

[54] **MACHINE FOR CUTTING TEETH ON
SELECTOR COMBS FOR DRUMS AND
OTHERS FOR KNITTING MACHINES**
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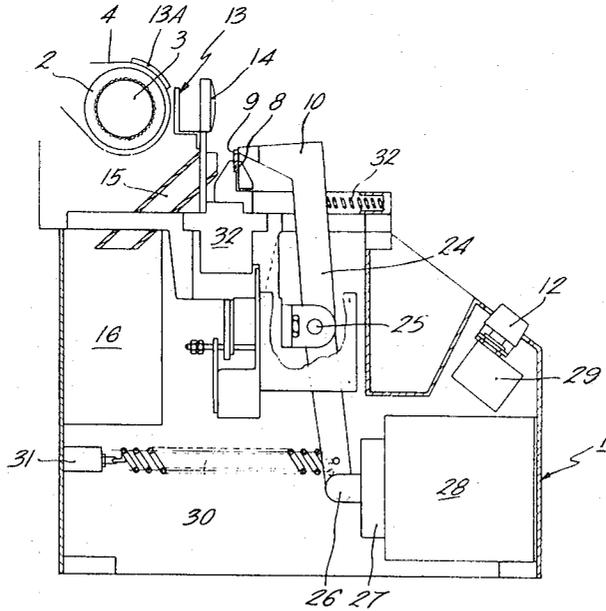
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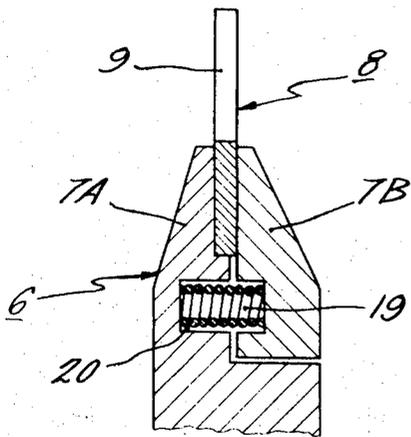
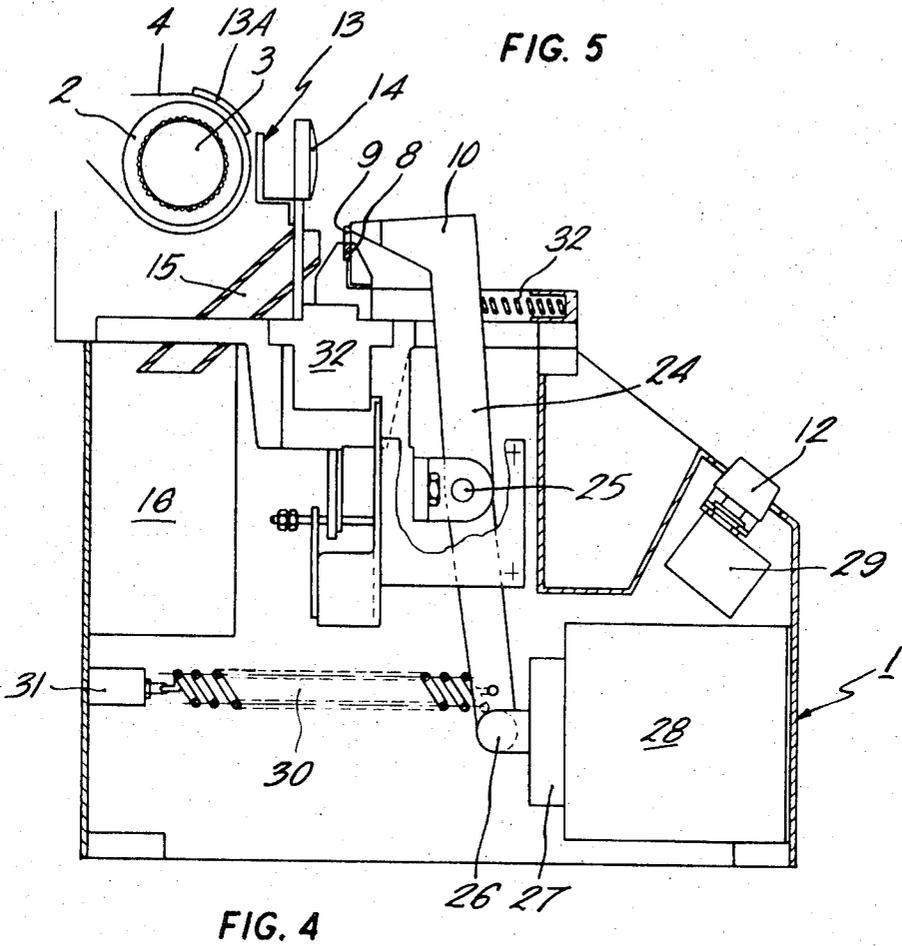
[52] **U.S. Cl.**.....**225/103, 234/131**
[51] **Int. Cl.**.....**B26f 3/00**
[58] **Field of Search**.....**225/103, 97, 93;**
234/131, 130, 59

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Primary Examiner—Frank T. Yost
Attorney—Parrott, Bell, Seltzer, Park & Gibson

[57] **ABSTRACT**
Apparatus for preparing pattern control elements for knitting machines by removing portions thereof which correspond to predetermined indications on a program, such as by removing teeth from a selector comb in a sequence indicated on a prepared program card.

