

[54] **APPARATUS FOR POSITIONING JACKS IN SLOTTED PATTERN WHEEL RINGS ACCORDING TO A PREDETERMINED PATTERN**

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[52] U.S. Cl. **66/1 R, 66/50 A**

[51] Int. Cl. **D04b 37/04**

[58] Field of Search **66/1 R, 50 A; 197/82**

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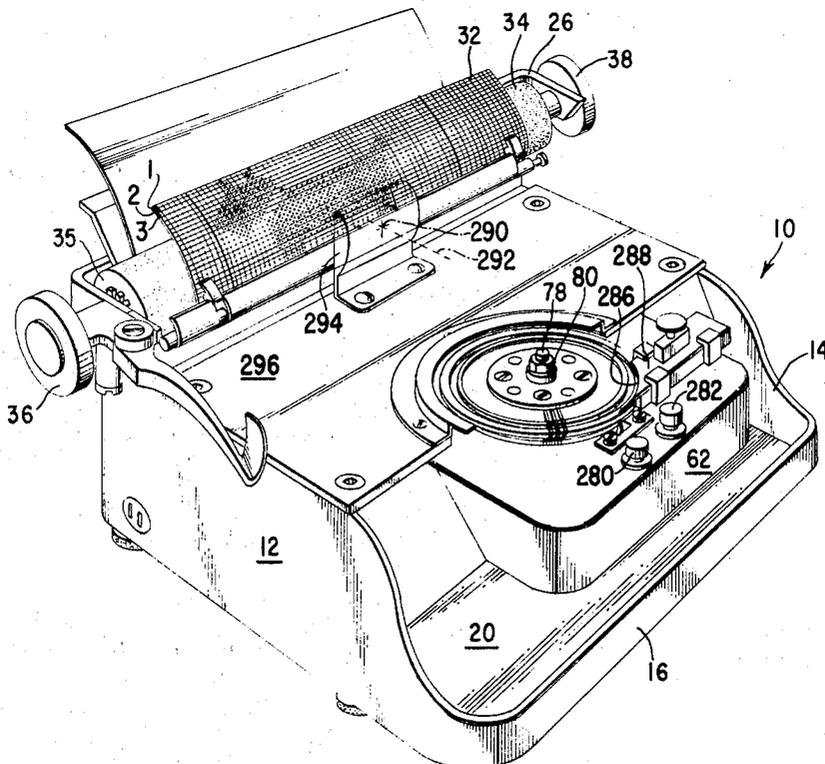
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Primary Examiner—Wm. Carter Reynolds
Attorney, Agent, or Firm—Marshall J. Breen; Chester A. Williams, Jr.; William V. Ebs

[57] **ABSTRACT**

A carriage is provided to carry a paper, card or the like on which a jack position is indicated for each of the slots of pattern wheels to be used in knitting a patterned cloth. Indexing movements are imparted to the carriage (or to a marker or pointer) to successively align consecutive jack indications for a selected wheel with the marker or pointer and also to a rotatably mounted pattern wheel ring in which, jacks are to be set, to consecutively register successive slots of the ring with a jack actuator, the indexing movements being so controlled that each indexing movement of the carriage (or marker or pointer) is accompanied by an indexing movement of the ring, and the jack actuator may be operated according to the indications in alignment with the pointer or marker to set jacks in the wheel.

