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3,552,148

CAM ARRANGEMENT FOR KNITTING PATTERNED FABRICS

Filed Aug. 27, 1968

4 Sheets-Sheet 1

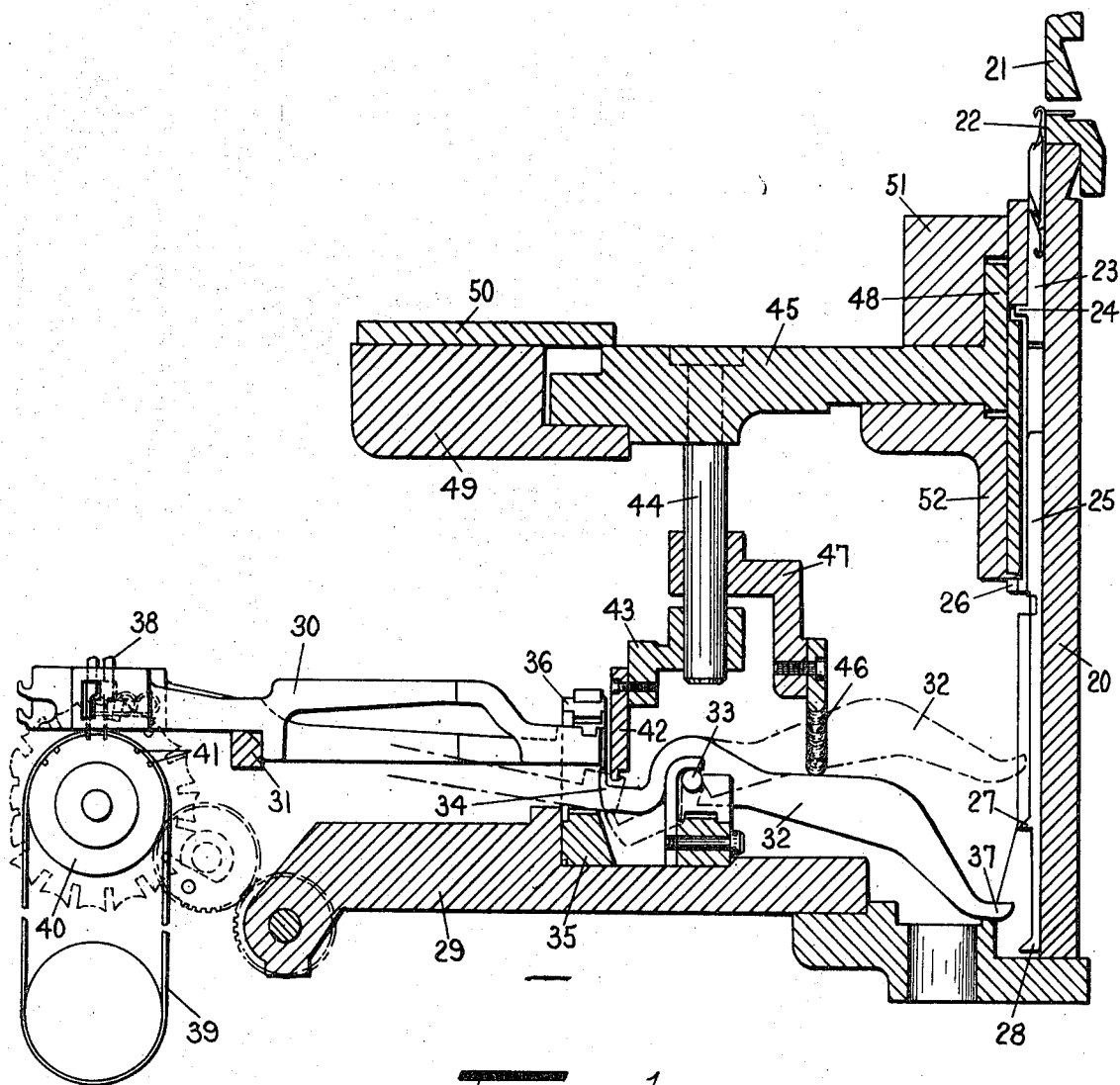