5 Claims, 5 Drawing Figures





MACHINE FOR CUTTING TEETH ON SELECTOR COMBS FOR DRUMS AND OTHERS FOR KNITTING MACHINES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a machine for cutting or breaking off the butts or teeth from pattern elements or selector combs used in pattern drums and other mechanisms for knitting machines in order to mechanize this operation.

2. Description of PRIOR ART

As is known, pattern elements or selector combs are fitted to rotating pattern drums and determine the activation of levers operating selector jacks which control the movement of needles in their operative phases. These combs must be previously prepared to remove certain of their teeth according to pattern cards prepared in accordance with the cloth pattern to be manufactured.

SUMMARY OF THE INVENTION

The apparatus in accordance with this invention allows for complete mechanization of the above operations, according to an improved process which surpasses all arrangements which have been adopted to date. Said machine is characterized in that the breaking-off of the butts or teeth to be removed from a comb is performed by the action of a cutting instrument suitable for operating step by step for each tooth of the comb, there being between the comb and cutting instrument a relative displacement movement so that the cutting action is developed along said comb in accordance with a program card containing at certain points the respective indications for each type of cloth to be obtained, there being likewise a relative translation movement between said card and an indicator which successively indicates each point of said card, so that there is established a correspondence between said card points and the butts or teeth of the comb.

The magnitudes of the relative displacements performed with reference to the card, on the one hand, and to the comb on the other hand, are of the proportional type.

The cutting instrument, according to one embodiment, consists of a hammer which delivers impacts for breaking off the pertinent comb teeth, said hammer being of the rocker type and articulated to the moving armature of an electromagnet.

The combs are held in a clamp having a fixed jaw and a moving jaw, the latter being associated with pressing means consisting, a stop and, on the other hand, of a lever having a pressure cam. Guiding elements formed by transversal pins and separating elements formed by springs are transversely disposed between the two jaws.

The card indicating the teeth to be removed is placed on a rotary roller similar to those used on typewriter carriages, in order to advance successively the indications referring to each comb and so that each line of indications refers to one of the combs which are applied to a drum.

At the rear of the clamp there is a collector chute for the broken-off teeth, leading them to a pick-up container.

The machine may also be automated so that the use of punched cards, with respect to their indications,

determines the activation of the moving members by means of pertinent electronic equipment.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objectives and features of the invention will be disclosed in detail in the following description, with reference to the attached drawings in which:

FIG. 1 is a simplified diagrammatic side elevation of a machine for cutting teeth on selector combs according to the invention;

FIG. 2 corresponds to a front elevation of the machine of the previous figure;

FIG. 3 is a plan view of a comb holding clamp during the teeth cutting operation;

FIG. 4 is a cross section taken along line IV—IV of the previous figure;

FIG. 5 is a cross section of one embodiment of the machine according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

Essentially a machine according to the invention consists of a frame 1 having a roller 2, similar to that of a typewriter, with lateral knobs 3 for hand turning, the purpose of which is to hold and slide a card 4 containing squares which constitute the points where the indications 5 relating to the structure of a knitted cloth are arranged.

On the frame 1 there is a clamp 6 formed by a fixed jaw 7A and a moving jaw 7B, suitable for holding a comb 8, the teeth of which are to be cut as required.

The cutting of the teeth 9 is performed by a hammer 10 which delivers impacts at will, according to the indications 5 of the card 4 through the pertinent device.

The machine is controlled by a push button 11 controlling the step by step relative movement between the card 4 and the comb 8 and by a further push button 12 controlling the actions of the hammer 10. Alternatively, relative movement between the comb 8 and the card 4 may occur automatically.

The relative positions of the card 4 and the comb 8 are marked or indicated by a pointer or indicator 13 which indicates the indications 5 one after the other by way of an upper limiting cover 13A and the angular portion 13B. In order to facilitate the visibility of the indication 5 on which the machine is working at any set time, there is a magnifying glass 14 situated before such indication.

To collect the teeth 9 broken during the operation of the machine there is a collector chute 15 pouring them into a container 16 arranged for this purpose.

