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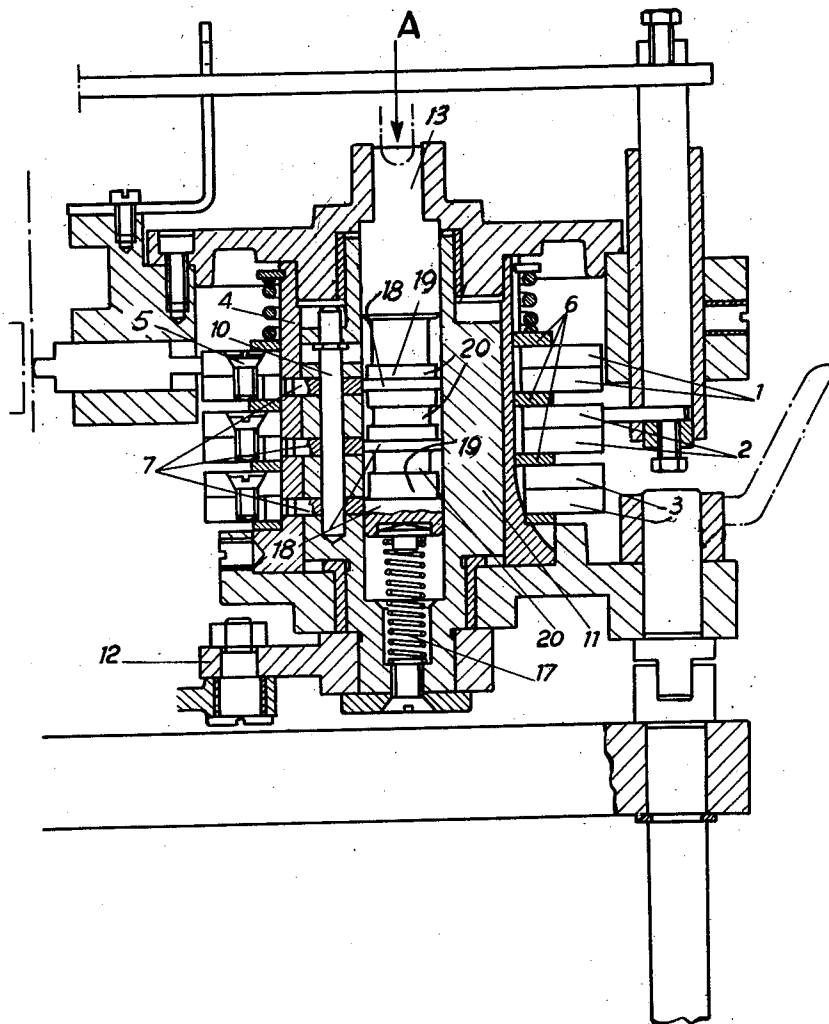
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CONTROL DEVICE FOR CIRCULAR KNITTING MACHINES

Filed June 19, 1956

2 Sheets-Sheet 1

Fig. 1



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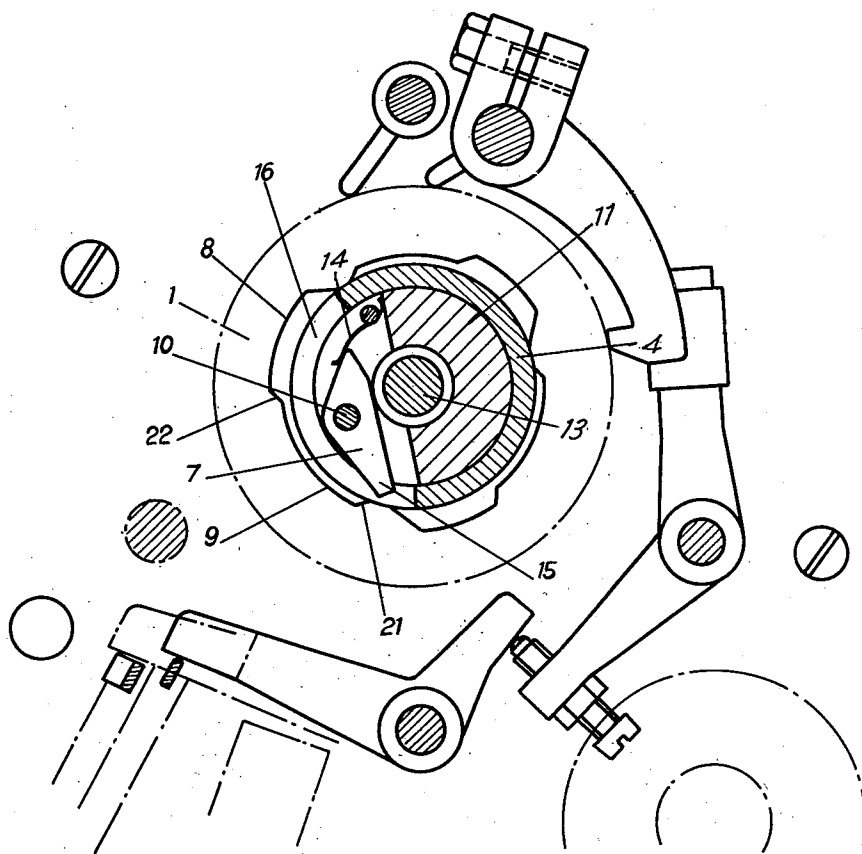
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Fig. 2



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## CONTROL DEVICE FOR CIRCULAR KNITTING MACHINES

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In circular knitting machines having superimposed cylinders, in which the needles are capable of travelling from one cylinder to another, and especially in such machines for manufacturing seamless hosiery, there may be provided a device for changing the colour of the thread. This device frequently consists of a system of cams assembled in groups and controlled by a set of swinging pawls, one for each group. In each control operation, the cams rotate through a certain angle, generally one of 60°, corresponding to the angle of oscillation of the pawl.

In the known machines, the pawls are held up by a comb-shaped selector, the shifting of which causes the fall of one or other pawl which, in turn, causes the rotation of one or other group of cams. The selector and the pawls are external to the cams which consist of discs having cam profiles on their outer circumference.

In the particular case of a circular knitting machine for hosiery, each group consists of three cams, of which one cooperates with the controlling pawl, one is designed to control the thread-carrier and one controls the shear.

The assembly is, however, bulky and has external swinging parts which are liable to damage.

The present invention has for its object a control device serving a similar purpose, but of much smaller size, much safer, having a less number of components and no external swinging parts.

According to the invention there is provided a control device for a circular knitting machine, comprising a stepped selector column having a plurality of portions of different diameters, a carrier member mounted so as to be able to oscillate about the selector column, groups of coaxial ring-like cam members to be controlled by said device, encircling and rotatable about the carrier member and each provided with a cam surface on their outer periphery, at least one cam member of each group being provided with recesses in its inner periphery, and a plurality of control pawls mounted on the carrier member, adapted to engage said recesses in the cam members of each group and controlled by the selector column which is movable lengthwise of its axis by the main drive of the machine to vary the portions thereof acting on the pawls and thereby alter the position of the pawls.

By use of the invention the number of components can be reduced, since one of the cams of each group has two working profiles, namely one on the outer periphery and another on the inner periphery.

More specifically, said cam has on its inner periphery alternately more and less deep recesses, and the respective control pawl engages with one or other or none of them according to the position assumed by the pawl by the action of the selector column.

By way of example, an embodiment of the invention will now be described with reference to the accompanying drawings in which:

Fig. 1 is a view, partly in vertical axial section and partly cut away, of a control device; and

Fig. 2 is a horizontal section of the device.

The assembly comprises three groups of cams: 1, 1, 2, 2,

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3, 3. The cams are ring-shaped and rotatably mounted on a cylindrical element 4, fixed to the frame of the machine. The two cams of each group, united together by a screw 5, are profiled on their outer peripheries and serve, in known manner, one for controlling the thread carrier and the other for controlling the shear. This outer profile of the cams, being of no interest for the purposes of the present invention, is not shown on the drawing.

The various groups of cams are separated from one another by washers 6, fixed to the cylindrical element 4, to prevent any group of cams from being driven frictionally by the adjacent group.

The lower cam of each group has, in addition to its outer profile, a profile also on its inner perimeter, which co-operates with a control pawl 7.

This inner profile consists of three sets of pairs of recesses 8 and 9 of different depths, each extending through about 60° and alternating with one another along the internal perimeter of the cam.

The three control pawls 7 one for each group of cams, are mounted on a pin 10 in slots milled in a sleeve 11 mounted within the cylindrical element 4 and to which is imparted by means of the crank 12, in known manner, a reciprocating rotary motion of an amplitude of about 60°.

The selector 13 is axially slidable in the sleeve 11 internally to the cams: it consists of a cylindrical stepped body against which bear the tails of the pawls 7. The tails of the pawls 7 are urged to lie against the selector 13 by the action of springs 14 and this, consequently, urges the tips 15 of the pawls to project outwardly. The pawls act upon the cams through suitable apertures 16 provided in the cylindrical element 4.

The selector 13 can be moved axially in the direction of the arrow A by the main drive of the machine, in opposition to the spring 17, acting as a return spring.

As shown in Fig. 1, the selector 13 has parts of three diameters, the portions 18 being of maximum diameter, each followed, from bottom to top in the figure, by a portion 19 of an intermediate diameter and a portion 20 of minimum diameter.

In its initial position, in which it is shown in the drawing, the selector 13 presents to the tails of all the pawls 7 a portion 18 of maximum diameter. The pawls assume therefore the position indicated in Fig. 2 where their tips do not protrude beyond the cylindrical element 4.