FIG. 1

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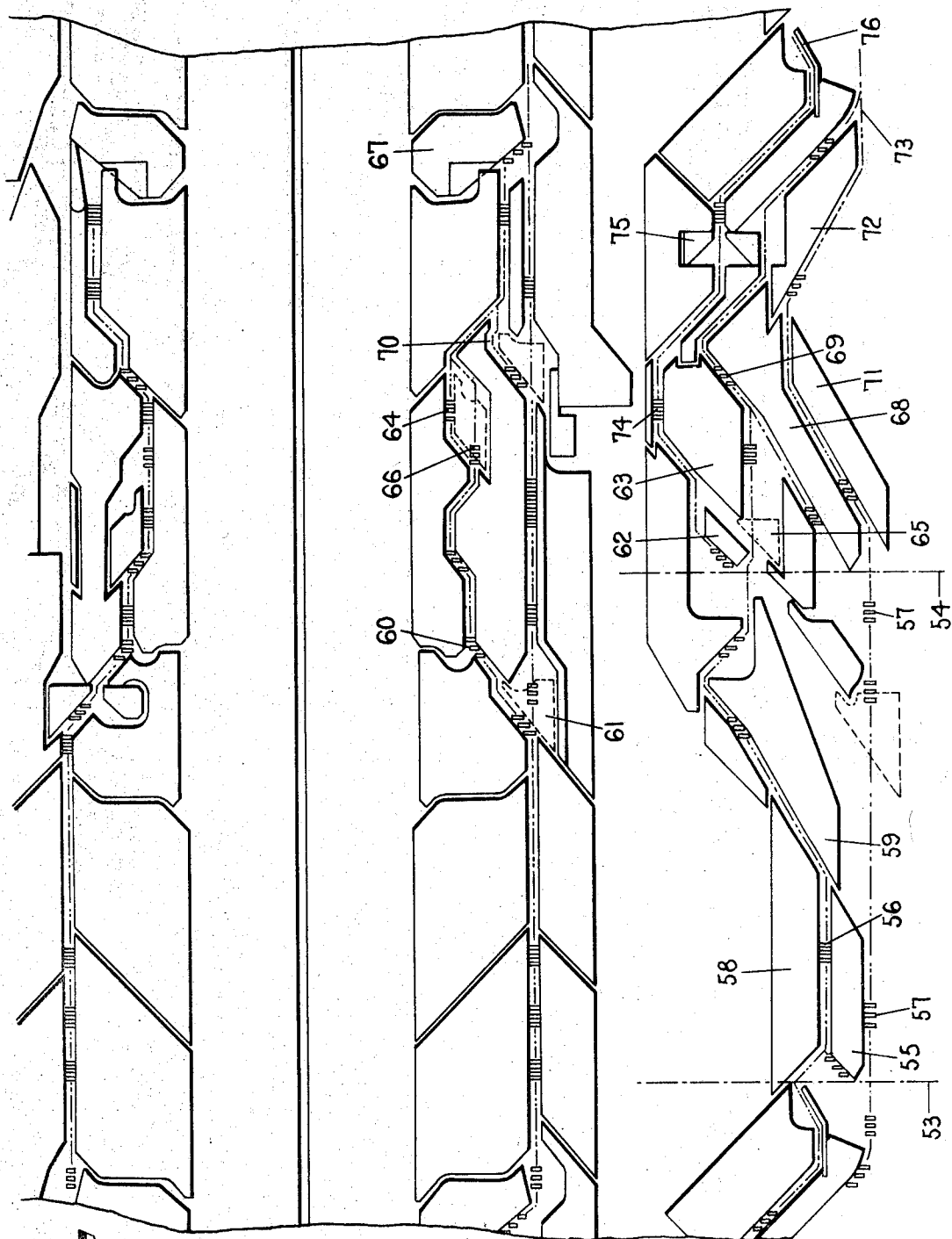
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4 Sheets-Sheet 3