The jaws 7A and 7B have recesses 17 on their inner faces, in mutual correspondence, for housing guide pins 18 joined to one of said jaws. In other recesses 19 there are housed springs 20 which tend to separate the jaws to facilitate the introduction of the combs 8. At its rear part the moving jaw 7B has pressing means consisting of a screw 21 at one end acting as a stop and, at the opposite end, a lever 22 with a cam 23 to push the jaw into the comb 8 holding position.

The hammer 10 is mounted on a lever 24 which pivots about point 25 to form two arms, the end opposite said hammer 10 being pivotally mounted in turn at point 26 on the moving core 27 of an electromagnet 28. This electromagnet is energized when the push button 12 is pressed to close the contacts of an electric cir-

cuit for this purpose, said contacts being contained in a casing 29. A spring 30 mounted between a fixed anchorage point 31 and the lever 24 of the hammer 10 tends to separate the latter from the comb 8 during the inoperative phases. A further spring 32 dampens the backstrokes of the hammer 10.

A mechanical device automatically, or related with the push button 11, causes stepwise successive movement of the carriage 34 similar to the way of typewriters where a universal bar retracts a pawl from a rack bar so as to permit movement of a carriage under the force of a biasing means such as a spring (not shown in detail herein). Such stepwise successive movement displaces the comb 8 and the indicator 13 relative to the card 4 and hammer 10.

The foregoing description refers to a particular embodiment of the machine within the general scope of the inventive idea, although it is possible to obtain other embodiments based on the same idea. On a more perfected scale, insofar as simplification of operation is concerned, there is foreseen the construction of automatic machines for which punched cards will be used to energize electronic circuits determining the activation of the machine mechanisms.

Emphasis is placed in the relativity of the different operative movements of the machine. Thus the card 4 and the carriage 34 move relatively, one or the other of them being able to move in either direction. On the other hand, the comb 8 and the hammer 10 also perform relative movements, one or the other of said elements moving in one direction or the other.

In the embodiment illustrated it is established that the roller 2 does not move lengthwise, but is only rotary and, therefore, the card 4 does not move lengthwise either. In a similar fashion, the upper limiting cover 13A and the hammer 10 are fixed insofar as lengthwise translation is concerned.

On the contrary, the carriage 34 moves in its lengthwise direction and with it the elements mounted on it such as the clamp 6, the comb 8 the magnifier 14 and the indicator 13.

It is important to point out that, essentially, the movements of the operative parts of the machine have a value determined by the magnitude of the corresponding unit, thus, a card feeds step by step in shifts equal to the magnitude of each square on its face in the case that the card is moveable. In similar fashion a comb moves step by step in shifts corresponding to the magnitude of the width of its teeth, moreover, the relative movement between a card and the corresponding comb takes place in the form of proportional magnitudes.

What I claim is:

1. Apparatus for preparing pattern control elements for knitting machines by removing portions thereof which correspond to predetermined indications on a program, such as by removing teeth from a selector comb in a sequence indicated on a program card, the apparatus comprising

card mounting means for receiving a program card having at certain points thereon indicia identifying portions to be removed from a pattern control element,

element mounting means for receiving a pattern control element to be prepared in accordance with a program card,

element removal means supported adjacent said element mounting means for removing portions from a mounted control element,

program indicator means supported adjacent said card mounting means for indicating points on a mounted program card corresponding to portions of a mounted control element which are presented for removal, and

control means operatively connected with a first grouped means including said card mounting means and said element removal means and with a second grouped means including said element mounting means and said program indicator means, said control means moving one of said first and second grouped means relative to the other of said first and second grouped means for stepwise successive presentation of portions of a mounted control element and corresponding points of a mounted program card.

2. Apparatus according to claim 1 wherein said control means comprises carriage means mounting said second grouped means for stepwise successive translation relative to said first grouped means.

3. Apparatus according to claim 1 wherein said element removal means comprises hammer means for impact against portions to be removed and electromagnetic actuator means operatively connected with said hammer means for driving the same.

4. Apparatus according to claim 1 wherein said element mounting means comprises clamp means having a fixed jaw and a moving jaw and further comprises means for urging said moving jaw toward said fixed jaw and into clamping engagement with a pattern control element disposed therebetween.

5. Apparatus according to claim 1 wherein said card mounting means comprises roller means for receiving a program card and for successively advancing received card to display a selected one of a plurality of lines of indicia.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,730,412 Dated May 1, 1973

Inventor(s) Jose Maria Dalmau Guell

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

Column 1, line 53, "means consisting, a stop and, on the other hand, of a" should read -- means consisting, of a stop and a -- .

Signed and sealed this 20th day of November 1973.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents