Sept. 23, 1952 H. DIEM 2,611,253

PATTERN DEVICE FOR CIRCULAR KNITTING MACHINES

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Fig. 1

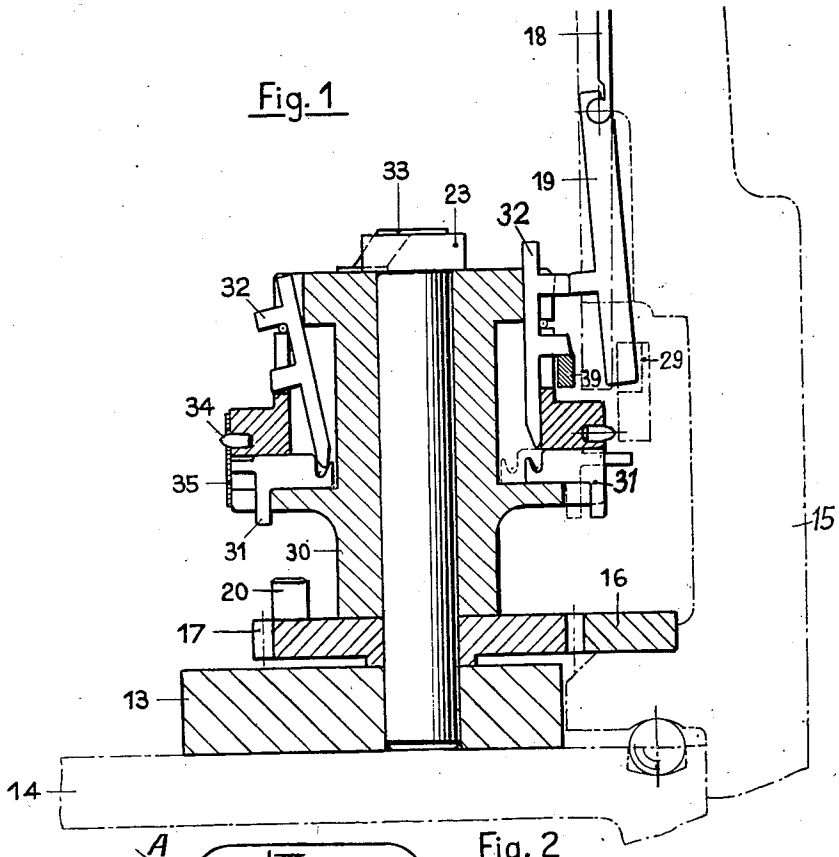
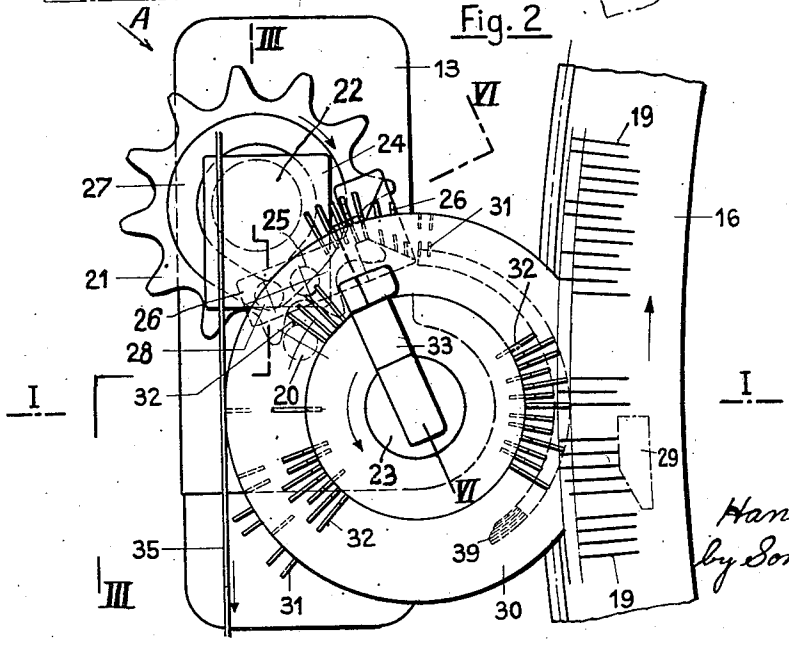