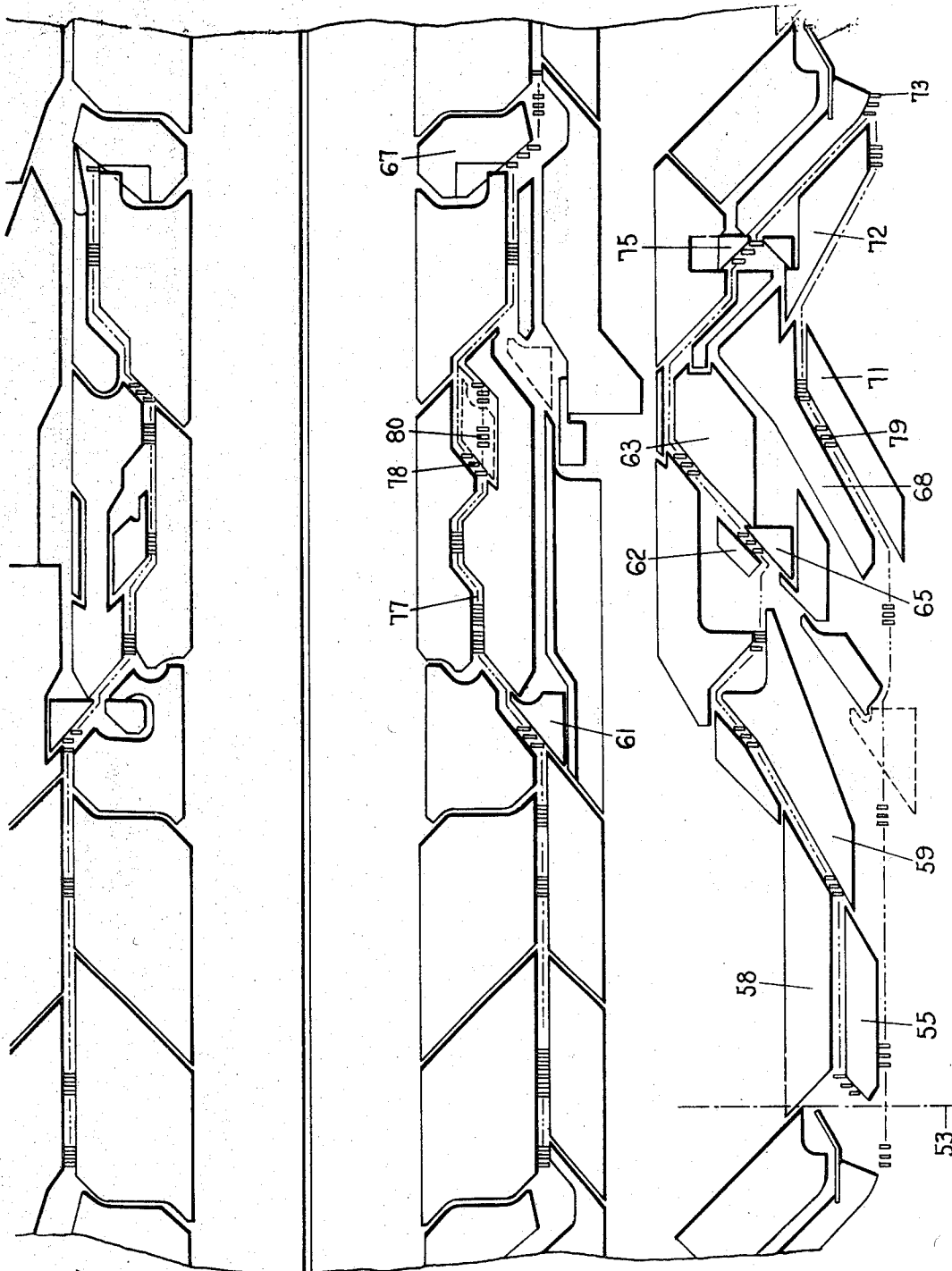


FIG. 3

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4 Sheets-Sheet 4

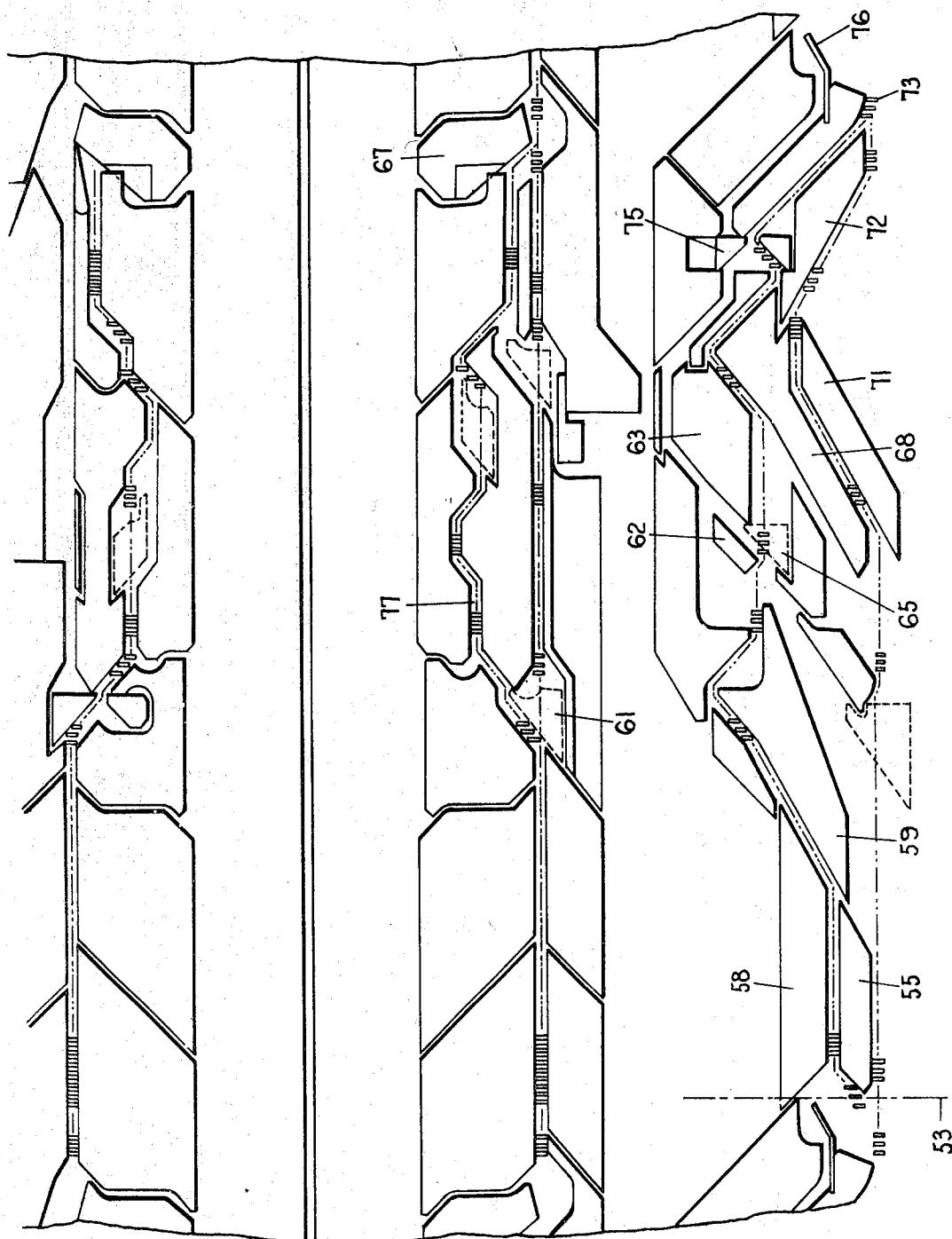


FIG. 4

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3,552,148 CAM ARRANGEMENT FOR KNITTING PATTERNED FABRICS

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U.S. Cl. 66—14

4 Claims

ABSTRACT OF THE DISCLOSURE

An arrangement of cams in multifeed, independent needle knitting machines of the double cylinder type whereby machine operations as single-selection or double-selection at each feed is interchangeably performed. The cylinder cams provide opportunity for knitting from single-selection patterns at cam sections capable of being set up for double selections.

