 23b. Thus the slider portion 5' is displaced outwardly through the camming action of the two acute faces 5'd and 6'c, disengaging the tongue 5'c from the hook 11' of the needle 4, at stage C (see FIG. 3). The cams 29 and 30 in the top cam box are recessed as required. Thus all needles in the top cylinder are transferred to the bottom cylinder.

If the needle 4 is required to knit a plain stitch, that is a stitch whilst remaining latched to the slider 5 in the bottom cylinder 1 at stage C the pattern jack 33 is not selected to pass over the jack raising cam 31. In this way the butts 5b and 6a pass below the cam 24 shown

at stage E in FIG. 2, while the slider 5' in the top cylinder 2 is retracted because the butt 5'b progressively engages the faces a, b and c of the cam 30 (see also stage E in FIG. 3). If however, it is necessary to transfer the 5 needle 4 back to the top cylinder 2 to knit a rib stitch, that is latched to the top slider 1, the pattern jack 33 located in the same track 3 below the slider 6 is selected by a pattern selecting device 32 to engage the jack raising cam 31 when approaching stage D. In that case the 10 advance of the butt 33a on the pattern jack 33 up the face 31a of the cam 31 causes the upper edge 33b of the jack 33 to come into contact with the lower edge 6d of the slider portion 6 thus raising the slider 5 and the needle 4 until the butts 5b and 6a take up a position 15 shown at stage D in FIGS. 2 and 3. At the same time the associated slider 5' in the top cylinder 2 progresses along the cam 23 with the butt 5'b riding up the face 30a of the cam 30 and the butt 6'a riding up the face 23c of the cam 23, the tongue 5'c of the slider portion 5' remaining open in a position to receive the hook 11' of the needle 4 as it moves upwards attached to the slider 5 in the bottom cylinder through the action of the pattern jack butt 33a riding up the face 31a of the jack raising cam 31 as previously described.

With the butt 6' contained between the cam faces 25a and 23d, further rotation of the needle cylinders past stage D causes the butt 5'b to ride up the cam face 30b of the cam 30 thus latching the tongue 5'c of the slider 5' into the hook 11' of the needle 4. At this moment the needle is latched between the bottom slider 5 and the top slider 5'. Disengagement of the bottom slider from the needle is brought about by the action of the butt 5b riding up the face 24a of the cam 24 and the butt 6a passing below it, thus causing a camming action 30 between the two faces 5d and 6c to disengage the tongue 5c from the hook 11 as shown at FIGS. 2 and 3.

The slider 5' attached to the needle is then retracted 40 into the track T in the top cam box 7' by the action of the butt 5'b riding up the face 30c of the cam 30. Retraction of the disengaged slider 5 in the bottom cylinder 1 is initiated first by the cam face 28a acting on the butt 5b and then by the bolt cam 26 acting on the butt 5a as shown at G in FIGS. 2 and 3.

Thus all needles can be distributed between top and bottom cylinders as required and can then be moved past a knitting station to make a plain or rib stitch as desired.

50 During knitting movements the two slider portions are caused to act in unison by cams acting on the butts of each of the two slider portions. Thus for example while butts 5a, 5b and 5'a, 5'b are acted on to lower the needle to a stitch draw position, butts 6a, 6'a are acted on to move the needle to a latch clearing position. The butts 5b, 5'b, 6a and 6'a conveniently pass through a common cam track, such as cam track T after the transfer stage.