Fig. 2



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Fig. 3

Fig. 5

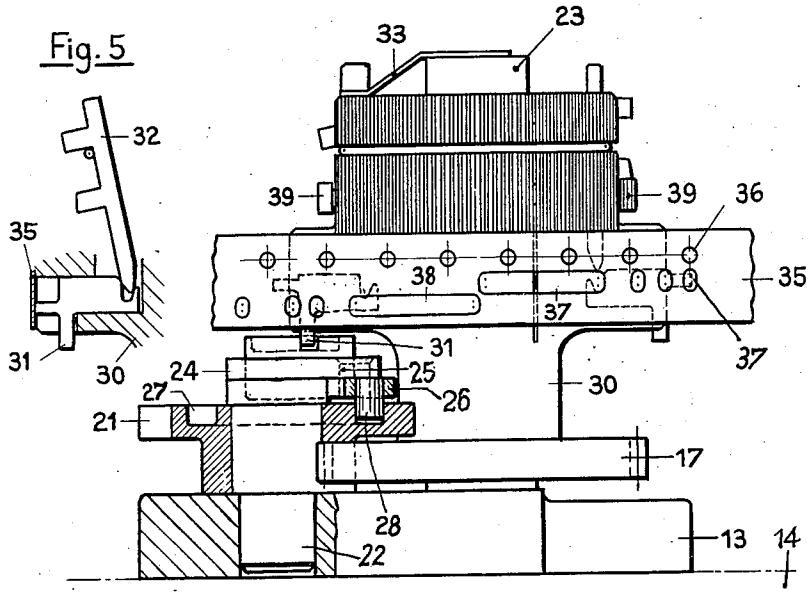
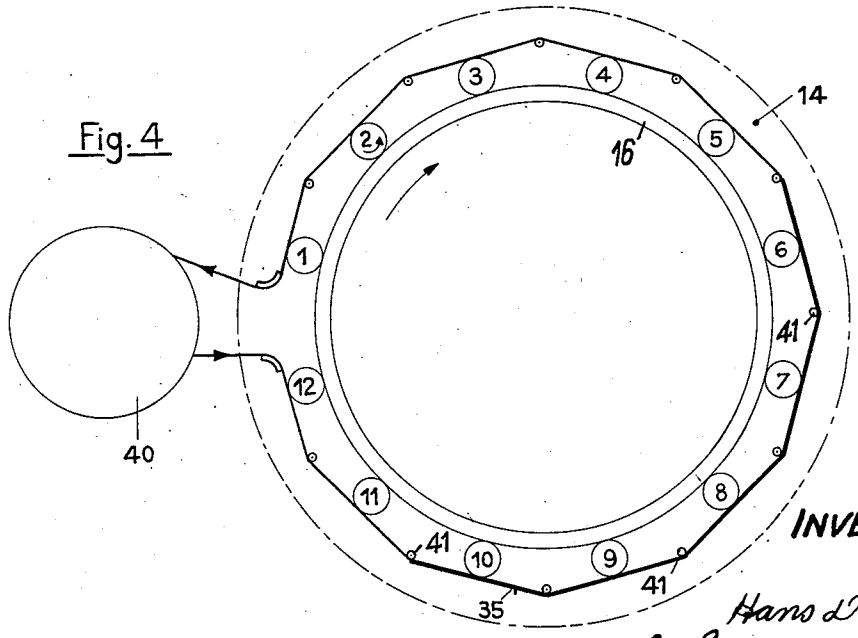