BACKGROUND OF THE INVENTION

This invention relates to the cylinder camming in the sections of multifeed machines where continuous, strip-pattern indicating devices select needle jacks to be moved individually into cam paths for effecting a number of possible knitting functions. More particularly the invention relates to a novel camming arrangement which allows a double selection of each needle jack within each cam section and which with simple modifications of certain cam positions reverts to single-selection operation with its attendant advantages.

In double cylinder independent needle knitting machines having patterning devices it is well known to provide means for imparting two selective actions to the needle jacks within each cam section in order to accomplish any one of four possible knitting functions with individual needles. To provide this multiple choice, double-selection was possible at two successive points within each cam section by pattern-automats carrying endless jacquard cards, punched with two lines of holes spaced to index at each feed. With such mechanism, patterning possibilities were practically unlimited as each needle could be controlled individually at each feed and pattern repetition was only limited by the desired length of the jacquard card or the imagination of the knitter.

Less complicated patterns, requiring selection between a pair of possible functions, when knitted with the above camming set-up still needed the double line of holes which made the jacquard cards twice as long as might otherwise be desirable, as well as adding greatly to the preparation cost of the cards themselves. This invention seeks to overcome these problems by providing camming sections which are suitable for use in double and single selection operation and may be changed from one operation to the other by activating or inactivating certain cams. This will permit the use of single-selection cards with one line of holes and half their usual length on machines capable of easy conversion to double-selection operation for more complicated patterns.

SUMMARY OF THE INVENTION

The cam sections of a multi-feed superimposed cylinder knitting machine have gate cams governing selected cam paths which permit double selection within each section for four-choice selectivity and also permit single-selection operation for two-choice selectivity and operable with single-selection pattern cards. Each needle is individually selected in either case and remains under full control with the full range of selective operations possible at each subsequent feed. A new gate cam in one position provides

automatic carry-over for all jacks selected for transfer in double-selection work so that each jack will attain knitting height for reception of the needle in the following feed. In single-selection operation the same gate cam directs all jacks to the lower or welt height for a possible selection at the subsequent feed. In this second illustration the needle sliders will remain in the knitting path automatically and receive the downwardly transferred needle in readiness for another selection, if any.

It is a general object of this invention to devise a camming arrangement for use in a plurality of cam sections of a knitting machine as above-stated which will, with only minor and speedy adjustment, be completely functional for double or single-selection knitting operation.

It is a further object of the invention to provide in a double-selection type knitting machine means for operating as, and benefiting from, a single-selection mechanism.

It is a further object of the invention to devise adjustable gate cams for directing selected and non-selected knitting instrumentalities through desired cam paths in either single or double-selection operation.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in greater detail by reference to a specific embodiment thereof as shown in the accompanying figures of the drawings wherein:

FIG. 1 is a section taken through a part of a double cylinder knitting machine to which the invention has been applied,

FIG. 2 is a developed view of the needle and jack cams showing positions and pathways incidental to double-selection operation,

FIG. 3 shows the cams of FIG. 2 arranged for single-selection operation and providing for either a knit or transfer function, and

FIG. 4 shows the cams as in FIG. 3 arranged for a single selection between the function of knit or welt.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Now referring to FIG. 1, the invention will be described as it applies to a double cylinder, multifeed, body fabric knitting machine. A lower cylinder 20 and a fragment of an upper cylinder 21 are shown superimposed in alignment with each being slotted for carrying a series of double ended needles 22. The needles 22 are controlled at their lower ends by sliders 23 having butts 24 for actuation in cam paths. Below each slider 23 is a jack 25 with a butt 26 centrally located and two lifter butts 27 and 28 spaced apart upon its lower end.