I claim:

1. In a knitting machine having coaxial needle cylinders with aligned tricks, needles slideable in said tricks and transferable from one cylinder to another, said needles having hooks at opposite ends, sliders slideable in said tricks and engageable with the needles to actuate and control the needles, and means for actuating the sliders, the improvement that each of said sliders is a composite slider comprising:

an elongate first body portion slidable lengthwise in a trick and having at one end an end face for abutting the outside on the hook of a needle in the trick, an elongate second body portion slidable lengthwise in the same trick relative to the first body portion and having at one end a hook inclined towards said end face for abutting with the inside of the needle hook, said first and second body portions fitting together in the trick to form an elongate composite slider,

10 a first butt on said first body portion adjacent the other end thereof projecting outwardly of the first and second body portions for engagement by slider actuating means to control lengthwise movement of said first body portion in the trick,

15 a second butt on said second body portion projecting outwardly of the first and second body portions for engagement by slider actuating means separately to control lengthwise movement of said second body portion in the trick, and abutment means for preventing the first and second butts moving together and maintaining them in longitudinally spaced relationship,

20 said first and second body portions being movable lengthwise relative to one another by actuation of the first and second butts between a first position in which a needle hook is held firmly between said end face of the first body portion engaging the outside of the needle hook and said hook of the second body portion engaging the inside of said needle hook, and a second position in which the hook of the second body portion is separated lengthwise from said end face of the first body portion to enable the composite slider to engage or disengage the needle hook.

25 2. In a knitting machine, a composite slider according to claim 1 in which said second body portion is disposed outwardly of said first body portion in said trick, said slider comprising cooperating means on said first and second body portions for moving said hook of said second body portion out of the path of movement of the needle hook when said first and second body portions are moved relative to one another to said second position.

30 3. In a knitting machine, a composite slider according to claim 2, in which said cooperating means comprise shoulders mutually facing sides of said first and second sliders, at least one of said shoulders being inclined, said shoulders being positioned to override one another when said first and second body portions are moved relative to one another to said second position and thereby move said hook of said second body radially outwardly of the needle cylinders.

35 4. In a knitting machine, a composite slider according to claim 1, in which said second body portion has a pointed latch guard extension and a recess for receiving a spring band.

40 5. A composite slider for a knitting machine having coaxial needle cylinders with aligned tricks, needles slidable in said tricks and transferable from one cylinder to another, said needles having hooks at opposite ends, said slider comprising:

45 an elongate first body portion longitudinally slidable in a needle cylinder trick and having at one end an end face for abutting the outside of a hook of a needle in the trick and adjacent the other end a first

actuating butt for moving said first body longitudinally in the trick, and an elongate second body portion overlapping said first body portion and longitudinally slidable in the same trick, said second body portion having at one end a hook for abutting the inside of the same hook of the needle in the trick and having a second actuating butt for moving said second body portion longitudinally in the trick and longitudinally relative to said first body portion,

50 said first and second butts projecting outwardly of said first and second body portions for engagement by slider actuating means separately to control lengthwise movement of said first and second body portions in said trick,

means for limiting relative lengthwise movement of said first and second body portions to maintain said first and second butts in lengthwise spaced relation to one another,

55 said first and second body portions fitting together to form an elongate composite slider and being movable longitudinally relative to one another by said actuating butts between a first position in which a needle hook is held firmly between said end face of the first body portion engaging the outside of the needle hook and said hook of the second body portion engaging the inside of the needle hook, and a second position in which said hook of the second body portion is separated lengthwise from said end face of the first body portion to enable the composite slider to engage or disengage the needle hook.

60 6. A composite slider according to claim 5, in which said second body portion overlies said first body portion in the trick with an inner longitudinal side of the second body portion slidably engageable with an outer longitudinal side of the first body portion and in which a cam portion on the inner longitudinal side of the second body portion is positioned to override a cooperating cam portion on the outer longitudinal side of the first body portion to move said hook of the second body portion radially outwardly of the needle cylinder so as to be located out of the path of movement of the needle hook when said first and second body portions are moved longitudinally relative to one another to said second position.

65 7. A composite slider according to claim 5, in which said second body portion has a third actuating butt located between said second actuating butt and said hook.

8. A composite slider according to claim 5, in which said second body portion has a point latch guard extension and a recess for receiving a spring band.

9. A superposed cylinder type knitting machine having coaxial needle cylinders with aligned needle tricks, double hook latch needles in said tricks and composite sliders for actuating said needles.

60 each of said sliders comprising an elongate first body portion longitudinally slidable in a needle cylinder trick and having at one end an end face for abutting the outside of a hook of a needle in said trick and adjacent the other end a first actuating butt, an elongate second body portion overlapping said first body portion and longitudinally slidable in the same trick, said second body portion having at one end a hook for abutting the inside of the same needle hook and having a second actuating butt, and

said first and second butts projecting radially outwardly of said first and second body portions for engagement by slider actuating cams separately to control lengthwise movement of said first and second body portions in said trick, 5 means for limiting relative lengthwise movement of said first and second body portions to maintain said first and second butts in lengthwise spaced relation to one another, a cam system comprising cams engageable with said 10 actuating butts to move said first and second body portions longitudinally in said trick and longitudinally relative to each other between a first position in which a needle hook is held firmly between said end face of the first body portion abutting the outside of the needle hook and said hook of the second body portion, and a second position in which said hook of the second body portion is separated lengthwise from said end face of the first body portion to enable the composite slider to engage or dis- 15 engage the needle hook.

10. A knitting machine according to claim 9, in which said second body portion overlies said first body portion in the trick with an inner longitudinal side of the second body portion slidably engageable with an 20 outer longitudinal side of the first body portion, said second body portion having on said inner side a cam portion engageable with a cooperating cam portion on said outer side of the first body portion to move said hook of the second body portion radially outwardly of 25 the needle cylinder so as to be located out of the path of movement of the needle hook when said first and second body portions are moved longitudinally relative to one another to said second position.

11. A knitting machine according to claim 9, in which a third actuating butt is provided on the second body portion between said second butt and said hook. 30

12. A knitting machine according to claim 9, in which the second body portion has a pointed latch guard extension with a recess on the radially outer side of said extension, and in which a spring band surrounding the needle cylinder is received in said recess to urge the second body portion radially inwardly of the needle cylinder. 45

13. A composite slider for a knitting machine having coaxial needle cylinders with aligned tricks, needles slidable in said tricks and transferable from one cylinder to another, said needles having hooks at opposite ends, said slider comprising:

14. A composite slider according to claim 13, in which said hook of said second body portion is inclined toward said end face of said first body portion for abutting with the inside of the needle hook. 50

an elongate first body portion longitudinally slidable in a needle cylinder trick and having at one end an 55

end face for abutting the outside of a hook of a needle in the trick and adjacent the other end a first actuating means for moving said first body longitudinally in the trick, and an elongate second body portion overlapping said first body portion and longitudinally slidable in the same trick, said second body portion having at one end a hook for engaging in the same hook of the needle in the trick and having a second actuating means for independently moving said second body portion longitudinally in the trick and longitudinally relative to said first body portion, said first and second body portions fitting together to form an elongate composite slider and being slidably longitudinally relative to one another by said actuating means between a first position in which a needle hook is held between said end face of the first body portion engaging the outside of the needle hook and said hook of the second body portion engaging in the same needle hook, and a second position in which said hook of the second body portion is separated lengthwise from said end face of the first body portion sufficiently to enable the composite slider to engage or disengage the needle hook,

said first body portion and second body portion having cooperating cam portions for moving the hook of the second body portion radially outwardly of the needle cylinder so as to be located out of the path of movement of the needle hook when said first and second body portions are moved longitudinally relative to one another to said second position.

15. A composite slider according to claim 13, in which said first actuating means comprises an actuating butt on said first body portion and said second actuating means comprises an actuating butt on said second body portion, said butts projecting outwardly for engagement individually by slider actuating cams separately to control lengthwise movement of said first and second body portions in said trick. 50

16. A composite slider according to claim 15, further comprising means for limiting lengthwise movement of said first and second body portions relative to one another to maintain said first and second butts in lengthwise spaced relation to one another.

17. A composite slider according to claim 13, in which said second body portion is disposed outwardly of said first body portion in said trick, said slider comprising cooperating means on said first and second body portions for moving said hook of said second body portion outwardly when said first and second body portions are moved relative to one another to said second position.

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