Fig. 4



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Fig. 6

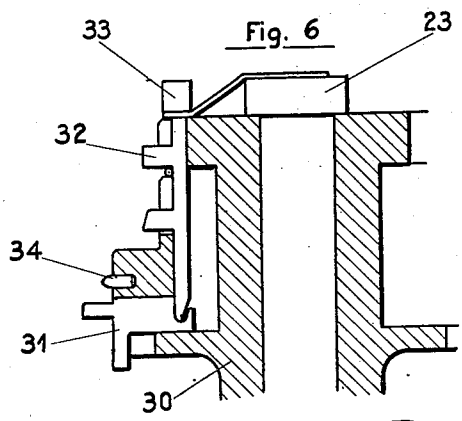


Fig. 7

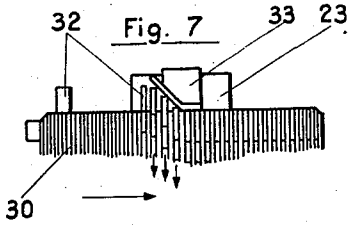


Fig. 8

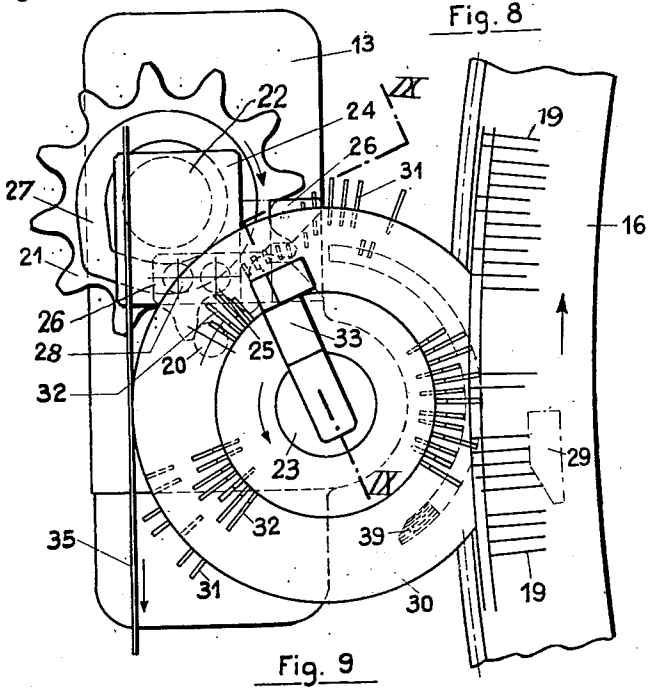
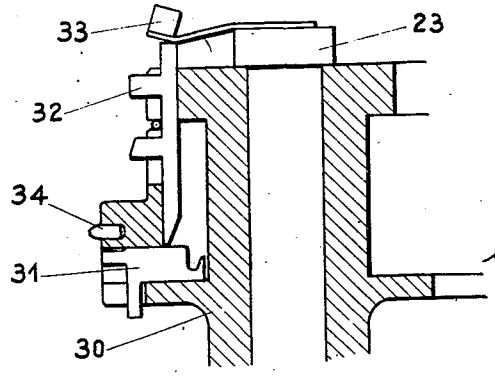


Fig. 9



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Fig. 11

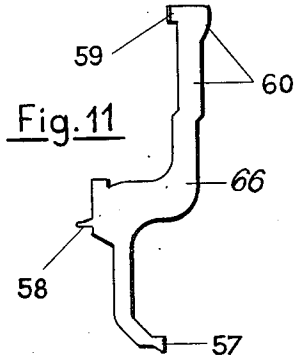


Fig. 10

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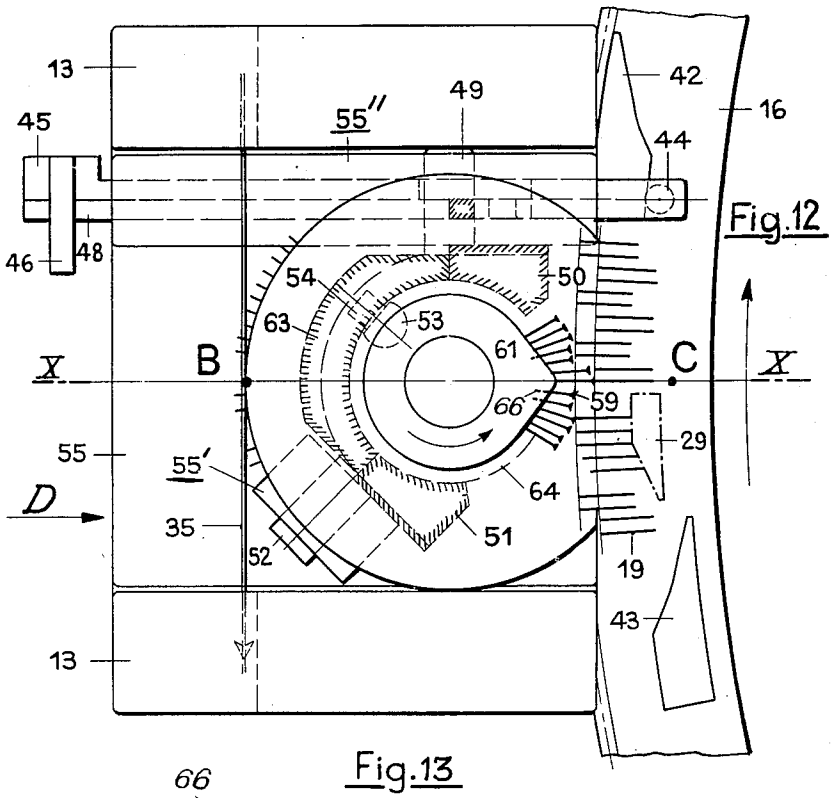
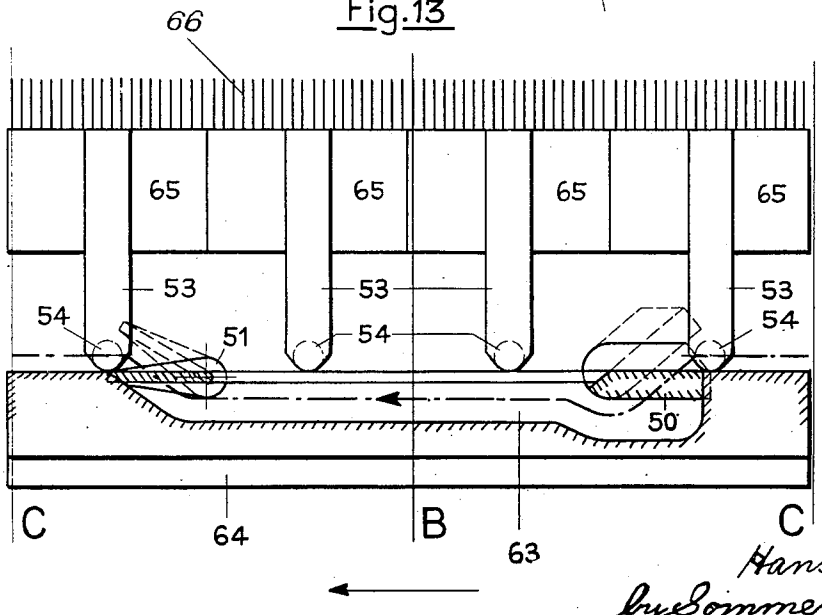