Selecting means of the jacquard type is provided and supported upon an extending ring 29 of which there may be as many segments as there are separate pattern units per machine. Each unit covers a sector of needles and jacks and these sectors are evenly divided between knitting stations. These jacquard type selecting units, as illustrated in U.S. Pat. No. 2,281,721, include, among other parts, pivoted selecting levers 30 which bear upon bar 31 and when selected, may be pushed radially inwardly against the resistance of springs (not shown), and lifter levers 32 pivoted on rod 33 and having their ends 34 beneath the inner ends of the selector levers 30 and positioned in the same guiding slots therewith. A guide member 35 extends upwardly to 36 and is constituted as a reed or slotted means by which the ends of the levers are maintained in alignment and are restrained to a vertical path of motion as affected by cams to be described. The inner ends 37 of the lifter levers 32 are guided in the cylinder slots which are flared as shown and act upon the lifter butts 27 and 28 in a manner fully explained in U.S. Pat. No. 3,012,423.

The selecting levers 30 each carry a spring pressed pin

38 which functions as a feeler upon the surface of an endless pattern strip 39 having either a single or a double row of perforations for affecting the selecting levers 30 in accordance with the machine set-up desired. The pattern strip 39 is driven in an intermittent motion by a driven roll 40 having a plurality of longitudinally extending slots 41 which index beneath the rows of pattern strip perforations. Where a single selection between two knitting functions is to be made at each feed, only a single row of perforations is needed and only one movement by the driven roll 40 is required. Where double selection is to be made between four possible functions, a double row of perforations and two intermittent motions by the driven roll are needed.

When a perforation is detected by the pin 38 its lever 30 is pushed inwardly and is there contacted and depressed by a selecting cam 42 which is fastened to a bracket 43 attached to a depending rod 44. The rod 44 is carried by a disc plate 45 of the cam cylinder section which is rotated about the needle cylinder 20. A lever return cam 46 is fastened to a bracket 47 which is also carried by the rod 44 and acts to depress the lifter lever 32 after a selection has been made. A second pair of cams similar to selecting cam 42 and return cam 46 is not shown but follows immediately behind for effecting a second selection within the range of a particular feed, if set forth in the pattern. In the event the machine is set up for single selection only, this second pair of cams would perform no function as no levers 30 would have been pushed inwardly at that point.

The disc plate 45 has an inwardly disposed flange 48 and rotates upon a bearing member 49 with a cap 50. Section rings 51 and 52 are removably attached for rotation by the disc plate 45 and carry a plurality of cams inwardly directed for acting upon the various slider and jack butts as will be further considered below. It will be understood from the disclosure set forth in the above-mentioned U.S. patents that a selection initiated by the pattern strip, whether in single or double selection operation, will effect a raising action by the associated lifter lever 32 upon its jack 25, so that the selected jack will follow a cam path above and removed from the cam path followed by those jacks not there selected.

Referring to FIG. 2, the cams within a single knitting station or section are shown for both the upper and lower cylinders. The movement is in a counterclockwise direction so that the cams in rotating past a stationary needle slider and jack will travel from right to left as viewed in the drawings. In FIG. 2 the adjustable cams are fixed for double-selection operation with the first selection being made just prior to point 53 and the second just prior to point 54 in the cam movement. The cam paths formed by the lower set of cams will be followed by the butts 26 of the jacks 25 and the cam paths formed by the middle set of cams will be followed by the butts 24 of the needle sliders 23. The upper set of cams are associated with the upper cylinder 21 and sliders therein (not shown) will receive those needles transferred thereto. A first selection is made at point 53 just before the arrival of a dividing cam 55 whose upper surface forms a cam path as at 56 for jacks subsequently effecting either a knit or transfer function and whose lower surface defines the cam path as at 57 for jacks to subsequently tuck or welt. Cam path 56 passes beneath a guard cam 58 and over a knit cam 59 which raises the needle sliders to the upper path as at 60 where a second selection may divide them when reached by the second selection point 54. The needle sliders associated with the non-selected jacks following cam path 57 will pass in front of the guard cam 61 which is drawn with dotted lines to signify the "out-of-action" condition.