9 Claims, 13 Drawing Figures



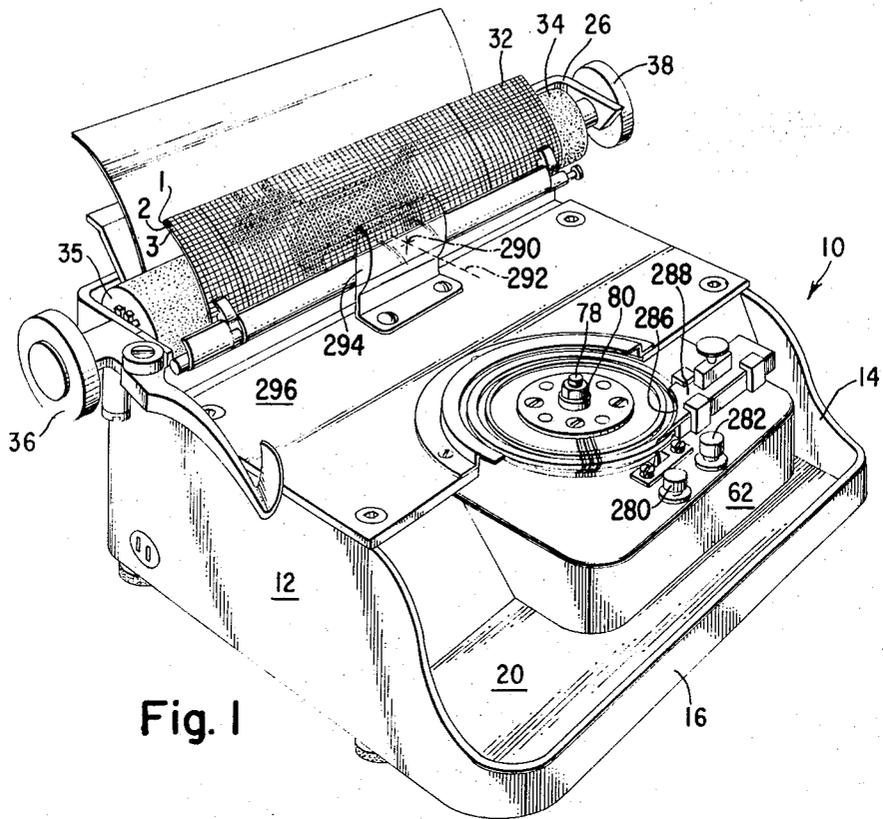


Fig. 1

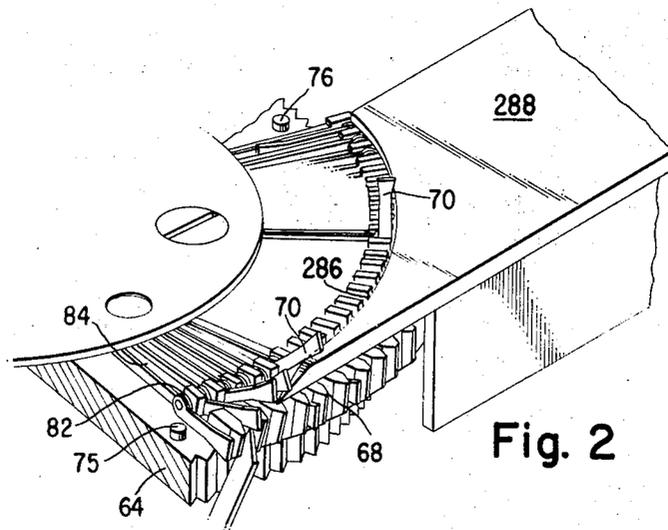


Fig. 2

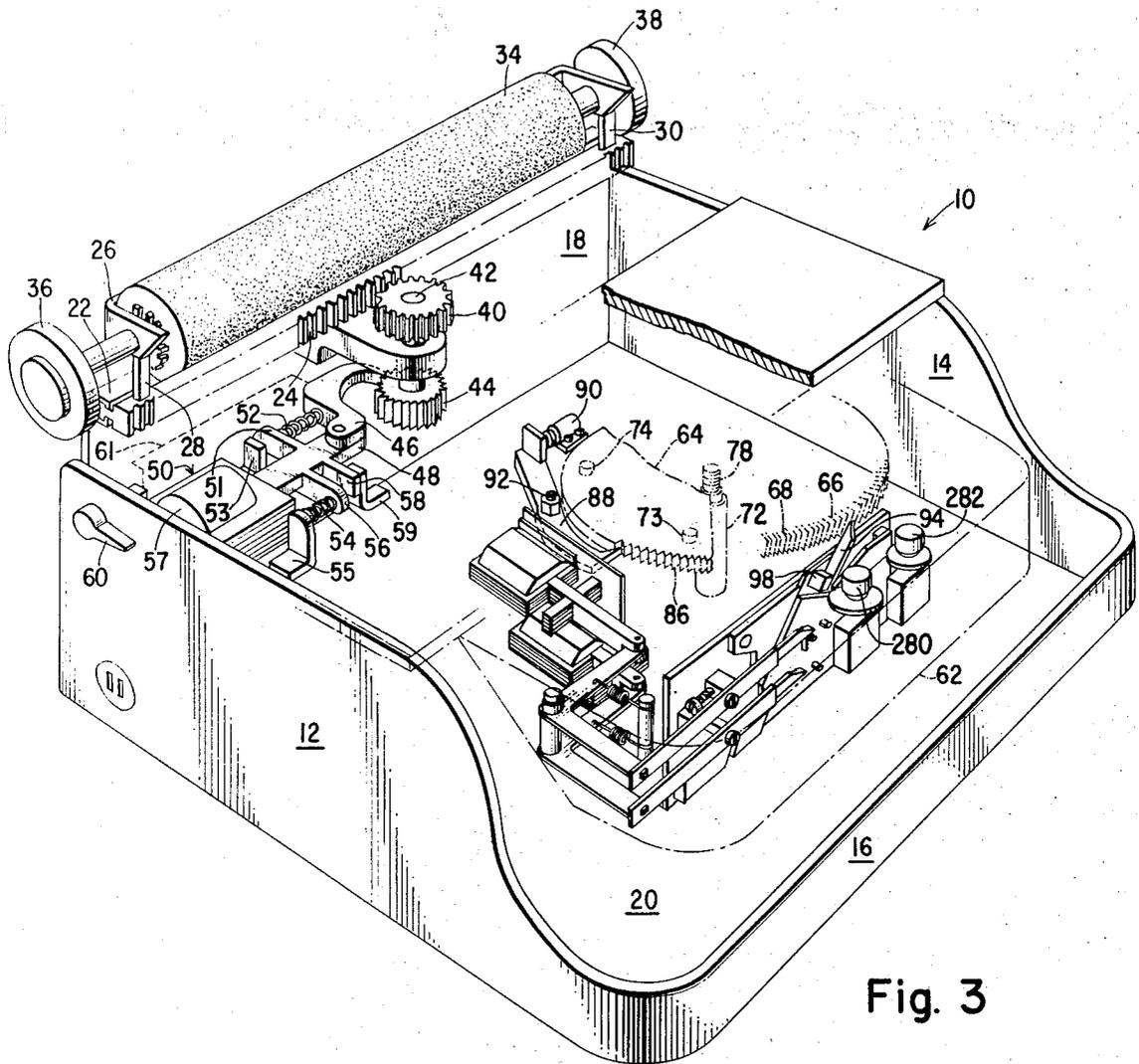


Fig. 3

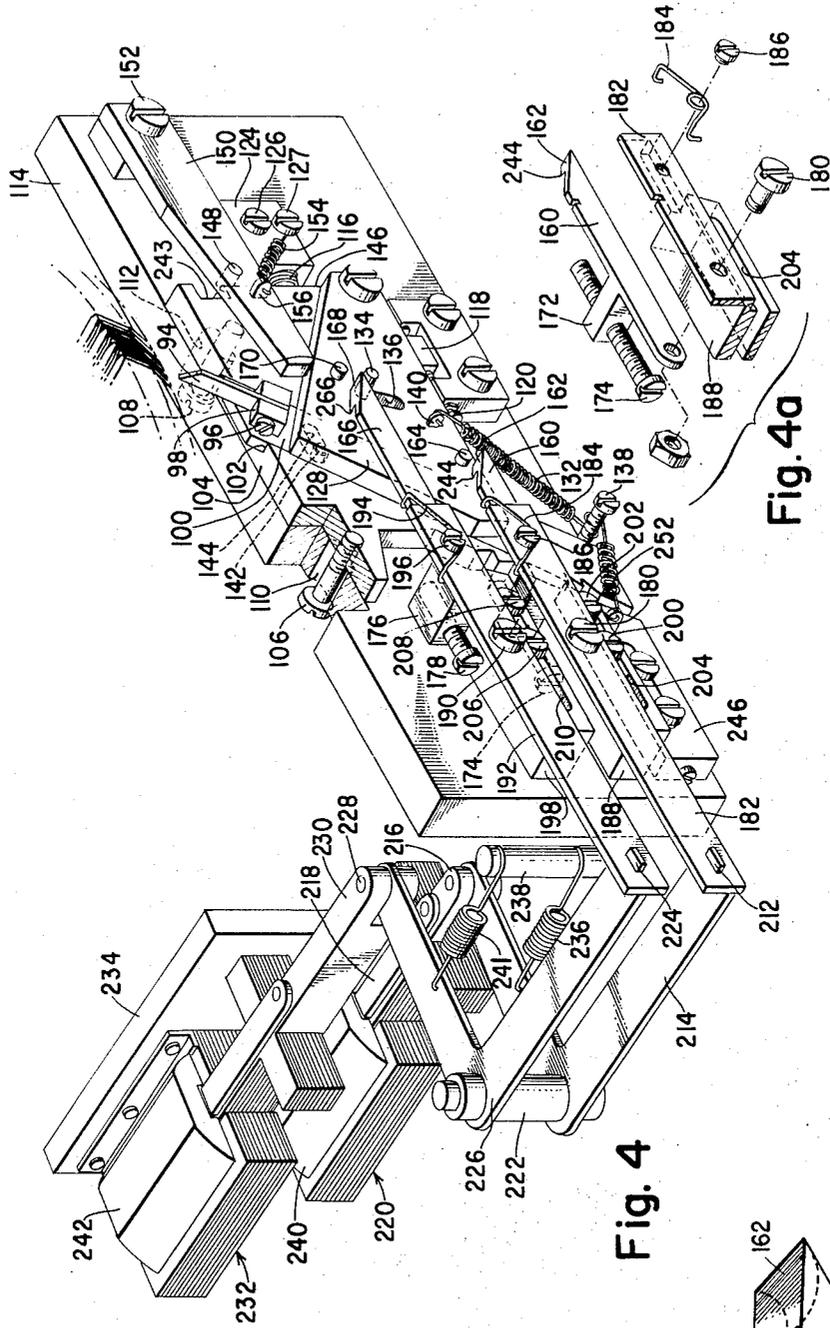


Fig. 4a

Fig. 4

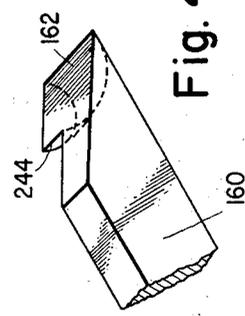


Fig. 4b

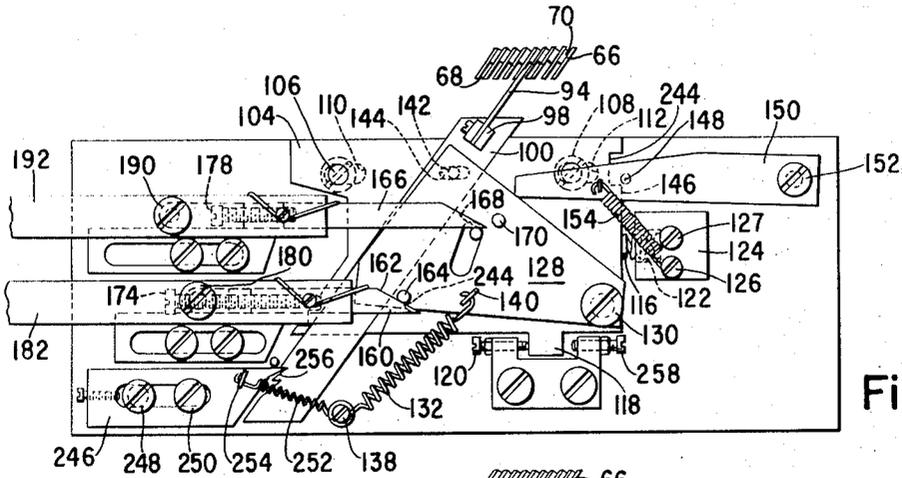


Fig. 5

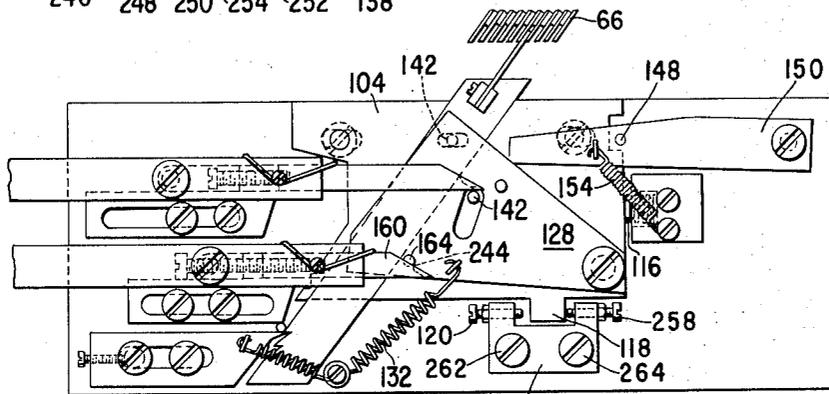


Fig. 6

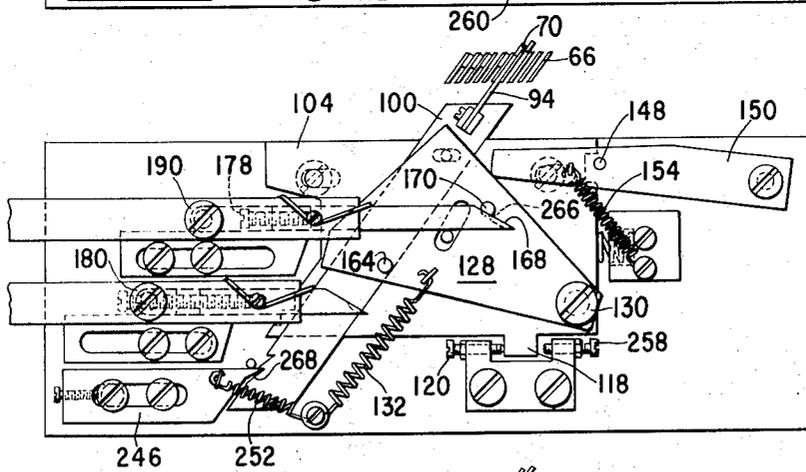


Fig. 7

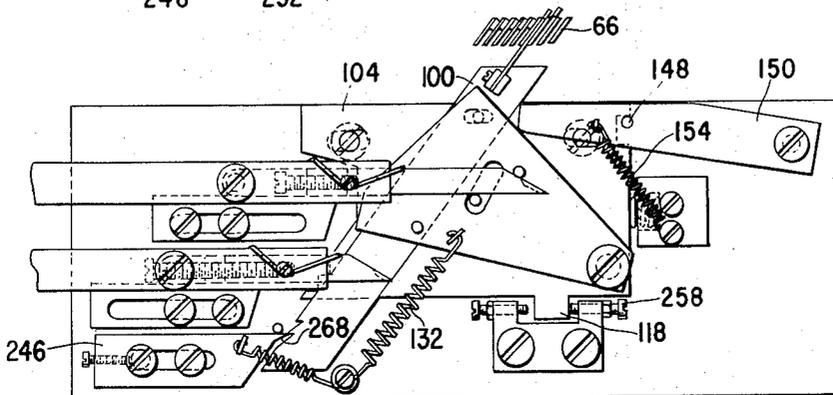


Fig. 8

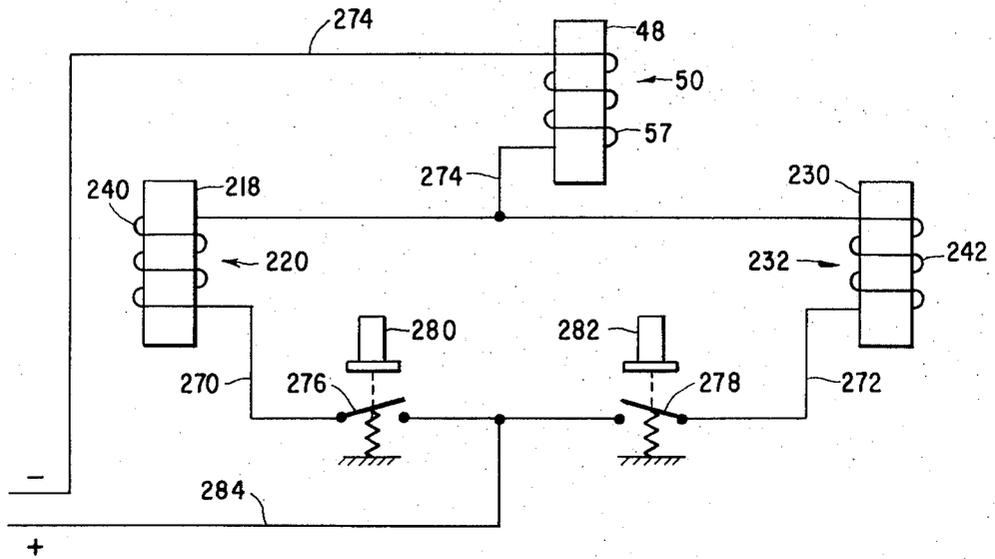


Fig. 9

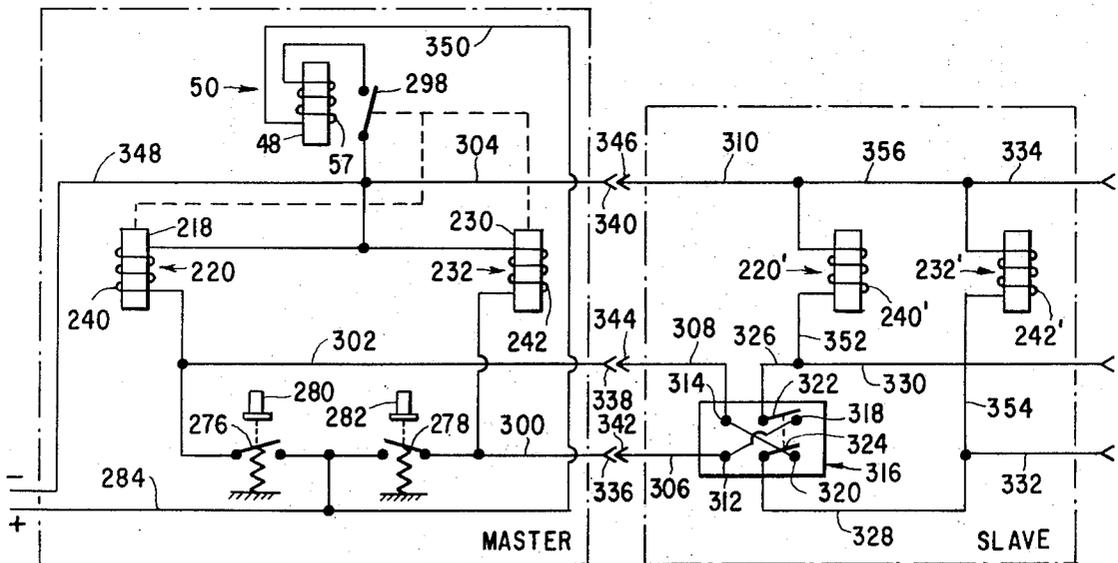


Fig. 10a

Fig. 10b

APPARATUS FOR POSITIONING JACKS IN SLOTTED PATTERN WHEEL RINGS ACCORDING TO A PREDETERMINED PATTERN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to pattern wheels for circular knitting machines and more particularly to apparatus for positioning jacks in pattern wheel rings according to a predetermined pattern.

2. Description of the Prior Art

Sophisticated electronically controlled knitting machines to which signals are fed on tapes or cards defining patterns to be produced on a machine are well known in the knitting industry. However, since such machines are expensive and find only occasional use, except in the largest mills, they have not been enthusiastically received by the knitting establishment. What is needed is a versatile inexpensive machine which has patterning capabilities and which can be quickly and inexpensively programmed when the need arises to change a pattern.

A pattern wheel circular knitting machine is a reliable patterning machine, the initial cost of which is low as compared to the electronically controlled machines. However, heretofore, unless a knitter purchased numerous extra sets of pattern wheels (and this proved very costly), he was only able to produce a limited number of patterns on his machines. Also when it became necessary for him to produce a pattern for which he had no pattern wheels, he had to order a new set and often production of the cloth in question was considerably delayed. Such difficulties have been overcome with the device of the invention.