Fig.12

Fig.13



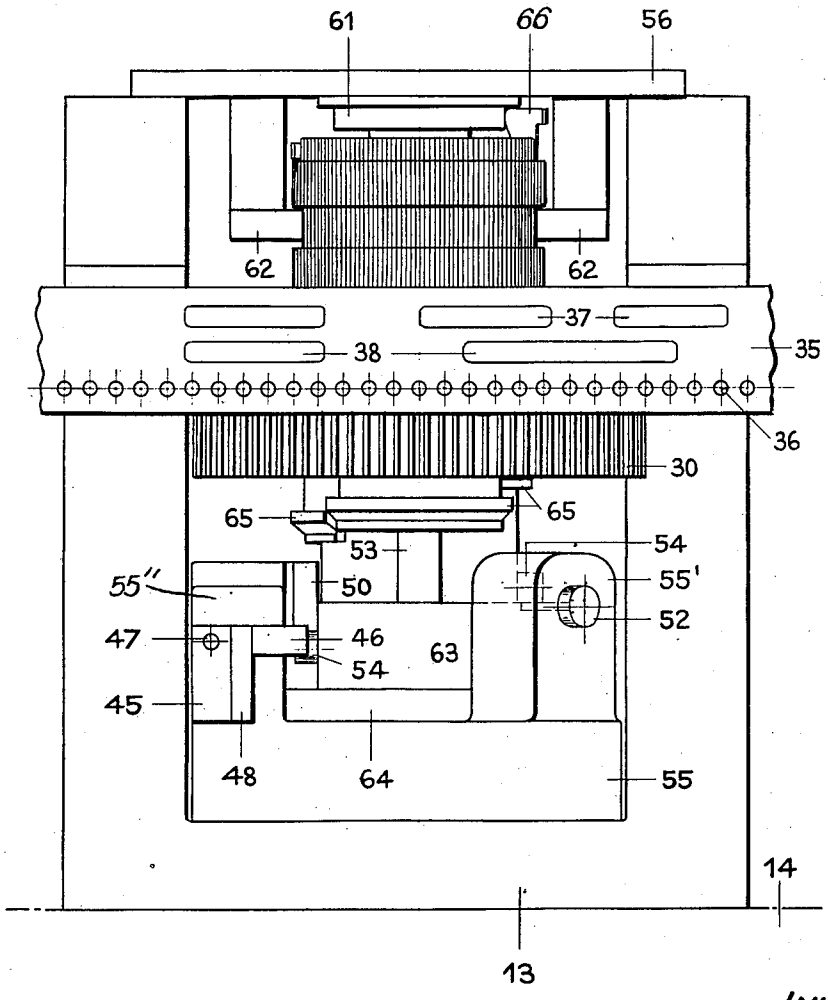
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PATTERN DEVICE FOR CIRCULAR KNITTING MACHINES

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Fig. 14



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UNITED STATES PATENT OFFICE

2,611,253

PATTERN DEVICE FOR CIRCULAR KNITTING MACHINES

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Application June 9, 1947, Serial No. 753,515
In Germany February 15, 1943

Section 1, Public Law 690, August 8, 1946
Patent expires February 15, 1963

8 Claims. (Cl. 66—50)

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The present application is in the nature of a continuation in part of my earlier copending application Serial No. 522,472 filed on February 15, 1944 which is now abandoned.

Pattern mechanisms comprising pattern wheels or tapes, are generally used in circular knitting machines for manufacturing fancy looped fabrics. Such pattern mechanisms either are disposed at each feeder or patterning station, in which case they may be called partial pattern mechanisms, or one mechanism only is provided for all the said feeders or stations.

My invention relates to a pattern mechanism for the needles of multi-feeder circular knitting machines, which comprises a plurality of partial pattern mechanisms each associated with a feeder. A wide variation of patterns is afforded in that selector means disposed in the pattern wheels, are adjusted by pattern means.

