United States Patent [19]

Schieber et al.

[11] **3,779,044**

[45] **Dec. 18, 1973**

[54] **METHOD AND APPARATUS FOR ADJUSTING STITCH CAMS**

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[73] Assignee: **Universal Machinenfabrik Dr. Rudolf Schieber G.m.b.H.,** Westhausen, Germany

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[21] Appl. No.: **219,342**

[30] **Foreign Application Priority Data**

Mar. 11, 1971 Germany.....P 21 11 803.6

[52] **U.S. Cl.** **66/78**

[51] **Int. Cl.... D04b 7/00,** D04b 15/36, D04b 35/00

[58] **Field of Search**..... 66/78, 14, 60

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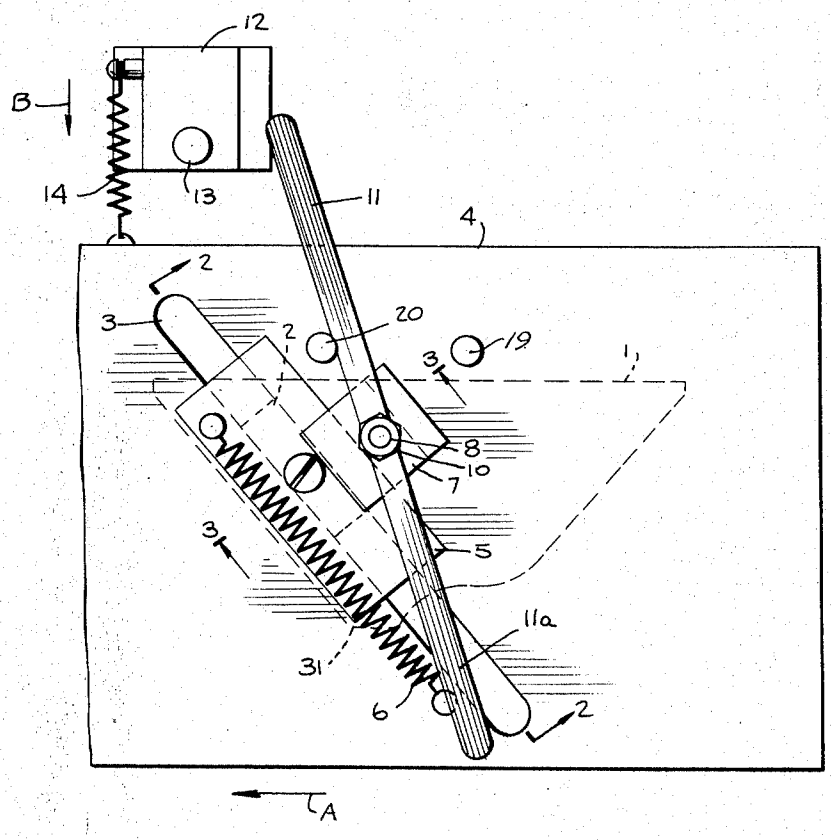
Primary Examiner—Ronald Feldbaum

Attorney—Joseph M. Fitzpatrick et al.

[57] **ABSTRACT**

Automatic cam setting device arranged on knitting machines at the end of carriage travel and including a fixed pin which engages and flips a lever on the carriage to loosen a cam which is then positioned as the carriage and cam move over a cam setting device. The cam is locked in its new position as the carriage moves in the opposite direction.

