

[54] **LOCK OR CAM ARRANGEMENT FOR KNITTING MACHINES**

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[30] **Foreign Application Priority Data**

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[58] Field of Search 66/78, 60, 64, 75, 154 A

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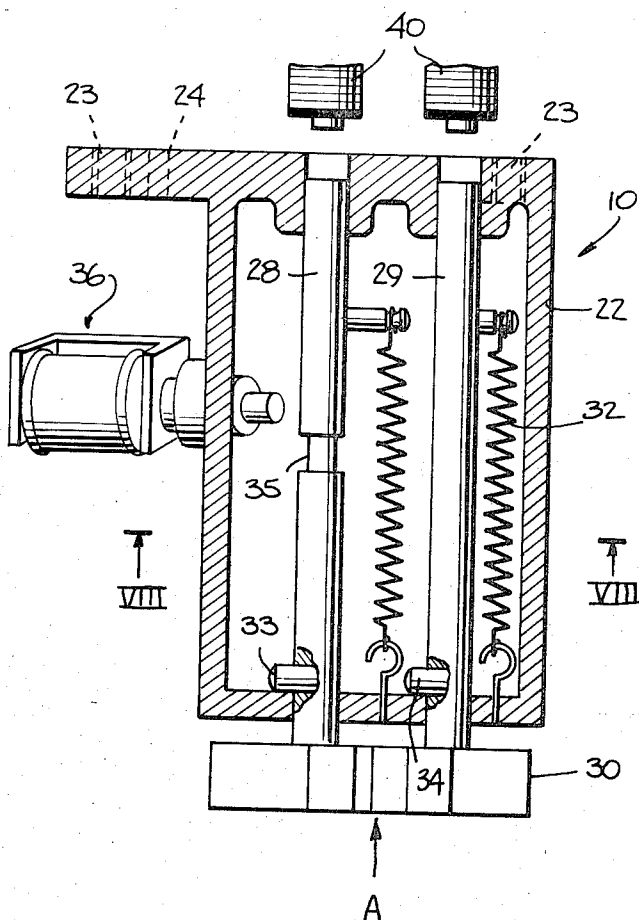
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[57] **ABSTRACT**

A knitting machine is made to be adaptable to a wide range of knitting patterns and knitting conditions by providing of a carriage, individual cam control structural units or modules which may be individually replaced. Each module has a standard mounting arrangement, but has individual cam and cam control arrangements.

12 Claims, 8 Drawing Figures



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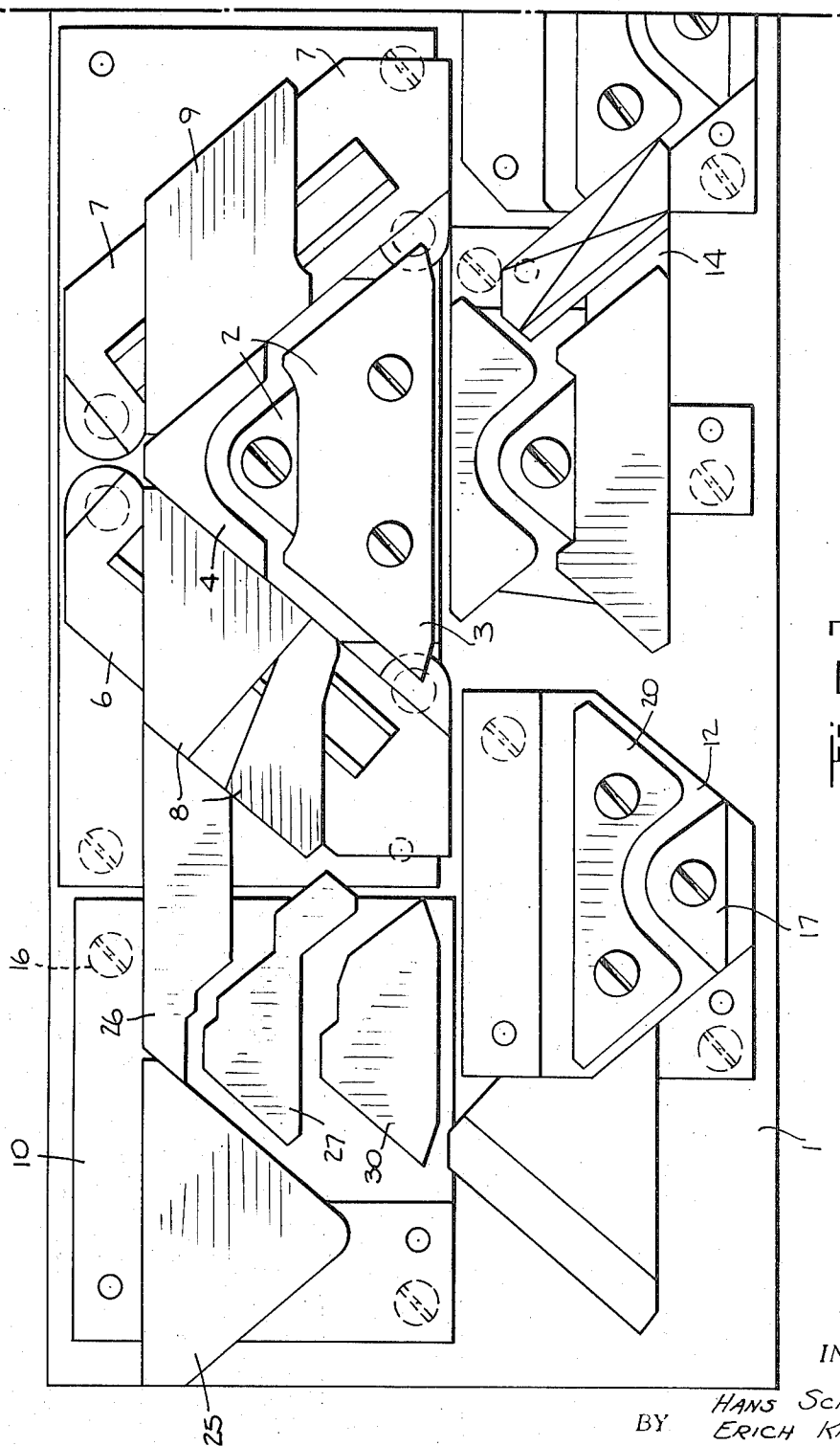
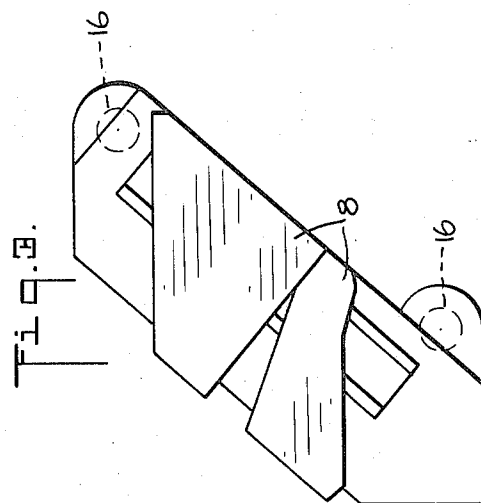
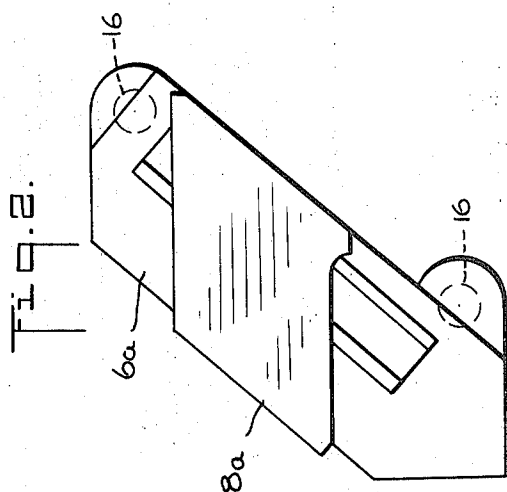
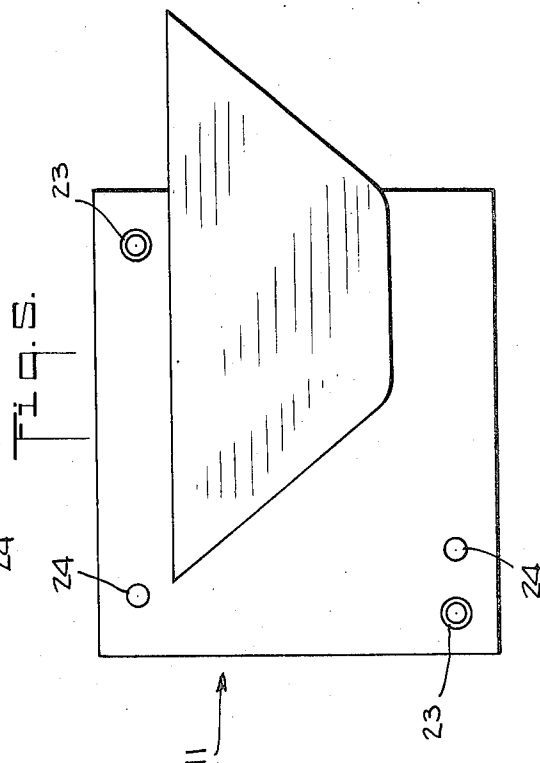
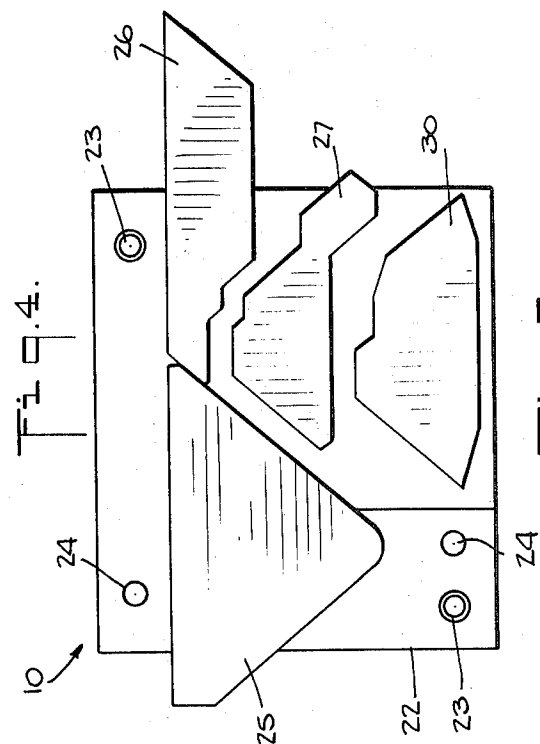


Fig. 1.

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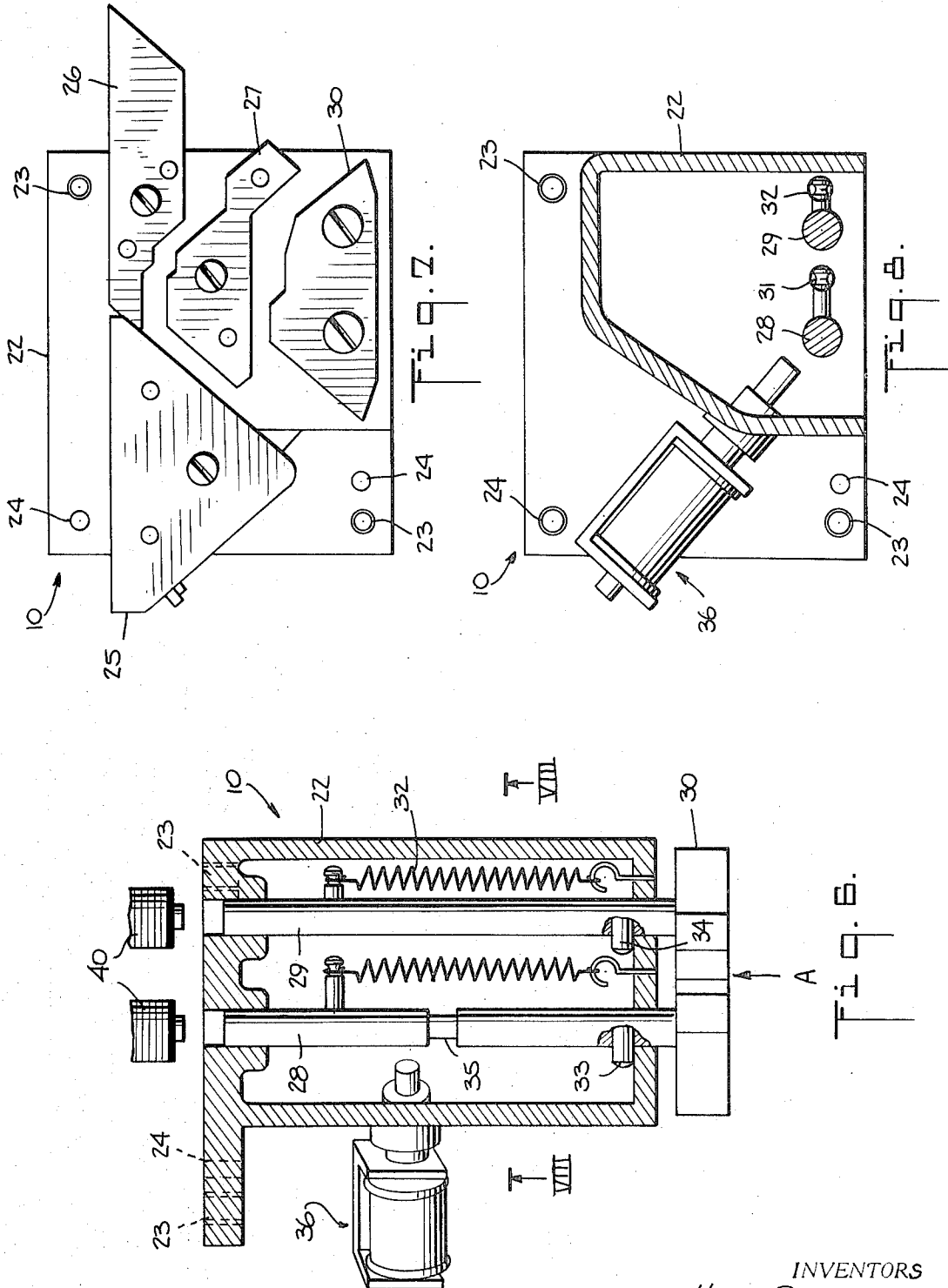
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LOCK OR CAM ARRANGEMENT FOR KNITTING MACHINES

The present invention relates to a switchable lock or cam arrangement for knitting machines, particularly flat-knitting machines.

Known switchable locks or switchable cams for flat-knitting machines are constructed in the manner that all cam parts for moving needles in the machine, as well as the means necessary for the switching of these cam parts, are mounted on a common base plate with which they form a single overall structure. Such locks must be designed very differently from each other since they must perform functions which differ, depending on the particular application of the knitting machine and the type of knitting to be undertaken. It frequently happens that with available knitting machines it is not possible, due to the shape of the various locks or cams in the machine, to knit new patterns in accordance with a fashion which has changed; so that as a rule, it becomes necessary to use a new machine having increased or different pattern possibilities.

To expand the switching capabilities of switchable locks or cams for knitting machines by conversion thereof is costly, if at all possible. For this reason, prior cams or locks have been quite complicated in their construction in order to provide large number of different functional possibilities. In the manufacture of knitting machines, difficulties arise upon assembly due to the fact that it must be determined at the very start of the assembling of the knitting machine what embodiment it is to have in its final condition. With relatively simple knitting machines, it has not been possible up to now to obtain many of the knitting combinations desired by the knitter. In order to have the possibility of all knitting combinations, the knitter must rather purchase complicated and expensive knitting machines.

It is an object of the present invention to provide a switchable lock or cam arrangement for knitting machines which can, in simple fashion, be adapted to the particular requirements of a given fashion of knit. In this connection, it becomes possible with the present invention, when assembling a knitting machine, to take into account in simple manner the special desires of the knitters.

The foregoing object is attained, according to the present invention, by means of a cam or lock arrangement which comprises a base plate and a plurality of structural units, each of which includes a guide for an associated cam, a cam locking device with switching means for same and a fastening device.

The structural units can suitably each be arranged in a separate housing, and space can be provided in the housing for a spring for biasing of the cams toward a particular position.

In one embodiment of the present invention, there is provided a structural unit wherein the housing is made of plastic. The cams of the individual structural units can be mechanically switchable and can be arranged to be held in position by locking devices actuated by electromagnets. However, electromagnets can also be provided for the direct switching of the individual cams.

The various individual structural units can contain needle raising cams, needle lowering cams, loop-transfer devices or safety devices.

There has thus been outlined rather broadly the more important features of the invention in order that the de-

tailed 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 illustrating schematically a part of a switchable cam arrangement in accordance with the invention for flat-knitting machines;

FIG. 2 is a top view illustrating schematically a needle lowering structural unit for the switchable cam arrangement of FIG. 1;

FIG. 3 is a top view illustrating schematically a structural unit for loop transfer for the switchable cam arrangement of FIG. 1;

FIG. 4 is a top view illustrating schematically a needle lowering structural unit for use with machines having a loop transfer device;

FIG. 5 is a top view illustrating schematically a safety-part structural unit for the switchable cam arrangement of FIG. 1;

FIG. 6 is a section view taken along the line VI—VI in FIG. 4;

FIG. 7 is a view of the structural unit of FIG. 6 in the direction of the arrow A in FIG. 6; and

FIG. 8 is a section view taken along line VIII—VIII of FIG. 6.

The embodiment of the invention shown and described herein comprises a switchable lock or cam arrangement in which selected cams are prepositioned by mechanical switching and the positions of the cam are fixed by means of electromagnets. In FIG. 1, there is shown a top view of a double system switchable lock or cam arrangement for flat-knitting machines with wrapping device and needle selection by pattern sinkers. Various individual structural units, shown schematically by way of example in FIGS. 2 to 5, can be introduced as exchange into such a switchable lock or cam arrangement.

In the switchable lock or cam arrangement shown, there are fastened to a base plate 1 a plurality of structural units, 2, 6, 7, 10, 12 and 14, by means of which there is composed a lock or cam configuration by which stitches or loops selected with long butt and short-butt needles can be formed which transfer loops and needles can be selected by means of cams via pattern sinkers.

The structural unit 2 is used for needle selection and is formed of a lower needle raiser 3, an upper needle raiser 4 and a base body 5, which are detachably connected to the base plate 1. Each needle raiser 3, 4 is switchable into fully inserted, semi-inserted or non-inserted position by electromagnets (not shown) fastened to the base body 5. If now the number of possible patterns is to be increased, the structural unit 2 for the needle selection can be replaced by another structural

unit in connection with which, for instance, in addition to the above-mentioned three positions, a fourth position is also possible without any change having to be made in the remaining construction of the overall lock or cam arrangement.

The structural unit 6, which is shown by itself in FIG. 3, contains adjustable needle lowerers 8 which can be switched in such a manner that they pass the knitting needles to the structural unit 10 (FIG. 1) for wrapping or for loop assuming and transmission. On the other hand, structural units 7 and 6a (FIG. 2), which are equipped with normal needle lowerers 9 and 8a, respectively, may be provided in the device. The structural unit 7 is shown in FIG. 1 in position incorporated in the lock, while in FIG. 2 the structural unit 6a, which is constructed as the mirror image of the unit 7, is shown by itself.

If, for instance, in the case of the lock shown, the structural unit 10 for the wrapping should no longer be required for a particular application, then the structural unit 6 for the loop transfer is replaced, for instance, by the needle lowerer structural unit 6a (FIG. 2), and the structural unit 10 is replaced by a safety structural unit 11, shown in FIG. 5. This last-mentioned structural unit has only safety parts 25 for covering the needle lowerer.

The structural units 12 and 14 shown in FIG. 1 serve to control pattern sinkers. These units can be either omitted individually as desired or be replaced by other corresponding structural units with different possibilities of cam selection and positioning.

In order to replace a structural unit, it is merely necessary to loosen screws 16 in the base plate 1, whereupon the structural unit can be removed and replaced by another structural unit which is then in its turn screwed fast. For example, the structural unit 12, which has a sinker raiser 17 which can be switched by corresponding electromagnets into non-engagement, half-engagement and full engagement, and a sinker lowerer 20 which can be switched by another electromagnet into half-inserted and disengaged position, could be replaced by a structural unit without the sinker lowerer 20, but with a sinker raiser which can be switched into one-third engaged, half engaged, fully engaged, and non-engaged position.

Switching of these elements is obtained by means of switching pulses fed to the base plate 1 of the lock by a trailing cable (not shown). Where the switchable lock or cam arrangement is installed in a mechanically switchable system, each structural unit will contain its own switching bolt which is disconnectable, in each case, with a corresponding switching bolt of the neighboring unit.

The structural unit 10 for the taking over and transfer of loops, is illustrated in detail in FIGS. 6, 7 and 8.

The structural unit 10 comprises a base body 22 in the shape of a housing which may be formed of a distortion-free plastic in order to minimize weight and to achieve economical manufacture. The base body 22 has screw holes 23 and pin holes 24 by means of which it can be attached to the base plate 1. In the case of a structural unit by which this structural unit 10 can be replaced, for instance the safety structural unit 11, the screw holes 23 and pin holes 24 are located at the same place in order to permit exchangeability. Safety parts 25 and 26 and a lift part 27, for loop transfer, are each firmly mounted on the base body 22. Two guide bolts

28 and 29 are movable in corresponding bore holes in the upper and lower walls of the base body. A lift part 30, for the taking over of loops, is fastened to the guide bolts 28 and 29.

Within the base body 22 there are provided tension springs 31 and 32 which pull downwardly upon and move the guide bolts 28 and 29 until limiting pins 33 and 34 mounted thereon come against the base body 22. In this position the lift part 30, for the taking over of the loops, can grasp the needle butts. This lift part 30 is urged upwardly mechanically by means of a wedge (not shown) upon each reversal of carriage or base plate movement. The lift part is then held in its upper position by means of a locking bolt actuated by an electromagnet 36 so that it enters into a groove 35 in the guide bolt 28. The lift part 30 may also be urged upwardly directly as by means of an electromagnet 40. With the above-described structural unit 10, it is possible to control, by selective energization of the electromagnet 36, whether the knitting machine needles are or are not to be driven out to take up loops.

The selection of needles for the transfer loops is obtained by means of the needle raiser 3 in FIG. 1. The needle lowerer 8 of the structural unit 6 for the transfer of the loops is divided, as shown in FIGS. 1 and 3. This needle lowerer is made up of two parts which can be disconnected so that the needles can be fed to the lift part 27 for the transfer of the loops. For this reason, the safety parts 25 and 26 and the lift part 27 do not have to be switchable for the transfer of the loops.

The structural unit 10 for the taking over and delivery of the loops can be replaced easily by the safety structural unit 11. This unit serves, in the case of machines without a wrapping device, to realign the needles. In this last-mentioned case, the structural unit 6 for the loop transfer would then also be replaced by the needle lowerer structural unit 6a of FIG. 2.

Having thus described our 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 our invention, that various changes and modifications may be made therein without departing from the spirit and scope of our invention, as defined by the claims appended hereto.

What is claimed is:

1. A switchable lock or cam arrangement on flat bed knitting machines, said arrangement comprising a base plate, a plurality of separate structural units, each of said structural units comprising a body, at least one guide having a cam attached thereto, said guide being movably mounted on said body for movement of said cam to different positions, separate switchable means also mounted on the body and positioned for locking its associated guide in preselected position with respect to the body and means for separately detachably mounting each structural unit as a separate integral body with its own associated guides, cams and switchable means contained thereon, separately onto said base plate, whereby said units are individually replaceable for obtaining any desired variation in knitting pattern.

2. An arrangement according to claim 1, wherein said structural units are each arranged in a separate housing.

3. An arrangement according to claim 2, wherein a spring is provided within each housing for biasing said guide, and its associated cam, toward a given position.

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4. An arrangement according to claim 2, wherein said housings are formed of plastic.

5. An arrangement according to claim 1, wherein each structural unit is provided with bolts for the switching of cams, each bolt being detachably connected with the corresponding bolt of the adjacent unit.

6. An arrangement according to claim 1, wherein each guide, and its associated cam, is mechanically movable and wherein there are provided locking devices actuable to hold said guides and associated cams in given position.

7. An arrangement according to claim 6, wherein there are provided electromagnets arranged to actuate

said locking devices.

8. An arrangement according to claim 6, wherein there are provided electromagnets arranged to obtain direct switching of the individual cams.

9. An arrangement according to claim 1, wherein the structural unit contains needle raisers.

10. An arrangement according to claim 1, wherein the structural unit contains needle lowerers.

11. An arrangement according to claim 1, wherein the structural unit contains loop transfer means.

12. An arrangement according to claim 1, wherein the structural unit contains safety means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,789,630 Dated February 5, 1974

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