In accord with my present invention I provide a pattern tape common to all the feeders, by means of which selectors disposed in the pattern wheels, are adjusted according to the pattern at hand, are maintained in their selective or working position, respectively, during at least one revolution of the pattern wheel, and thus act continuously on to the needles or jacks of the machine respectively until the pattern tape gives origin to another selective position of the selectors.

In the accompanying drawing two forms of invention are illustrated, partially schematically, as applied to a circular knitting machine, having a single set of needles and a rotary cylindrical bed, a jack being associated with each selector in the first example, but not in the second example. In the drawings—

Fig. 1 shows a first example in vertical section through a partial pattern mechanism, on line I—I of Fig. 2,

Fig. 2 a top plan view of Fig. 1,

Fig. 3 an elevation and section on line III—III of Fig. 2,

Fig. 4 schematically, a top plan view of the machine having twelve feeders or partial pattern mechanisms respectively, with a pattern tape common to all the feeders,

Fig. 5 a selector jack of different design,

Fig. 6 a pattern wheel in vertical section on line VI—VI of Fig. 2,

Fig. 7 a partial view in direction of the arrow A in Fig. 2,

Fig. 8 a top plan view of Fig. 1 in which, however, the operative state of the partial pattern mechanism is different from that shown in Fig. 2,

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Fig. 9 a vertical section through the pattern wheel on line IX—IX of Fig. 8,

Fig. 10 a vertical section of the second example, through a partial pattern mechanism on line X—X of Fig. 12,

Fig. 11 a selector of different design,

Fig. 12 a top plan view of Fig. 10, a cover plate provided with control cams, being omitted,

Fig. 13 the portions of a composite control-structure, developed about point B of Fig. 12, in working position and as seen from the inside, and appurtenant actuating elements, and

Fig. 14 a view in direction of the arrow D in Fig. 12.

In the first example (Figs. 1–9) 1—12 (Fig. 4) designate a partial pattern mechanism each of a jacquard circular knitting machine comprising twelve feeders, 13 the base of such partial pattern mechanism, rigidly secured to the table top 14 (Figs. 1, 4), 15 (Fig. 1) the rotatable needle cylinder comprising the toothed rim 16 for actuating the gear wheel 17 of each partial pattern device. The needles 18 of cylinder 15 are hingelike engaged to a jack or pusher 19 each. Numeral 20 indicates a stud rigidly secured to gear wheels 17 and intermittently engaging a pinion 21 for the purpose of turning same for one tooth division at each revolution of gear wheel 17. Numerals 22 and 23 indicate the pivots of pinion 21 and pattern wheel 30 respectively which are rigidly secured in base 13, pattern wheel 30 being rigidly mounted on gear wheel 17. A plate 24 is rigidly secured to pivot 22, and comprises the pivot 25 of a bell-crank lever 26.

Numeral 27 indicates a cam or guide groove in pinion 21 for engaging a stud 28 of bell-crank lever 26 for the purpose of setting the jacks 31 which are disposed radially displaceable on pattern wheel 30, each jack coacting with a selector 32. Numeral 29 designates one of the cams secured to the conventional cam-box, known per se, at each feeder, which brings all the jacks 19 into working position (see Fig. 1 in dash and dot) before same are brought into their position of rest, as defined by the pattern, by means of the selectors 32.

A leaf spring 33 is rigidly secured to pivot 23, for the purpose of bringing the selector 32 disposed in pattern wheel 30 into their initial position according to Fig. 6, after the appurtenant jacks 31 again have been brought into the initial position by bell-crank lever 26.

Numeral 34 (Fig. 1) indicates guide pins secured to pattern wheel 30, for engaging a series

of perforations 36, and 37, 38 (Fig. 3) are cuts in pattern tape 35.

At each feeder, a cam or stop 39 (Figs 3, 8) is secured to the conventional cam-box. The pattern-tape casing is designated by 40 (Fig. 4), and the guide rolls for the pattern tape 35 by 41.

Three positions are envisaged for the selectors 32, viz. the position of rest and the working position, as shown in Fig. 1 in the left hand and the right hand portions respectively of pattern wheel 30, as well as the initial position shown in Fig. 6.

The machine operates as follows:

Each partial pattern mechanism 1—12 is rotated in the same direction by means of the gear wheels 17 meshing with toothed rim 16 of needle cylinder 15, which latter continuously rotates in a direction indicated in Figs. 2, 4, and 8 by an arrow. The endless pattern tape 35 is continuously moved along by the guide pins 34 provided in pattern wheels 30, the said tape being, as known, spirally wound and unwound in casing 40. At the start of the operation, all the selectors 32 are adjusted as required, during the first revolution of pattern wheels 30 by means of pattern tape 35 and the jacks 31. In Fig. 1, in the left hand portion of the pattern wheel 30, the jack 31 and the selector 32 are shown in the position of rest, assuming that pattern 35 at the respective point does not present a cut 37 to the jack 31, so that the latter, and thus the respective selector 32, are moved by pattern tape 35 toward the center of pattern wheel 30. In this depressed position of parts 31 and 32, the lower lug of selector 32, when turning pattern wheel 30, is outside the range of cam or stop 39.