11 Claims, 7 Drawing Figures



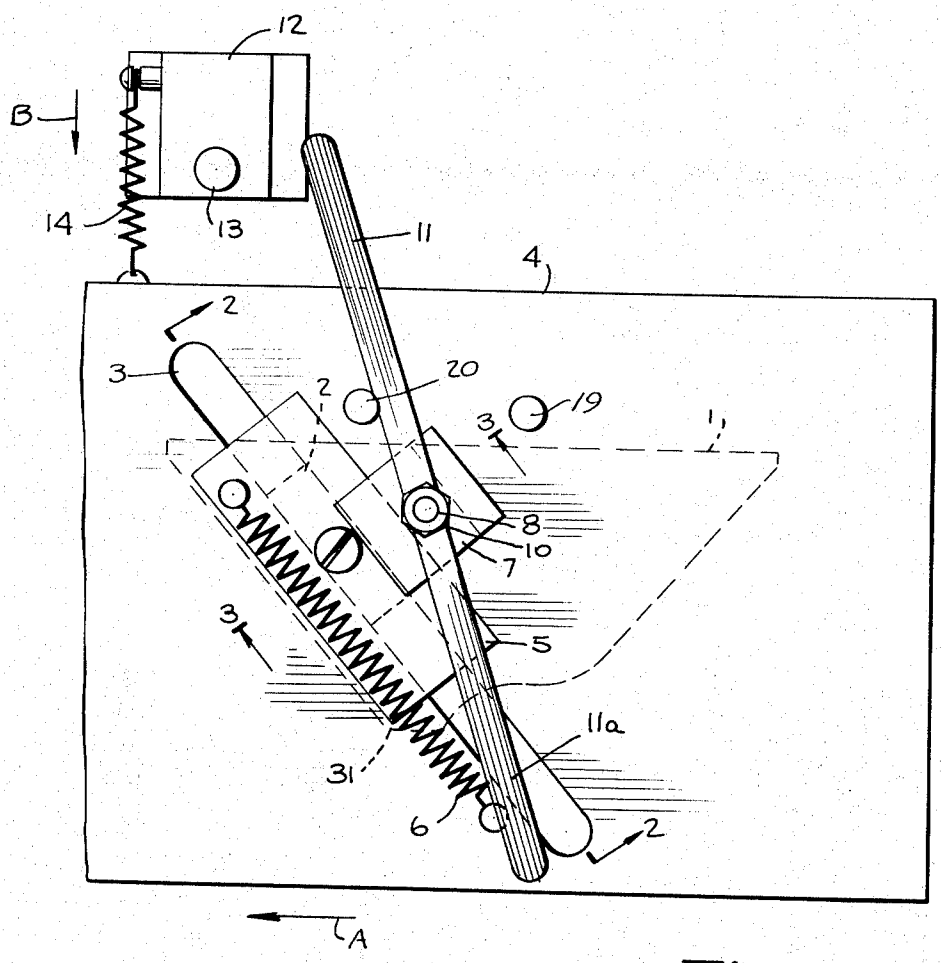


Fig. 1.

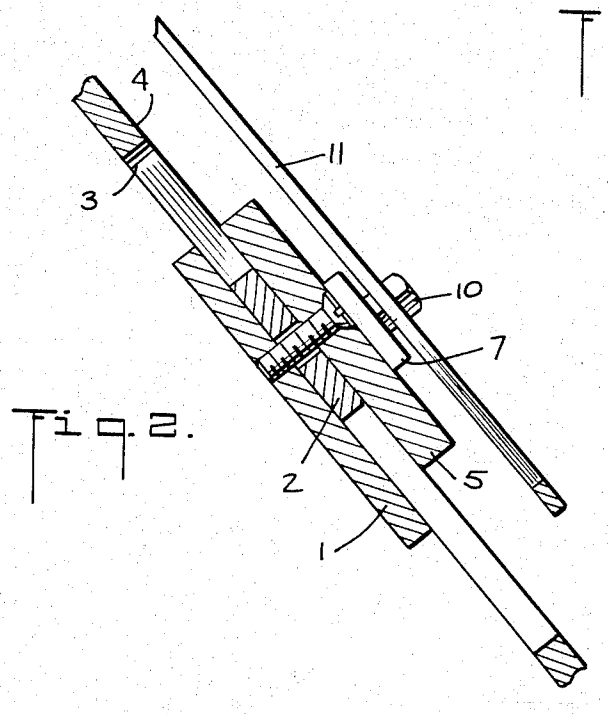


Fig. 2.