SUMMARY OF THE INVENTION

The device of the invention is a jack setter which can be used to quickly set jacks in pattern wheels. Such device includes a carriage for holding a paper, card or the like on which the jack positions for a set of pattern wheels is indicated and also a support on which a pattern wheel ring wherein jacks are to be set may be rotatably mounted with a slot in registration with a jack actuator. The carriage (or a marker or pointer) may be indexed to align successive jack indications with the marker or pointer, and the ring to successively register the slots therein with the jack actuator. The two indexing movements are interrelated so that each indexing movement of the carriage (or marker or pointer) is accompanied by an indexing movement of the ring and the jack actuator may be utilized to position the jacks according to the indication brought into alignment with the pointer or marker.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the device of the invention;

FIG. 2 is a fragmentary perspective view illustrating the operation of a jack actuating cam on the device of FIG. 1;

FIG. 3 is a more or less diagrammatic perspective view showing the device of FIG. 1 partially disassembled;

FIG. 4 is an enlarged perspective view showing mechanism operable to index a pattern wheel ring, or to both index a pattern wheel ring and lift a jack in such ring;

FIG. 4a is an exploded view showing a portion of the mechanism of FIG. 4;

FIG. 4b is an enlarged fragmentary perspective view showing a portion of the structure of FIG. 4a;

FIGS. 5 and 6 are elevational views illustrating the operation of the mechanism of FIG. 4 for indexing a pattern wheel ring;

FIGS. 7 and 8 are elevational views illustrating the operation of said mechanism when used to both index a pattern wheel ring and to lift a jack in the ring;

FIG. 9 is a circuit diagram showing circuitry for the device of the invention;

FIG. 10a and FIG. 10b are circuit diagrams showing circuitry for operating a master jack setting control unit and a slave jack setting unit respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, and particularly to FIGS. 1, 2 and 3, reference character 10 designates the jack setting device of the invention which, as shown, includes side walls 12 and 14, front and back walls 16 and 18 respectively and bottom wall 20. Back wall 18 fixedly supports a channeled guide bar 22 and the guide bar slidably supports a rack 24 to which a carriage 26 is affixed at 28 and 30. The carriage is adapted to hold a paper 32, card or the like and includes a rotatably mounted roller 34 with which the paper may be initially adjusted in a vertical direction as by turning roller knobs 36 and 38 or by manipulating other roller adjusting means, not shown, but customarily provided on typewriter carriages.

As shown rack 24 engages a gear 40 which is affixed to one end of a shaft 42. The other end of shaft 42 is affixed to a ratchet wheel 44 which is engaged by a pawl 46 that is pivotally mounted on the movable plunger 48 of a solenoid 50 and biased by spring 52 into the ratchet wheel. The plunger 48 is biased by a spring 54, located between a fixed part 55 and an abutment 56 on the plunger, and when the solenoid coil 57 is de-energized, the plunger is caused to assume the position shown wherein a movable stop 58 on the plunger engages a fixed stop 59. When the coil 57 is energized the plunger is moved in the direction indicated until movable stop 51 engages fixed stop 53; pawl 46 actuates the ratchet wheel and gear 40 turns to advance the rack 24 by one tooth in a leftward direction as viewed in FIG. 3. Suitable means, diagrammatically shown as lever 60 and connection 61 extending between the lever and pawl 46 may be provided for disengaging the pawl from the ratchet wheel 44 to permit the carriage 26 to be moved manually in either direction free of restraint.

A base 62 which is secured to bottom wall 20 is provided to support various operating parts of the device 10 including a gear 64 for supporting a pattern wheel ring 66 containing slots 68 in which jacks 70 are to be set. The gear which is rotatably mounted on a stationary shaft 72 includes alignment pins such as 73, 74, 75 and 76 to register in holes in the ring and so prevent relative rotation of the gear and ring, and the shaft 72 includes a threaded end portion 78 which may be capped with a nut 80 to prevent the ring from moving vertically.

The pattern wheel ring 66 shown on the gear 64 is of the type disclosed in U.S. Pat. No. 3,660,991 of Lester Mishcon and Donald W. Reagan for "Pattern Wheel with Pivotally Mounted Jacks" issued May 9, 1972 in

that the jacks 70 are mounted as at 82 in arms 84 for pivotal movement between needle actuating and non-actuating positions, and various elements of the device 10 described herein have been arranged for the specific purpose of positioning jacks in such a pattern wheel ring. It is to be understood, however, that the invention is not limited in its application merely to pattern wheels with pivoted jacks since with slight modifications the device of the invention may be rendered applicable to other types of pattern wheels.

The gear 64 should be provided with the same number of teeth 86 as there are slots in pattern wheel rings wherein jacks are to be set with the device 10. A ratchet stop 88, biased by a spring loaded device 90 around a pivotal mounting at 92 into engagement with the gear teeth 86, holds the gear and thereby the pattern wheel ring mounted thereon in successive positions into which they may be moved as hereinafter described and in each of which a different pattern wheel slot is aligned with a jack actuator 94. Each slot on the pattern wheel ring 66 contains a pivoted jack 70 and all jacks are manually disposed in needle actuating positions prior to the operation of the device. Selected jacks are moved to non-actuating positions during the operation of the device.

Jack actuator 94 is fixed at 96 to a boss 98 which is on a member 100 that is slidable in a groove 102 formed in an indexing plate 104 (FIGS. 4 through 8). Screws 106 and 108 extend through openings 110 and 112 respectively in a stationary plate 114 and fasten to the indexing plate 104. The openings 110 and 112 are elongated and therefore accommodate sliding movement of the indexing plate 104 relative to the plate 114. The indexing plate 104 is biased by a spring 116 into a rest position (FIGS. 4, 5, and 7) wherein an abutment 118 on the indexing plate engages adjustable screw-stop 120 on the stationary plate 114. Spring 116 is located in a recess 122 in a block 124 which is affixed to plate 114 by screw 126 and 127 as shown.

A jack lifting plate 128 is pivotally mounted on a screw 130 on the indexing plate 104, and biased by a spring 132 into a rest position wherein the jack lifting plate 128 engages a pin 134 on the indexing plate in a slot 136 (FIG. 4). Spring 132 is secured at one end by screw 138 to stationary plate 114 and has its other end affixed to a tab 140 on the jack lifting plate. A pin 142 on member 100 extends into a horizontal slot 144 in the jack lifting plate 128 as shown.

With both the indexing plate 104 and jack lifting plate 128 in their rest positions (FIG. 4), end surface 146 of the indexing plate 104 is engaged by a pin 148 on a locking lever 150 which is pivotally mounted on plate 114 by screw 152 and biased by a spring 154 into engagement with jack lifting plate 128. As shown, spring 154 is connected at one end to a tab 156 on the lever 150 and at the other end to screw 127 on the block 124.

