

[54] **CIRCULAR KNITTING MACHINE WITH JACK REMOVAL SLOTS**

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**FOREIGN PATENTS OR APPLICATIONS**

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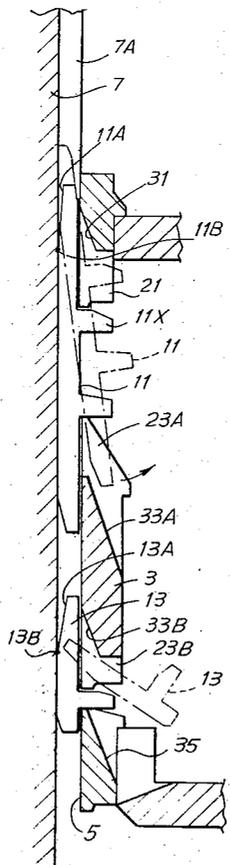
[58] Field of Search..... 66/57, 8, 78, 123, 50 R,  
 66/115, 75

[57] **ABSTRACT**

At least one through recess extends through the cam shell surrounding the rotary needle cylinder of a circular knitting machine at a predetermined position in line with the cam track therein to allow for withdrawal of the needles jacks therethrough. The upper and lower edges of the recess are chamfered to permit inclination of the jacks with respect to the needle cylinder to facilitate said withdrawal operation.

[56] **References Cited**  
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**2 Claims, 3 Drawing Figures**





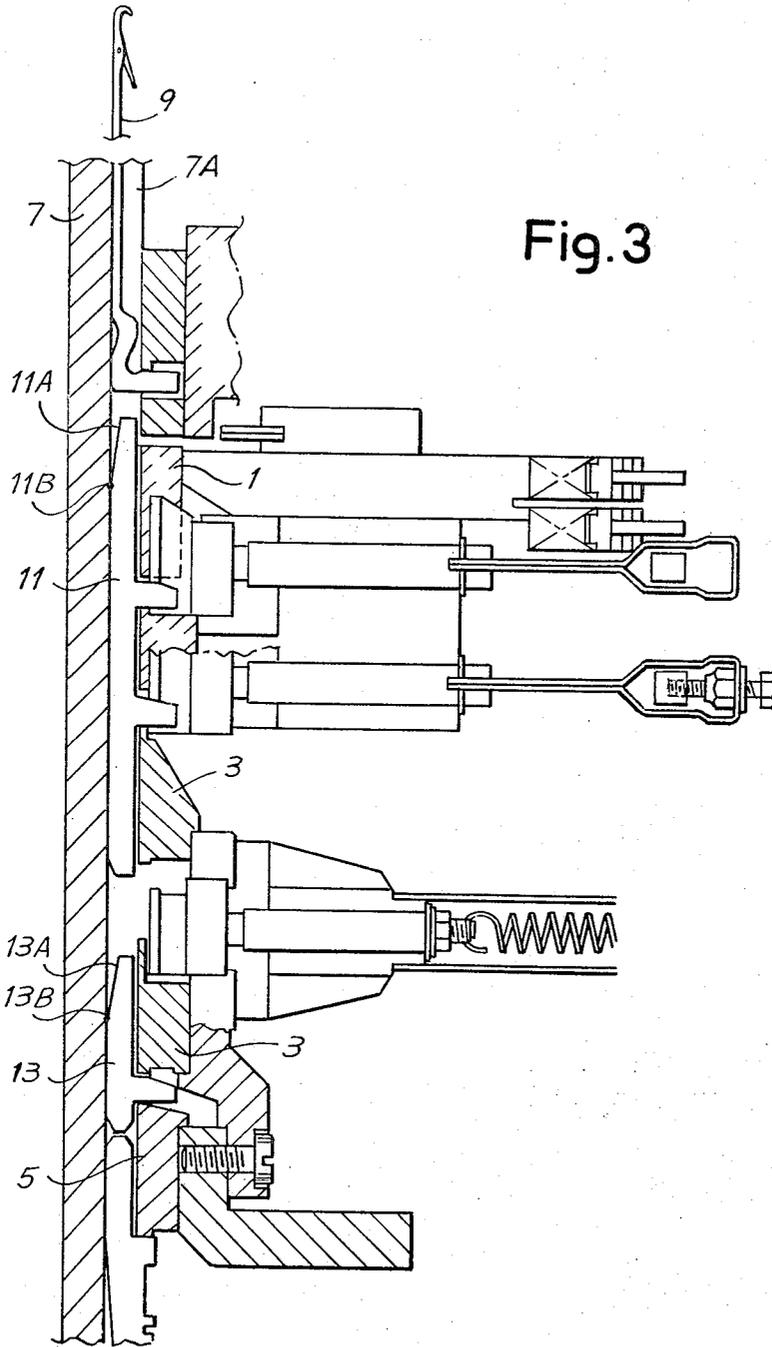


Fig. 3

## CIRCULAR KNITTING MACHINE WITH JACK REMOVAL SLOTS

In the conventional circular hosiery machines, both for hosiery and for stockings and socks, there is provided a rotary needle cylinder with a series of longitudinal grooves, containing needles, which obtain certain pattern effects controlled by sub-needles or jacks, which are arranged also in a multiple number in the needle grooves under the needles. For the control of these jacks or sub-needles, there is provided an annular member or the so-called shell of the cams, which surrounds at least a portion of the needle cylinder and carries a system of cams or cam profiles which engage and operate the jacks as one of the needle cylinder and cam shell rotates with respect to the other.

Because of the speed and the working mode of these jacks, and consequent wear thereof, the replacement of said sub-needles or jacks is often necessary and for this purpose, hitherto, there has been provided to make a portion of the shell demountable, an operation which is relatively complex, delicate and long. The present invention relates to an annular shell for the aforesaid purposes, which is provided with an arrangement which is designed to make the withdrawal of a jack, simple and quick without removal of portions of said shell.

The annular shell according to the invention substantially includes, in an angular position arranged to allow the replacement operations of the jacks, chamfered openings through the cam shell to allow an averting withdrawal of the jacks, the latter being chamfered also at least at one of the ends, to allow their inclination with respect to the associated sliding channel bottom.

In particular there is provided along each profile, an opening through the cam shell with a tapered wall on at least one of the upper or lower edges thereof, facing inwardly if on the upper edge and outwardly if on the lower edge. The openings are so dimensioned that the shell continues to assure the retaining of the jack during the usual transit in front thereof in the machine operation, but allows the withdrawal with an offset of the jack for sliding in the proper channel and subsequent inclination.

The drawing illustrates an embodiment of a shell according to the invention showing only to the portion thereof which affects the novelty effected therein.

In particular, in the drawing:

FIG. 1 illustrates a partial view of the shell from the interior thereof;

FIG. 2 illustrates a vertical section taken along the line II—II of FIG. 1;

FIG. 3 illustrates a vertical section in another intermediate position of the needle cylinder.

According to the accompanying drawing, the annular shell surrounding the needle cylinder at least in the illustrated zone includes three cam profiles 1, 3 and 5. A plurality of grooves 7a surround needle cylinder 7 and accommodate both the needles 9, and respective jacks 11, and additional jacks 13, whose butts are outwardly directed and conventionally controlled by cam profiles 1, 3, 5 carried by the cam shell.

In correspondence of the zone visible in FIG. 1 and sectioned in FIG. 2, the portions 1 and 3 present vertically elongated openings or recesses 21, 23A, 23B extending entirely through the thickness of the cam shell at a point intersecting the cam tracks. The openings are

defined by an upper edge and a lower edge and the distance between the upper edge and the lower edge is at least as great as the distance between the upper edge of the uppermost jack butt and the lower end of the jack. In correspondence of the recess 21, there is moreover provided an inwardly facing chamfer 31 beginning at the upper edge of the opening and tapering inwardly through the thickness of the cam shell; in correspondence of the recess 23A there is provided an outwardly facing chamfer 33A beginning at the lower edge of the opening and tapering downwardly through the thickness of the cam shell; in correspondence of the recess 23B there is still provided a chamber 33B turned towards the needle cylinder. A chamfer 35 is provided in the portion 5, directed towards the outside, like the chamfer 33A. The lower edges of recesses 23A and 23B are positioned at an elevation higher than the lower end of the corresponding jacks and sub-jacks during normal operation so that the jacks and sub-jacks are normally held in proper position.

The jack 11 has the upper end chamfered in 11A, and thus a pivot point 11B on the bottom of the channel 7A. The jack 13 also has an upper chamfer 13A and a pivot point 13B.

Usually the jacks such as those denoted by 11 and 13 are passed in the zone of the recesses and of the chamfers of the shell in the positions shown in FIGS. 2 and 3, whereby they are guided by the internal surfaces of the profiles 1, 3, 5 of the shell. When a jack is to be withdrawn, the cylinder is stopped with the jack to be disassembled, aligned with the recesses. Then for instance, the jack 11 is withdrawn, sliding it upwardly, which is allowed because the butt 11X thereof may move in the recess 21; by means of the chamfer 11A, the chamfer 31 and the recess 23A, the jack 11 may be inclined around the pivot point 11B and thus withdrawn along the chamfer 33A. Similarly the jack 13 may be withdrawn raising it, making it turn around the pivot point 13B and withdrawing it in the inclined arrangement, using the chamfers 33B and 35 and the recess 23B.

By reversing the operation one may insert another jack, which when fully seated in the cam track is ready for operation and will not inadvertently become dislodged.

What is claimed is:

1. In a circular hosiery machine of the type comprising a needle cylinder having a plurality of vertical slots therein receiving needles and jacks of the type having butts extending outwardly therefrom, and a cam shell surrounding said needle cylinder and having a system of cams therein which form a cam track for receiving the jack butts and operating the jacks according to a prescribed pattern as said cam shell rotates relative to said needle cylinder, the improvement comprising a vertically elongated opening extending entirely through the thickness of said cam shell at a point intersecting said cam track, said opening being aligned with and providing access to the butts of said jack at the point where the jacks pass said opening, said opening being defined by an upper edge and a lower edge, the distance between said upper edge and said lower edge being at least as great as the distance between the upper edge of the uppermost jack butt and the lower end of said jack, an outwardly facing chamfer beginning at the lower edge of said opening tapering downwardly through the thickness of said cam shell and an

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inwardly facing chamfer beginning at the upper edge of said opening tapering inwardly through the thickness of said cam shell, whereby selected jacks may be tilted for removal and insertion through the vertically elongated opening in said cam shell, the lower edge of said opening being positioned at an elevation higher than the lower end of said jack when said jack passes said open-

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ing during normal operation whereby said jacks are normally held in proper position during operation.

2. The improvement according to claim 1 wherein said jacks are chamfered at their upper ends adjacent the needle cylinder to permit their inclination in preparation for removal and insertion through said recesses.

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