Jack 31 and selector 32 remain in such latter position during at least one revolution of pattern wheel 30, until they are moved (according to Fig. 2) again into their initial position (shown in Fig. 6) and thus into the range of pattern tape 35. When selector 32 is in the position of rest, its top lug is outside the range of jack 19, and the needle 18 coupled to the latter remains in working position, in that jack 19 in cylinder 15 is not depressed into its guide groove, and its lug thus is within the range of the cams. In Fig. 1, in the right hand portion of pattern wheel 30, the jack 31 is in working position, and also the selector 32; the pattern tape 35 at the corresponding point has a cut 37 so that jack 31 and selector 32 are not moved by the pattern tape 35 toward the center of pattern wheel 30, i. e. jack 31 and selector 32 are not depressed. When pattern wheel 30 rotates, the lower lug of selector 32 comes within the range of the stop 39, whereby selector 32 is vertically lifted and brought into the position shown; when the lower selector lug has moved out of range of stop 39, jack 31 according to Fig. 8 is slid toward the center of pattern wheel 30 by bell-crank lever 26 which coacts with its lower lug, and thus, according to Fig. 9, underneath selector 32. Jack 31 and selector 32 remain in such latter position until the former is moved by bell-crank lever 26, and the latter (as shown in Fig. 2) by a skew face of spring 33 back into the initial position (Fig. 6) and thus into the range of pattern tape 35. In the corresponding vertical and raised position of selector 32 (Figs. 1, 9), its upper lug engages that of jack 19, in order to bring needle 18 coupled therewith, into the position of rest, in which jack 19 is depressed into its groove by the top lug of selector 32, and thus into a position outside the range of the cams 29.

The number of jacks 31 and selectors 32 disposed in pattern wheel 30, corresponds to a fraction of the number of needles 18 of cylinder 15; and the spacing of pattern wheels 30 corresponds to the length of a series of cuts 37 and 38 respectively, of pattern tape 35, which series brings about the adjustment of the selectors 32 provided on the pattern wheel 30. In the present example, the number of selectors 32 for each pattern wheel 30 amounts to one-twelfth of the number of needles so that each pattern wheel 30, therefore, rotates twelve times during one revolution of cylinder 15 and pattern tape 35, for the purpose of selecting the jacks 19 and thus the needles 18. During eleven revolutions of each pattern wheel 30, the adjustment of the selectors 32 by the pattern tape 35, effected during the first revolution of wheel 30, remains intact. During the thirteenth revolution of each pattern wheel 30, all the selectors 32 and jacks 31 are pushed, as will be explained more fully later, by bell-crank lever 26 (Fig. 2), and spring 33, which latter is provided with an inclined guide face, into the initial position shown in Fig. 6 so that jacks 31 subsequently coact with a series of cuts 37 of pattern tape 35 to again move the selectors 32 into the selective position.

Bell-crank lever 26 is engaged and disengaged, at any desired time intervals or respectively after a certain number of revolutions of the respective pattern wheel 30, by means of control groove 27 of pinion 21. Stud 20 secured to gear wheel 17, during each revolution is engaged in an interdental gap of pinion 21 and turns the latter, in the present example, by a tooth division. After each twelfth actuation, bell-crank lever 26 is swung, during a revolution of pattern wheel 30 and by means of stud 28 sliding in control groove 27, into the working position according to Fig. 2 so that the jacks 31 or selectors 32 respectively, may mesh with pattern tape 35.

During the first revolution of pattern wheels 1—12, the pattern tape 35 acts onto the jacks 31 or selectors 32 respectively, which are to be selected. After such first revolution of pattern wheels 1—12, the jacks 31, according to Fig. 8, are held out of range of the pattern tape by bell-crank lever 26 during the other eleven revolutions, whereas the selectors 32 remain in their working position according to Fig. 9.

By virtue of such engaging and disengaging of the jacks 31, taking place at predetermined time intervals, one attains a continuous uniform movement of the endless pattern tape 35. In order to ensure a reliable and positive selection of jacks 31, the cuts 37 and 38 in pattern tape 35 are so spaced and disposed, that each group of cuts 37 and 38 respectively may act only unto the jacks 31 of a certain partial pattern mechanism. To such end, the horizontal lug of jacks 31, which have to be brought into mesh with pattern tape 35, are correspondingly staggered in two consecutive partial pattern mechanisms. Fig. 5 shows a jack 31 having a horizontal lug which is staggered with respect to that of the jacks 31 shown in Fig. 1 etc.

In the second example (Figs. 10—14), like parts and portions are designated by like numerals as in the first example, jack and selector, however, being formed by a single working element which is correspondingly adapted.

Two cams or stops 42 and 43 (Fig. 12) are rigidly secured to the toothed rim 16, to coact with stud 44 of a latch 45, and an arm 46 is pivoted to latch 45 on pin 47 (Fig. 14), which

arm serves for coupling latch 45 with a slide 48 in order to automatically actuate element 50 which is pivoted on pin 49 (Fig. 12) in the pedestal support 55 for the pattern wheel having a supporting eye 55', and a supporting wall 55''.

An actuating element 51 (Figs. 12, 13) is pivoted on pin 52 in a bearing block of support 55, and is actuated by the studs 54 mounted on the slide members 53. The cover plate 56 is mounted on base 13. The numeral 57 indicates the butt, 58 and 59 the lugs, and 60 the stem top portion of selector 66. Numeral 61 indicates a cam disc, and 62 the cams which are rigidly mounted to the underside of cover plate 56 and serve for coercively guiding the selectors 66 which are in their operating position. A segment 63 is provided for guiding the studs 54, and a bush 64 having an upper control rim (Fig. 14); bush 64, segment 63 and support 55 form a single structure. Numeral 65 indicates a control structure comprising four portions, each latter being secured on a slide member 53 guided displaceable in pattern wheel 30.

Such latter partial pattern mechanism for a jacquard circular knitting machine having a plurality of feeders, operates as follows:

At each feeder, pattern wheel 30 of a partial pattern mechanism is continuously rotated by the toothed rim 16 of needle cylinder 15, by means of gear wheel 17, in the direction indicated in Fig. 12; at the same time the endless pattern tape 35 is moved continuously by means of the guide pins 34 provided in pattern wheel 30.

During the first revolution of pattern wheel 30, the control structure 65 which comprises four portions first moves all the selectors 66 into the initial position. To such end, latch 45 (Fig. 12) is displaced, when turning toothed rim 16, by the cam or stop 42 which acts on the stud 44, and thus also slide 48 which is coupled to latch 45 by means of arm 46. Slide 48 thus is swung to the right, with respect to Fig. 12, and element 50, therefore, is rocked from its horizontal position (shown in full lines in Fig. 13) into the oblique position indicated by dotted lines. The studs 54, guided on the curved control rim of bush 64, then slide underneath element 50 in a path indicated by a dot-and-dash arrow. The control structure 65, as well as all the selectors 66 disposed in pattern wheel 30, thus are moved from the operative position (shown in Fig. 12 at point C, and in Fig. 10 in the right-hand portion of the pattern wheel) into the initial position (shown at point B in Fig. 12, and in Fig. 10 in the left-hand portion of the pattern wheel). The bottom butt 57 provided on each selector 66, serves for displacing the selector by means of the control structure 65 from the selective into the operative position, and from the latter into the initial position. The said butt 57 further serves for locking selector 66 in its operative position by control structure 65. Under the action of the camming curves formed by disc 61 and cams 62, onto the correspondingly adapted stem top portion 60 of selector 66 (which is in operating position) the latter is continuously subjected, as shown in Fig. 10 (right hand portion of the pattern wheel) to a certain coercive tilting movement, which permits of attaining a positive selection of needles 18, or, respectively, the jacks 19 on jacquard circular knitting machines of any diameter and division. To such end, further, the selector 66 is provided with the head lug 59 for depressing jack 19 in needle cylinder 15 (vide Fig. 10, right-hand portion of pattern wheel 30) and thus moving same out of range of the feeders.

At point B (Fig. 12) the selectors 66 are selected by pattern tape 35; and these selectors arranged opposite cuts 37 or 38 of pattern tape 35 remain in the initial position. Those selectors 66 which are not opposite cuts 37 or 38 of the pattern tape are moved by the latter into the position shown by dash-and-dots in the left hand portion of the pattern wheel in Fig. 10, i. e. from the initial into the selective position. Upon further rotation of pattern wheel 30 in direction of the arrow from B to C (Figs. 12 and 13), the control structure 65 is moved by bush 64 into the operating position (right-hand portion of the pattern wheel in Fig. 10), whereby also all the selectors 66 which have been depressed into the selective position by pattern tape 35, are moved into the operative position. Upon completing a revolution of pattern wheel 30, all of the selectors 66 have been adjusted, as required, by pattern tape 35 and control structure 65. Latch 45, slide 48 and actuating element 50 then again are brought into the initial position (shown in Fig. 13) under action of cam or stop 43 on stud 44. The portions or components of control structure 65 and the selectors 66 actuated by the latter, therefore, remain for the time being, in operating position, i. e. until a new selection of the selectors is taking place, in the manner provided for and after a predetermined time interval. It is possible, however, either to change the selective position of the selectors continuously, i. e. after each revolution of pattern wheel 30, or to maintain the said selective position by disengaging slide 48 from latch 45 by means of arm 46.

The individual control portions or components produced by subdividing control structure 65, are actuated by element 50 and by the curved top control rim of bush 64 in accurately determined time intervals, and the selectors 66 associated therewith thus also are positively adjusted without the need of any intermediate position.

In order to ensure a reliable selection of the selectors 66, the cuts 37 and 38 in pattern tape 35 are so punched in two rows that a group of cuts each is destined for the selectors of one certain partial pattern mechanism only. To such end, the lugs 58 of selectors 66 which have to be brought to mesh with pattern tape 35, are staggered in two consecutive partial pattern mechanisms. The selector 66 shown in Fig. 11 possesses a lug 58 which is offset or staggered with respect to the selector 66 shown in Fig. 10 said lug being engaged by pattern tape 35.

What I claim and desire to secure by Letters Patent is:

1. A pattern mechanism for controlling the needles of a circular knitting machine of the class described and including a plurality of partial pattern mechanisms continuously operated by gear means, each mechanism being associated with a feeder or working station, comprising a single pattern tape, a base, a pattern wheel for each said feeder or station pivoted on said base, a plurality of selectors mounted radially and longitudinally displaceable in each pattern wheel, means for moving the said selectors in sequence into an inoperative, an initial, and an operative or working position respectively, according to the pattern punched into the said pattern tape, means for holding each said position during at least one revolution of the respective pattern wheel to permit of correspondingly and continuously controlling the needles on the rotary cylin-

drical needle bed of the machine until the said pattern tape will bring about another operative position of said selectors.

2. In a pattern mechanism set forth in claim 1, a partial pattern mechanism, comprising a selector and associated jack for each needle to be selected, a pinion pivoted to the said base and adapted to be turned by one tooth space at each revolution of said pattern wheel, a guide groove provided on the top face of said pinion, a plate secured to the head of the pivot on which the said pinion rotates, a bell-crank lever pivoted to and guided by said plate and provided with a cam groove for engaging the said selector jacks, a stud rigidly secured to said bell-crank lever for engagement in said guide groove to radially displace said selector jacks during each revolution of the pattern wheel from the inoperative into the initial position, a cam box having a cam adapted to raise said selectors into the operative position and a leaf spring rigidly secured to the top of the pattern wheel and adapted to depress the said selectors from the operative into the initial position; the whole in such combination as to move the selectors into the said positions either individually or collectively.

3. In a pattern mechanism as set forth in claim 1, a single pattern tape having a plurality of rows, openings therein arranged according to a desired pattern, each of said rows of openings being positioned to set only selectors of certain definite partial pattern mechanisms.

4. In a pattern mechanism set forth in claim 1, a partial pattern mechanism, comprising a pattern wheel, a plurality of selectors to be selected and mounted in the pattern wheel, slide members guided displaceably in the pattern wheel, a control structure secured to one of the said slide members and adapted to move the latter for the purpose of actuating the selectors and the knitting needles, cam means for engaging and moving said slide members vertically, and latching means for locking the moved selectors in their adjusted position.

5. In a pattern mechanism set forth in claim 1, a jack for each needle, a partial pattern mechanism, comprising a selector each adapted to directly move the jack of each needle to be selected, and means for adjusting according to a predetermined pattern all the selectors in the pattern wheel by means of the pattern tape.

6. In a pattern mechanism set forth in claim 1, a jack for each needle, a partial pattern mechanism, comprising a selector each adapted to directly move the jack of each needle to be selected, means for adjusting according to a predetermined pattern all the selectors in the pattern wheel by means of the pattern tape, latch means for locking the selectors in the operative position, slide means for displacing the selectors from the initial into the operative position, and a butt on each selector for effecting the said locking and displacing operations and adapted to co-operate with said control structure.

7. In a pattern mechanism set forth in claim 1, a jack for each needle, a partial pattern mechanism, comprising a selector each adapted to directly move the jack of each needle to be selected, means for adjusting according to a predetermined pattern all the selectors in the pattern wheel by means of the pattern tape, latch means for locking the selectors in the operative position, slide means for displacing the selectors from the initial into the operative position, a butt on each selector for effecting the said locking and displacing operations and adapted to co-operate with said control structure, a lug on the head of each selector and adapted to engage the needle jack.

8. In a pattern mechanism set forth in claim 1, a jack for each needle, a partial pattern mechanism, comprising a selector each adapted to directly move the jack of each needle to be selected, and means for adjusting according to a predetermined pattern all the selectors in the pattern wheel by means of the pattern tape, the latter including a plurality of portions mounted displaceably in the pattern wheel for the purpose of adjusting said selectors.

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No references cited.