The jack lifting plate 128 may be pivoted out of its rest position against the bias of spring 132 by either of two plate actuating members, the plate actuating member 160 having an inclined surface 162 thereon engageable with a pin 164 affixed to the plate 128, or the plate actuating member 166 which includes inclined surface 168 engageable with a pin 170 affixed to the jack lifting plate. Plate actuating member 160 includes an integral boss 172 in which an adjustable screw 174 is mounted, and similarly plate actuating member 166 includes an

integral boss 176 in which adjustable screw 178 is mounted. The plate actuating member 160 is pivotally connected by a screw 180 to a member 182 and is biased by a spring 184, which is attached by screw 186 to the member 182, into a position wherein the boss 172 on member 160 engages a boss 188 on the member 182. Similarly, plate actuating member 166 is pivotally connected by a screw 190 to a member 192 and is biased by spring 194, which is attached by screw 196 to the member 192, into a position wherein the boss 176 on member 166 engages a boss 198 on the member 192. Screws 200 and 202 extending through an elongated slot 204 in boss 188 and affixed in stationary plate 114 slidably mount member 182 on the plate 114. Screws 206 and 208 extending through an elongated slot 210 in boss 198 slidably mount member 192 on the plate 114.

Member 182 connects at 212 with one end of a bell-crank 214. The other end of the bell-crank 214 pivotally connects at 216 with the movable plunger 218 of a solenoid 220 mounted on bottom wall 20. Between its ends the bell-crank 214 pivotally connects with a fixed member 222. Member 192 connects at 224 with one end of a bell-crank 226 having its other end pivotally connected at 228 to the movable plunger 230 of a solenoid 232 which is affixed to a plate 234 that is secured to bottom wall 20. Between its ends bell-crank 226 pivotally connects with fixed member 222. Spring 236 connected at one end to fixed member 238 and at the other end to bell-crank 214 causes the bell-crank 214, plunger 218, member 182 and plate actuating member 160 to assume the positions in which they are shown in FIG. 4 when coil 240 of solenoid 220 is de-energized. Spring 241 connected to fixed member 238 and to bell-crank 226 causes the bell-crank 226, plunger 230, member 192 and plate actuating member 166 to assume the positions in which they are shown in FIG. 4 when coil 242 of solenoid 232 is de-energized.

When coil 240 of solenoid 220 is energized, plunger 218 acting through bell-crank 214 and member 182 moves plate actuating member 160 into contact with pin 164 on the jack actuating plate 128 and the pin is caused to ride up the rear portion of the inclined surface 162 on the actuating member until it reaches edge 244 (FIG. 5). The jack lifting plate is lifted about its pivotal mounting on screw 130 and the jack lifting plate acting on pin 142 lifts member 100 and the jack actuator 94 thereon, causing the jack actuator to enter an aligned slot 68 of the pattern wheel ring 66 without raising a jack 70. The jack lifting plate 128 also acts on locking lever 150 pivoting it upwardly around screw 152 to effect disengagement of pin 148 from surface 146 of plate 104 and register the pin with a recess 243 in the plate (thereby unlocking the plate 104) when pin 164 on the jack lifting plate 128 reaches edge 244 on inclined surface 162 of the plate actuating member 160. When pin 164 reaches edge 244, a member 246, slidably mounted on screws 248 and 250 affixed in the stationary plate 114, is caused by a spring 252, connected to a tab 254 on the member 246 and to screw 138, to engage a notch 256 in member 100 and hold the member 100, the jack actuator 94 thereon and plate 128 in their lifted positions. At the same time screw 174 comes into engagement with indexing plate 104.

Member 160 acting through screw 174 moves the indexing plate until abutment 118 thereon comes into en-

gement with an adjustable stop-screw 258 (FIG. 6). As shown stop-screw 258 is mounted in a block 260 which also supports the adjustable stop-screw 120, the block 260 being secured by screws 262 and 264 to plate 114. Member 100 and jack actuator 94 move with plate 104 and the actuator indexes the pattern wheel ring 66. At the end of the indexing motion wherein abutment 118 engages screw 258 disengagement of notch 256 and member 246 occurs, and immediately thereafter jack lifting plate 128 is returned to its rest position by spring 132 with the pin 164 falling behind member 160. The plate 128 acting on pin 142 returns member 100 and jack actuator 94 to their original positions (FIG. 4) wherein the jack actuator is disengaged from the pattern wheel ring 66. Upon de-energization of coil 240 of solenoid 220, plunger 218, bell crank 214, member 182, and plate actuating member 160 are all returned to the original positions (FIG. 4) by spring 236, the plate actuating member being returned over the top of pin 164 and being pivoted about screw 180 against the bias of spring 184 in the process. Indexing plate 104 and locking lever 159 are returned to their original FIG. 4 positions by springs 116 and 154 respectively.

When coil 242 of solenoid 232 is energized, plunger 230 acting through bell-crank 226 and member 192 moves plate actuating member 166 into engagement with pin 170 on jack actuating plate 128 and inclined surface 168 acting on the pin pivots plate 128 about screw 130 (FIG. 7), the pin 170 riding up inclined surface 168 to edge 266 in the process. The jack lifting plate 128 is pivoted through a greater angle by the action of plate actuating member 166 than by plate actuating member 160 because of the location of pin 170 as compared to pin 164 with respect to screw 130 on which plate 128 pivots. The jack actuating plate lifts member 100 causing the attached jack actuator to enter a slot 68 in ring 66 and raise the jack 70 therein. The jack actuating plate also pivots lever 150 to unlock indexing plate 104. Member 246 engages member 100 in notch 268 and screw 178 engages the indexing plate 104. Plate actuating member 166 acting through screw 178 moves plate 104 until abutment 118 engages screw-stop 258 (FIG. 8) and in so moving indexes pattern wheel ring 66. Member 246 and member 100 disengage at notch 268 whereupon the spring 132 acting on plate 128 and the plate acting on member 100 cause the plate 128 and member 100 respectively to return to their original positions. Jack actuator 94 on member 100 is disengaged from pattern wheel ring 66 by the return movement of member 100. When coil 242 of solenoid 232 is de-energized, plunger 230, bell crank 226, member 192, and plate actuating member 166 are returned to their original FIG. 4 positions by spring 241 with plate actuating member 166 being returned over the top of pin 170 while pivoting on screw 190. Indexing plate 104 and locking lever 150 are returned to their original FIG. 4 positions by springs 116 and 154 respectively.

Control circuitry for controlling coil 240 of solenoid 220, coil 242 of solenoid 232 and coil 57 of solenoid 50, and thereby movement of plate actuating member 160, plate actuating member 166 and carriage 26 respectively is shown in FIG. 9 as including parallel branches 270 and 272, and the branch 274 in series with the parallel branches. Branch 270 includes coil 240 and a switch 276 which is normally biased to an

open position; branch 272 includes coil 242 and a switch 278 normally biased to an open position; and branch 274 includes coil 57. Control buttons 280 and 282 for the switches 276 and 278 respectively may be seen in FIGS. 1 and 3 as well as in FIG. 9. DC power is supplied to the circuit between lines 284 and 274.

When control button 280 is operated to close switch 276, a circuit is completed through coils 240 and 57 of solenoids 220 and 50 respectively. The plungers 218 and 48 of solenoids 220 and 50 respectively are actuated and as a result the carriage 26 and pattern wheel ring 66 are indexed without the jack actuator 94 being moved far enough into an aligned slot of the ring to engage a jack. When control button 282 is operated to close switch 278 a circuit is completed through coils 242 and 57 of solenoids 232 and 50 respectively. The plungers 230 and 48 of solenoids 232 and 50 respectively are actuated and as a result the carriage is indexed, the jack actuator 94 lifts the jack 70 in the pattern wheel slot 68 aligned with the jack actuator, and the pattern wheel ring 66 is indexed. The pattern wheel ring carries the raised jack into engagement with contoured surface 286 of cam-plate 288 (see FIG. 2) and subsequent indexing movements of the pattern wheel ring results in the jack being flipped over to a non-actuating position by the cam surface 286, as in the device of U.S. Pat. No. 3,668,897 of Lester Mishcon and Donald W. Reagan for "Device for Setting Pivotaly Mounted Jacks in Pattern Wheels" issued June 13, 1972.

With the device 10 jacks may be conveniently set in pattern wheel ring 66 and thereafter in other identical pattern wheel rings as required to produce a patterned fabric with such rings in pattern wheels on a circular knitting machine.

As may be seen in FIG. 1, paper 32 has ruled lines thereon defining a plurality of horizontal rows 1, 2, 3 etc. of rectangular areas. The jack settings for each pattern wheel ring are defined in a different row, the jack positions for consecutive slots of a pattern wheel ring being found in consecutive areas of the row corresponding to the ring. In the various areas on paper 32 a dot "." indicates a needle actuating position for a jack and a blank space indicated a non-actuating position for a jack, although any other suitable indications of jack positions may be employed. When the jacks are to be set in a particular pattern wheel ring like the pattern wheel ring 66 it is mounted on gear 64 with all jacks 70 in the needle actuating position. The paper is adjusted on the roller and the carriage is adjusted horizontally to bring the first defined area indicating a jack position for a pattern wheel ring on the left-hand side of the paper of a selected row into alignment with the cross-hairs of a marker 290 along the line of sight 292. As shown, such marker 290 is on a magnifier 294 which is secured to a cover plate 296 of the device 10.

Assuming the indication in the aforesaid first area under the marker specifies a needle actuating position for a jack, and control button 280 (FIG. 9) is operated to close switch 276 whereupon the carriage 26 and the pattern wheel ring 66 are indexed without a jack being disturbed, the carriage moves to the left as viewed in FIGS. 1 and 3 to bring a succeeding area in line with the marker 290 and the pattern wheel ring moves counter-clockwise as viewed in FIGS. 1 and 3 to bring a succeeding slot of the pattern wheel ring in alignment with the jack actuator 94.

Assuming the indication in the succeeding area brought under the marker indicates a non-actuating jack position, control button 282 is operated to close switch 278 whereupon the carriage is indexed, the jack in the slot aligned with the jack actuator is lifted by the jack actuator and the pattern wheel ring is indexed bringing the jack in contact with contoured surface 286 of cam-plate 288. As indicated hereinbefore, jacks which are lifted by the jack actuator and brought into contact with surface 286 of cam-plate 288 are flipped over by cam surface 286 during indexing movements of the pattern wheel ring.

By continuing in the manner described, that is, by operating control button 280 when the marker is aligned with an indication specifying a needle actuating position for a jack and by operating control button 282 wherever the marker is aligned with an indication specifying a non-actuating position for the jack, a pattern wheel ring results in which all jacks are set as specified on the paper 32. After all jacks in the pattern wheel ring on the gear are in the positions specified for them, the pattern wheel ring may be removed from the gear 64 and replaced by another, the paper 32 and carriage 26 adjusted to align the first defined area indicating a jack position for the ring in another row on paper 32 with the marker 290, and the control buttons 280 and 282 operated according to the indications in the row to set jacks in the new pattern wheel ring.

Instead of having the carriage 26 movable with respect to a marker 290 as described, it would, of course, be possible to have the marker movable with respect to the carriage and to adapt the device 10 to index the marker rather than the carriage. Obviously, other changes in the device are also possible.

In particular, the device 10 may be modified as shown in FIG. 10a to render it useful as a master unit for controlling the operation of other units (slaves) which are similar in construction to the device 10 but are without a carriage, and which include circuitry as shown in FIG. 10b suited to their operation as slaves. In the modified arrangement of FIG. 10a, coil 57 of solenoid 50 is connected in parallel with coils 240 and 242 of solenoids 220 and 232, and is connected in series with a switch 298 mechanically actuable by either plunger 218 of solenoid 220 or plunger 230 of solenoid 232. The modified arrangement includes output lines 300, 302 and 304 which may be connected to input lines 306, 308 and 310 respectively of the slave circuitry of FIG. 10b. As shown in FIG. 10b, the input lines 306 and 308 connect with terminals 312 and 314 respectively of a reversing switch 316. Terminal 312 connects with a terminal 318 of the switch and terminal 314 connects with a terminal 320 of the switch. Arms 322 and 324 of the reversing switch connect with lines 326 and 328 respectively of the slave circuitry. Line 326 connects to output line 330 of the slave circuitry and to one end of a coil 240' of a solenoid 220' for indexing a pattern wheel ring. Line 328 connects to output line 332 of the slave circuitry and one end of a coil 242' of a solenoid 232' for raising jacks and indexing the pattern wheel ring. The other ends of the coils 240' and 242' connect with an output line 334.