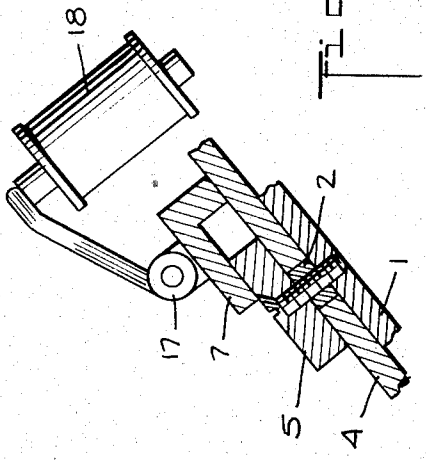


Fig. 4.

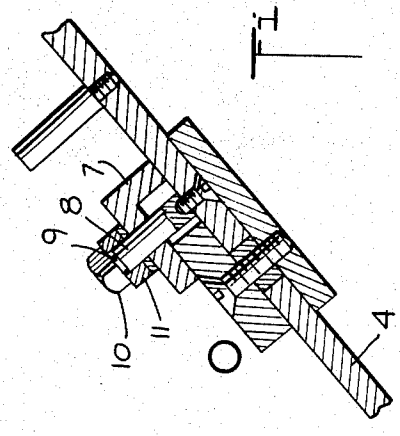


Fig. 3.

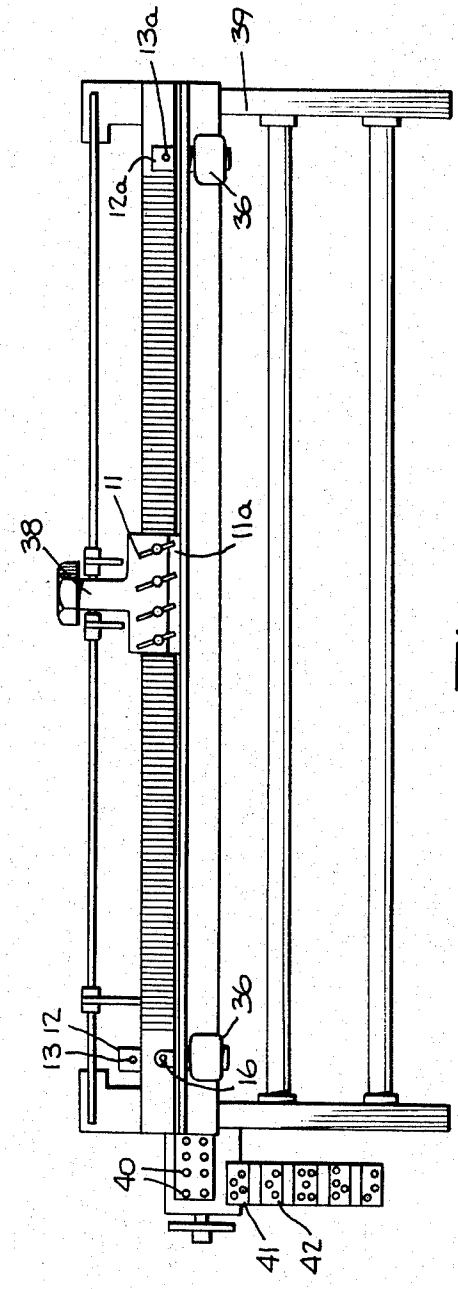


Fig. 2.

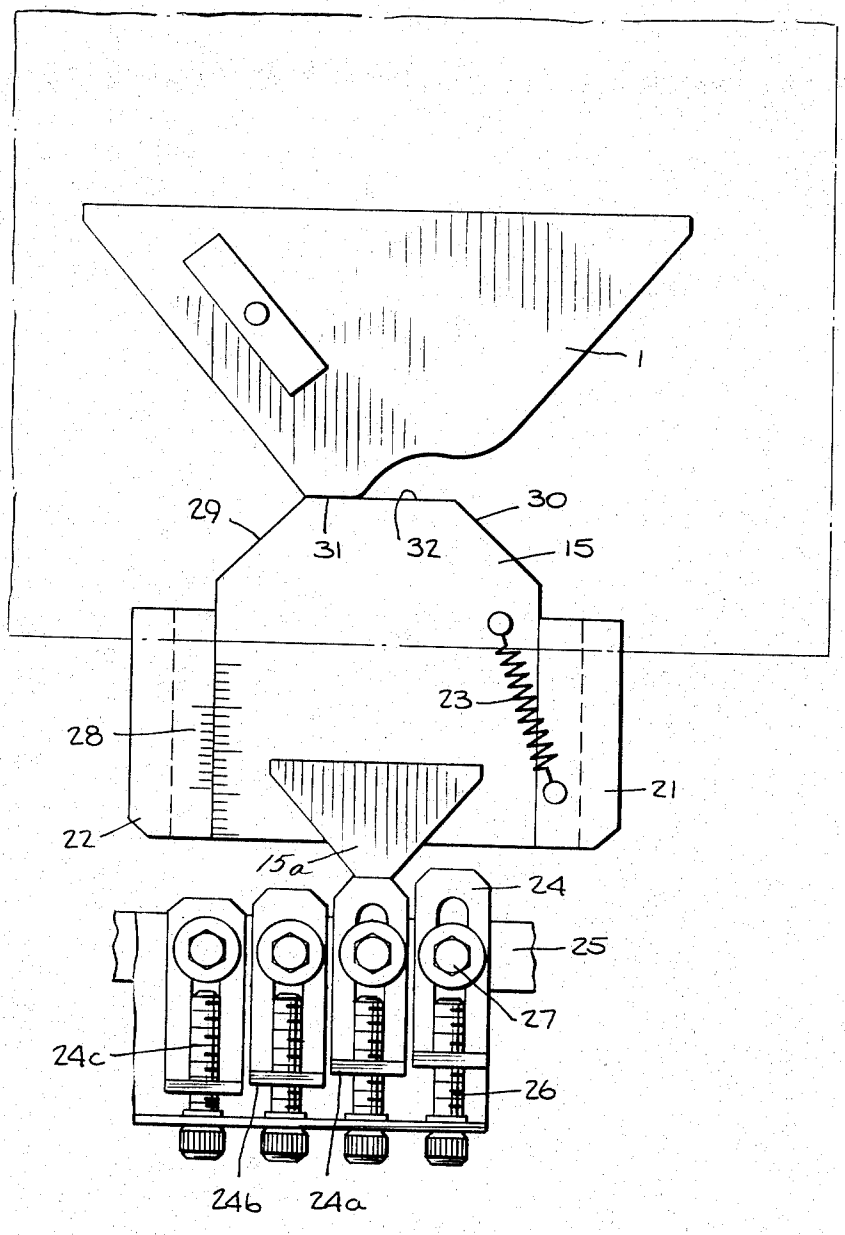


Fig. 5.

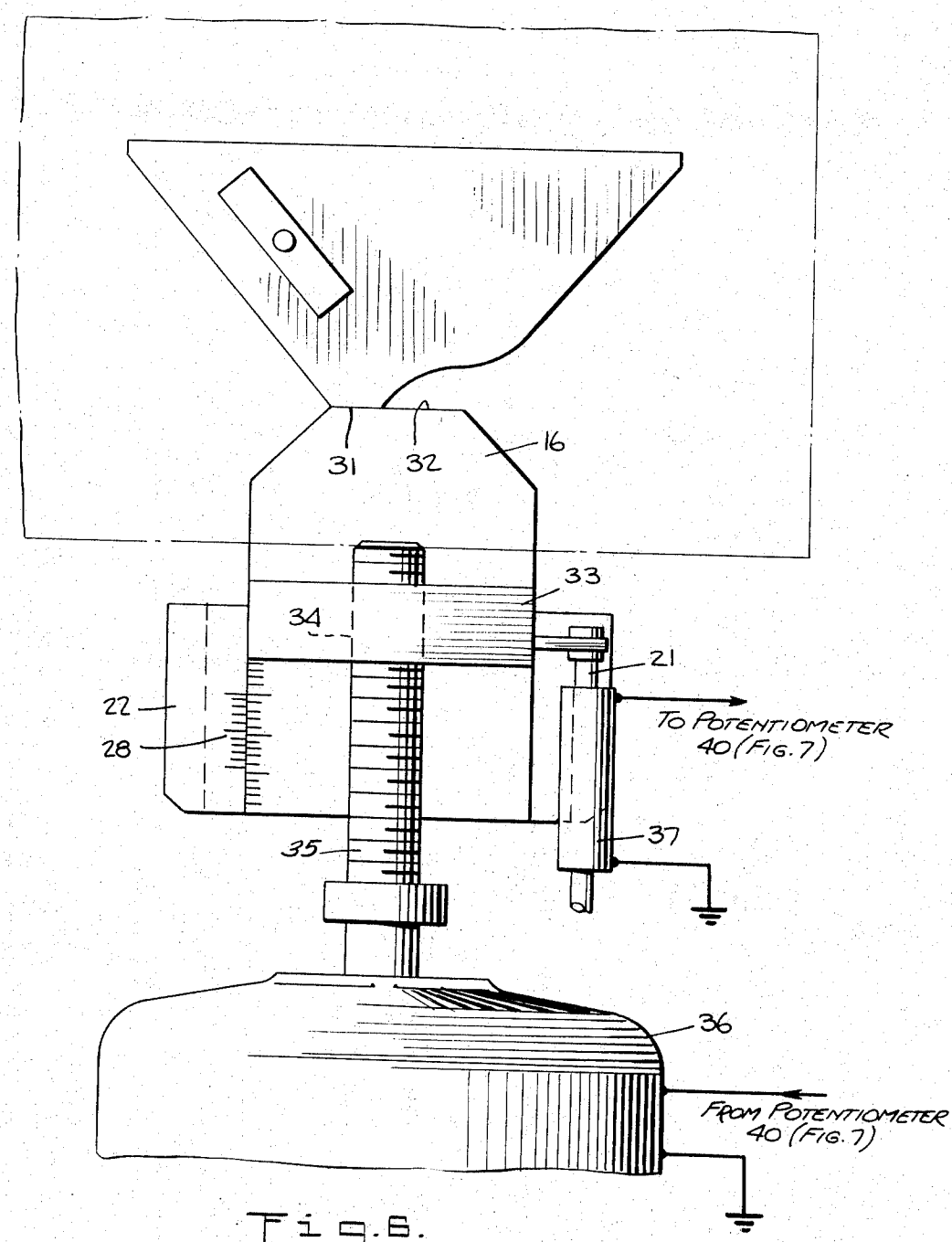

16
31
32
33
34
21
22
28
TO POTENTIOMETER 40 (FIG. 7)
35
37
36
FROM POTENTIOMETER 40 (FIG. 7)

Fig. 6.

METHOD AND APPARATUS FOR ADJUSTING STITCH CAMS

This invention relates to method and apparatus for setting stitch cams on knitting machines, particularly those stitch cams which are present on flat knitting machines. The setting of these stitch cams serves to control the firmness of knitting.

Previously known methods and devices for setting stitch cams in flat knitting machines have involved considerable difficulties. These devices are mounted on the carriages which carry the corresponding stitch cams. Because of this, the construction of the cam carriages is quite complicated and the weight of each carriage comprises, to a considerable extent, the weight of the adjusting devices. Further, with these prior devices, it is not possible to obtain a very accurate adjustment using mechanical transmission elements on the cam carriage.

It has been proposed to carry out the adjustment of stitch cam setting by electrical switch means. In this case, however, there remains the difficulty that for each stitch cam there are required an electric motor and a corresponding displacement pickup device with a feedback system, which also must be mounted in the carriage. These various elements serve substantially to increase the weight of the carriage.

It is an object of the present invention to provide methods and apparatus for obtaining precise adjustment of the stitch cams of knitting machines in which the above-indicated disadvantages do not occur and in which in particular the weight of the carriage is reduced.

This object is achieved, according to the present invention, by effecting the adjustment of one or more stitch cams for one or more carriages, from an adjusting device which is located outside the cam carriage. The stitch cams are clamped during the stitching process of the machine, are released before their adjustment and are then clamped again after adjustment.

In one suitable embodiment of the invention, an adjusting member of the adjusting device acts directly on the lowermost surface of the stitch cam. The adjusting device can be controlled mechanically, pneumatically or electrically.

Apparatus in which the present invention is embodied is characterized by the fact that the adjusting device has a setting member arranged laterally on the outside of the knitting machine with a corresponding actuating member and that a clamping device is provided on the cam carriage. In order to adjust the setting member, there may be provided a switchable bar on which, in individual switch steps, fine-adjustable setting plates are arranged. In an alternate embodiment of the invention, an electric motor is provided for adjusting the setting member. This electric motor can be arranged to be controlled by an electric displacement pickup and an electric adjusting device for the setting device. The electric adjusting device is preferably a potentiometer.

Also, in one suitable embodiment, an electromagnet is provided with an eccentric lever for clamping of the stitch cams.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of

course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a top view of a portion of a stitch cam lock in which only a stitch cam with a cam clamping device is shown;

FIG. 2 is a section view taken along line 2—2 of FIG. 1;

FIG. 3 is a partial section view taken along line 3—3 of FIG. 1;

FIG. 4 is a view similar to FIG. 3, but showing another embodiment of a stitch cam clamping device;

FIG. 5 is a plan view of a mechanically actuated setting device used to establish the position at which the stitch cam is clamped;

FIG. 6 is a plan view of an electrically actuated setting device; and

FIG. 7 is a schematic view of a flat knitting machine with an attached stitch cam setting device.

In the part of a lock shown schematically in FIG. 1, a stitch cam 1 (shown in dashed outline) travels by means of its guide block 2 in a guide slot 3 of a cam box 4 and is held down by a cover plate 5. A tension spring 6 pulls the stitch cam 1 downward. Above the cover plate 5 is a clamping angle 7 through which a clamping bolt 8 threaded at its upper half 9 extends. A clamping nut 10 is screwed onto the threaded half 9 of the bolt 8. The nut 10 is fashioned into the configuration of a shift lever having two switch lever arms 11 and 11*a*. When the switch lever is in the rotational position shown in FIG. 1, it presses the clamping angle 7 firmly against the coverplate 5 and thus prevents movement of the stitch cam 1. When the switch lever is rotated clockwise from the position shown in FIG. 1, it loosens the clamping angle 7 and allows movement of the stitch cam 1.

At the carriage reversal points of the knitting machine (FIG. 7), there are arranged on the knitting machine switch slides 12 and 12*a*, respectively, which are urged by a spring 14 at all times into the position shown in FIGS. 1 and 7. To the switch slides 12 and 12*a*, there are firmly connected switch pins 13 and 13*a*, respectively. If for instance the switch lever arm 11 travels in the direction of the arrow A indicated in FIG. 1 against the switch pin 13, it will be swung to the right, i.e., clockwise, and the clamping of the stitch cam 1 will be released. This release takes place at a moment when the stitch cam 1 travels onto an adjusting slide 15 and 16, respectively, in FIGS. 5 and 6.

As shown in FIG. 4, the clamping can also be effected by an eccentric lever 17 which is actuated by an electromagnet 18.

Upon further movement of a carriage 38 in the direction indicated by the arrow of FIG. 1, the switch lever arm 11, which is mounted on the carriage, strikes against a limiting pin 19 and presses the switching slide

12 away from the lock. This allows the cam block 4 to continue its movement in the direction of the arrow B while the lever arm 11, now in its loosened position, passes under the pin 13 which is urged upwardly, along with the slide 12, over the end of the lever arm 11. After the passage of the switch lever arm 11, the switching lever 12 springs back into its basic position shown in FIG. 1. After the reversal of the carriage into the opposite direction of travel, the switch lever arm 11 is swung to the left against a limiting pin 20 and again clamps the switch cam 1 fast.

For the switching of the clamping after the travel of the carriage from left to right to the second carriage reversal point, the switch lever arm 11*a* and the switch slider 12*a* are provided with switch pins 13*a*, as shown in FIG. 7.

FIG. 5 shows an embodiment for the mechanical adjustment of the switch cam 1. In this case, the adjustment takes place via a setting slide 15 which is arranged laterally on the outside of the machine. The setting slide 15 moves in guides 21 and 22 and is pulled by a spring 23 so that a stop 15*a* on the setting slide is urged against one of several setting plates 24 which are supported on a switch bar 25. The setting plates 24 can be fine-adjusted by means of screw spindles 26 in their position with respect to the setting slide 15 and then clamped fast by a set screw 27. From the control unit of the knitting machines by means of control cards, the switch bar 25 can automatically alternately bring each of the setting plates 24, 24*a*, 24*b*, 24*c* into engagement with the setting slide 15. On the setting slide 15, there is furthermore arranged a vernier scale 28 for the accurate reading of the position in which the setting slide is set.

The clamping of the stitch cam 1 is released before it comes onto an incline 29 or 30 of the setting slide 15 and is clamped when upon the return of the carriage 38 the lowermost edge 31 of the stitch cam 1 is, as shown in FIG. 5, on the upper edge 32 of the setting slide 15.

As shown in FIG. 6, the adjustment of stitch cam positioning can be effected, for instance, also by an electric device. A setting slide 16, which is also guided in guides 21 and 22, has a driving member 33 with internal threads 34 into which a threaded spindle 35 is engaged. The threaded spindle 35 is driven by an electric motor 36. An electric displacement pickup 37 conducts information as to the exact position of the setting slide 16 to a control device of the electric motor 36. The adjustment of the different positions of the setting slide 16 by which the firmness of the knitting is determined, is effected, for instance, by several potentiometers 40 (FIG. 7) which can be controlled alternately by the control device 41 of the knitting machine. The potentiometers 40 correspond to the switch plates 24 in the mechanical adjustment of the setting slide.

In case of multi-system knitting machines, the selection of the adjustment for the travelling stitch cams takes place between the system or in other types of flat knitting machines, between the individual carriages.

Having thus described the invention with particular reference to the preferred form thereof, it will be obvious to those skilled in the art to which the invention pertains, after understanding the invention, that various changes and modifications may be made therein without departing from the spirit and scope of the invention, as defined by the claims appended hereto.

What is claimed is:

1. A method of adjusting the stitch cams on knitting machines and particularly flat knitting machines, wherein the adjustment of stitch cams is effected from an adjusting device which is located outside cam carriages on the machines, said method comprising the steps, during the carrying out of a knitting process on the machine, of successively clamping the cams in position and releasing the cams, as said cams move past preselected locations along the machines, and separately adjusting the cams, upon release thereof, to predetermined new positions, and reclamping the cams.

2. A method according to claim 1, wherein the step of adjusting the cams is carried out by causing an adjusting member of the adjusting device to act directly on the lowermost surface of the stitch cam.

3. A method according to claim 1, wherein said adjusting device is controlled mechanically.

4. A method according to claim 1, wherein said adjusting device is controlled pneumatically.

5. A method according to claim 1, wherein said adjusting device is controlled electrically.

6. A device for setting the stitch cams on knitting machines, particularly on flat knitting machines, said device comprising, on a knitting machine, a set member fixed laterally on the outside of the knitting machine and having means for adjusting the position of said set member, a cam clamping device on the carriage of said machine, and means on said machine for releasing said clamping device when said cam carriage is at a position to bring a cam thereon into setting engagement with said set member.

7. A device according to claim 6, wherein the means for adjusting the position of said set member comprises a switchable bar, and a plurality of fine-adjustable setting plates arranged on said bar individual switch steps.

8. A device according to claim 4, wherein the means for adjusting the position of said set member includes an electric motor.

9. A device according to claim 8, wherein said means for adjusting the position of said set member further includes an electric displacement pickup and an electric adjustment device by which the electric motor can be controlled.

10. A device according to claim 9, wherein said electric adjustment device is a potentiometer.

11. A device according to claim 6, wherein there is provided an electromagnet having an eccentric lever for the clamping of the stitch cams.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,779,044 Dated December 18, 1973

Inventor(s) HANS SCHIEBER, ET AL.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Title page, Column 1, item [73] delete "G.m.b.H."

and substitute --KG--.

Signed and sealed this 9th day of July 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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