In this position the device is idle and the cams 1, 2, 3 remain stationary during the oscillations imparted by the crank 12 to the group of pawls.

The selector, on being shifted axially by a predetermined length, will present to the tails of the various pawls the portion 19 of intermediate diameter, thus enabling the tips 15 of the pawls to protrude, under the action of the springs 14, a certain distance through the apertures 16 of the cylindrical element 4. Thus, the pawls can engage in the shallowest recesses 9 of the cams. When the cam, at the beginning of the oscillation of a pawl, presents to the pawl tip 15, the end of the cavity, i. e., its slanting portion 21 that joins the inner face of the recess 9 to the inner perimeter of the cam, this cam will be driven in rotation by the pawl through 60°. If, on the other hand, the cam presents to the tip 15 the end of the deepest recess, i. e., the slanting portion 22 that joins the recess 9 to the inner face of the deepest recess 8, the pawl tip 15 will not protrude sufficiently to be able to drive the cam.

In order for a pawl 7 to drive its cam also in this position, it is necessary for the pawl 7 to protrude farther from the aperture 16 in the cylindrical element 4. This greater protrusion is obtained by shifting the inner selector 13 still more, so as to bring the pawls into contact with the portions 20 of the selector of minimum diameter,

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It should be noted that the selector shown when in this third position enables only the two upper pawls to be brought on the portions 20 having the minimum diameter of the selector, while the lower pawl remains still on a portion 19 of intermediate diameter, which has a greater height than the other such portions 19.

To bring also this pawl on the minimum diameter portion 20, an even greater movement must be imparted to the selector.

As shown on the drawings, the various portions of the selector of different diameters are joined together by suitable slanting surfaces, thus enabling the pawl tails to slide from one portion to another during the return of the selector.

It is obvious that by varying the positions and heights of the portions of the selector, the various cams can be operated in the desired succession or all returned to a predetermined position.

The described device, having the selector disposed internally of the cams, provides an extremely compact control system of minimum size in plan and height, which has a smaller number of separate cam members, avoiding the disadvantages of external swinging parts.

As an alternative to the embodiment described above, instead of slanting surfaces joining the selector steps, the selector may be provided with a flat portion to avoid the possibility that, in being shifted, the selector might be hindered by the tails of the pawls sliding thereon.

What I claim is:

1. A control device for a circular knitting machine, comprising a stepped selector column, movable lengthwise of its axis by the main drive of the machine and having a plurality of portions of different diameters, a carrier member mounted so as to be able to oscillate about said selector column, groups of coaxial ring-like cam members, encircling and rotatable about said carrier member and each provided with a cam surface on their outer periphery, at least one cam member of each group being provided with recesses in its inner periphery, and a plurality of control pawls mounted on said carrier member, and adapted to engage said recesses in said cam members of each group and controlled by said selector column.

2. A control device for a circular knitting machine, comprising a stepped selector column, movable lengthwise of its axis by the main drive of the machine and having a plurality of portions of different diameters, a carrier member mounted so as to be able to oscillate about said selector column, groups of coaxial ring-like cam

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members, encircling and rotatable about said carrier member and each provided with a cam surface on their outer periphery, at least one cam member of each group having in its inner periphery alternately more and less deep recesses, and a plurality of control pawls mounted on said carrier member and adapted to engage one or other or none of said recesses under the control of the portions of different diameters of said selector column.

3. A control device for a circular knitting machine, comprising a stepped selector column, movable lengthwise of its axis by the main drive of the machine and having a plurality of portions of different diameters, a carrier member mounted so as to be able to oscillate about said selector column, groups of coaxial ring-like cam members, encircling and rotatable about said carrier member and each provided with a cam surface on their outer periphery, at least one cam member of each group having in its inner periphery alternately more and less deep recesses, and a plurality of control pawls mounted on a common pin in said carrier member and adapted to engage one or other or none of said recesses under the control of the portions of different diameters of said selector column, and resilient means urging the tails of said pawls against said selector column.

4. A control device for a circular knitting machine, comprising a stepped selector column, movable lengthwise of its axis in one direction by the main drive of the machine and in the other direction under the action of a return spring, and having a plurality of portions of different diameters, a carrier member mounted so as to be able to oscillate about said selector column, a crank mechanism adapted to impart to said carrier member a reciprocating oscillatory motion, groups of coaxial ring-like cam members, encircling and rotatable about said carrier member and each provided with a cam surface on their outer periphery, at least one cam member of each group having in its inner periphery alternately more and less deep recesses, and a plurality of control pawls mounted on said carrier member, adapted to engage one or other or none of said recesses under the control of the portions of different diameters of said selector column, and resilient means urging the tails of said pawls against said selector column.

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