Assuming terminals 336, 338 and 340 of the output lines of the circuit in FIG. 10a are connected to terminals 342, 344 and 346 of the input lines of the slave circuitry of FIG. 10b, and the reversing switch is positioned to connect arms 322 and 324 to terminals 314

and 312 respectively, then, if control button 280 is operated to close switch 276, solenoid 220 for indexing a pattern wheel ring on the master unit is energized over line 284, switch 276 and line 348. Solenoid 220 closes switch 298 and coil 57 of solenoid 48 for indexing the carriage is energized over lines 284, 350 and 348. Coil 220' of solenoid 240' for indexing a pattern wheel ring on the slave unit is energized over line 284, switch 276, lines 302, line 308, line 326, line 352, line 310, line 304 and line 348. If control button 282 is operated to close switch 278, coil 242 of solenoid 232 for both raising jacks in a pattern wheel ring on the master unit and indexing the ring is energized over line 284, switch 278 and line 348. Solenoid 242 closes switch 298 and coil 57 of solenoid 48 for indexing the carriage is energized over lines 284, 350 and 348. Coil 242' of solenoid 232' for both raising jacks in a pattern wheel ring on the slave unit and indexing the ring is energized over line 284, switch 278, line 300, line 306, line 328, line 354, line 356, line 310, line 304 and line 348.

From the foregoing, it is apparent that with the reversing switch in the position described, whatever operation is performed on a pattern wheel ring on the master unit, that is merely indexing of the ring or both indexing of the ring and raising a jack, is duplicated on the pattern wheel ring on the slave unit. However, if the reversing switch is thrown to a reverse position such that switch arms 322 and 324 are caused to engage switch terminals 318 and 320 respectively, positive and negative pattern wheel rings may be simultaneously produced. The operation of the slave unit is then such that coil 242' of solenoid 232' for both indexing a pattern wheel ring and raising jacks in the ring on the slave unit is energized when coil 240 of solenoid 220 for merely indexing a pattern wheel ring on the master unit is energized, and coil 240' of solenoid 220' for merely indexing a pattern wheel ring on the slave unit is energized when coil 242 of solenoid 232 for both indexing a pattern wheel ring on the master unit and raising jacks in such ring is energized.

The device 10 has been described as having an actuator 94 which raises jacks and indexes a pattern wheel ring, and as having a cam plate 288 which flips over raised jacks. The jack actuator 94 and cam plate 288 may, however, be eliminated from the device and the jacks positioned manually with the aid of a simple tool according to the indications on paper 32, card or the like successively aligned with marker 290; suitable mechanism, other than that shown being provided for bringing slots of a ring successively into alignment at a jack positioning station with an indicator pointing to the slot which is to receive an operator's attention at any particular time.

While the invention has been described in its preferred form, it is to be understood that the words which have been used are words of description rather than of limitation, and that changes within the purview of the appended claims may be made without departing from the true scope and spirit of the invention.

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

1. A device for setting jacks in slots of pattern wheel rings as required to provide a particular patterned fabric with said rings on a pattern wheel circular knitting machine, said device comprising a jack actuator, a support on which the pattern wheel rings may be rotatably mounted, adapted to receive a pattern wheel ring in a

position wherein a slot is in registration with the jack actuator, a paper, card or the like on which jack positions are defined for the slots of each of said pattern wheel rings, a carriage to hold the paper, card or the like, a marker, first indexing means for relatively moving the carriage and marker for successively aligning the marker with portions of the paper, card or the like defining the jack positions for the slots of a selected ring, second indexing means to operably connect with a pattern wheel ring on said support and successively move slots into registration with the jack actuator, means operably connected to both indexing means for interrelating their operation such that each movement of the carriage is accompanied by an indexing movement of the ring, and means operable to move the jack actuator as required to move the jacks of a slot which is in registration with the actuator toward the position indicated on the portion of the paper, card or the like in alignment with said marker.

2. The device of claim 1 wherein said second indexing means connects with the pattern wheel ring through the jack actuator.

3. The device of claim 1 wherein the means operably connected to both indexing means for interrelating their operation is an electric control circuit.

4. The device of claim 3 wherein said circuit also controls the means operable to cause the jack actuator to move a jack, and said circuit includes switch means for initiating operation of the first and second indexing means and other switch means for initiating operation of both indexing means and also the means for causing the jack actuator to move a jack.

5. The device of claim 1 wherein the jacks are mounted for pivotal movement in the rings between a needle actuating and non-actuating position and the jack actuator moves selected jacks on their pivotal mountings.

6. The device of claim 5 wherein selected jacks are moved by the jack actuator from a needle actuating position to an intermediate position between the needle actuating position and non-actuating position, said device including cam means for moving the selected jacks from said intermediate position to the non-actuating position.

7. In combination, at least two jack setting devices each adapted to support a pattern wheel ring and each including a jack actuator, one of said devices including a carriage to support a paper, card or the like on which jack positions are indicated and a marker for areas on the paper, card or the like, said one device including

circuitry for controlling relative movements of its carriage and marker, a pattern wheel ring on the device, and the jack actuator on the device, the circuitry including first switch means operable to cause the carriage and marker to be moved relatively an incremental indexing distance and the pattern wheel ring to be indexed without a jack being positioned by the jack actuator, and second switch means operable to cause the carriage and marker to be moved relatively said incremental distance, the pattern wheel ring to be indexed and a jack to be positioned by the jack actuator, another device including circuitry for controlling movements of a pattern wheel ring on the device and the jack actuator of the device, the circuitry for said another device being adapted for connection with the circuitry for said one device and including circuit means operable in response to the operation of said first switch means for causing the pattern wheel ring on said another device to be indexed without a jack being positioned and other circuit means operable in response to the operation of the second switch means for causing the pattern wheel ring on said another device to be indexed and a jack positioned by the jack actuator.

8. The combination of claim 7 wherein the circuitry for said another device includes switch means for reversing the operation of the said circuit means in response to the operation of the first and second switches.

9. A device for setting jacks in the slots of pattern wheel rings as required to produce a particular patterned fabric with said rings on a pattern wheel circular knitting machine, said device comprising a support on which the pattern wheel rings may be rotatably mounted, a paper, card or the like on which jack positions are defined for the slots of each of said pattern wheel rings, a carriage to hold the paper, card or the like, a marker, first indexing means for relatively moving the carriage and marker for successively aligning the marker with portions of the paper, card or the like defining the jack positions for the slots of a selected ring, second indexing means to operably connect with a pattern wheel ring on said support and successively move slots therein into a jack positioning station at a predetermined location on said device, and means operably connected to both indexing means for interrelating their operation such that each indexing movement of the carriage is accompanied by an indexing movement of the ring.

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