At point 54 a second selection may be made to divide both those jacks in the upper pathways 56 and those in the lower pathway 57 in order that each needle may per-

form a selected one of four possible functions. Jacks selected from those in pathway 56 will rise over the upper dividing cam 62 and over the transfer cam 63 which will cause the needle sliders to rise to point 64 and transfer to the upper cylinder. Those jacks in pathway 56 not selected at the point 54 will pass in front of the transfer gate cam 65 and allow the needle sliders to remain at a level 66 where the stitch cam 67 will cause the needles to knit. Jacks selected at point 54 from those in pathway 57 will pass over the tuck cam 68 and rise to the point 69 thus raising the needle sliders to a tuck height 70 to take yarn and tuck. Any jacks from pathway 57 not selected at point 54 will remain below the tuck cam 68 and may pass over a jack raise cam 71 and beneath a return cam 72 to the welt height at the point 73. All jacks will arrive at the welt height 73 in readiness for a first selection in the subsequent feed except those which were doubly selected for transfer and were raised to the point 74. From point 74 they will pass through a vertically movable carry-over gate cam 75 in its upper position and over a guard cam 76 which will automatically direct these particular jacks above the dividing cam 55 of the next feed to subsequently receive their transferred needles from the upper cylinder.

With the cams arranged as in FIG. 2, double selection by the patterning unit is accomplished with individual needles being selected for any one of four knitting functions. The jacks are immediately available for selection in the following cam section and even the jacks whose needles were transferred are automatically in position to accept them whereby the needles may knit in the lower cylinder or may transfer back to the upper cylinder by selection at point 54.

It is often desirable to knit a less complicated pattern requiring a single selection between two functions. This may be easily accomplished by slight changes in the gate cams just explained and will require pattern strips with a single row of perforations per feed thus reducing the overall lengths of the pattern strips and their rotative speed by half.

To operate as a single selection machine and to choose between the functions of knit or transfer, refer to FIG. 3 of the drawings. Selection will be made at point 53 only, and those jacks selected will pass over the dividing cam 55 and knit cam 59. The welt path guard cam 61 is in action so all needle sliders will follow the knit path 77. Transfer gate cam 65 is also in action so that all selected jacks will rise over the transfer cam 63 and raise their needle sliders as at 78 to transfer to the upper cylinder. The jacks not selected at point 53 remain in the lower pathway and at point 79 do not affect their needle sliders, which are at knit height 80 and will knit when contacted by the stitch cam 67. The carry-over gate cam 75 is in the lower position whereby all jacks are directed to the low point 73 at welt height for selection at the following feed. It is not necessary to hold the selected jacks in the carry-over height as all the needle sliders will follow the knit pathway in any case and will be in position to accept the downwardly transferred needles.

To change over to the single selection operation where either the knit or welt function is chosen, the welt path guard cam 61 and the transfer gate cam 65 are made inactive and selection is made as before at the point 53 with the selected jack causing its needle to knit. Selected jacks are raised and pass above the dividing cam 55 and the knit cam 59 where they raise their needle sliders to the knit path 77. Needle sliders associated with jacks not selected will pass in front of the inactive welt path guard cam 61 and remain at the welt height through the cam section. Those selected sliders in the knit path 77 will take yarn and knit at the stitch cam 67 and all jacks will pass into the following section at the height 73.

This invention provides an arrangement of cylinder cams which, with minor adjustment to certain gate cams,

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can be used for either single or double selection knitting at each feed. The arrangement allows for greater versatility in the knitted fabrics and provides the economic advantages of single selection knitting not previously possible in a double selection machine without major adjustment.

What is claimed is:

1. In an independent, multifeed knitting machine having superimposed aligned cylinders, needles carried by and movable in said cylinders, sliders individual to said needles in each of said cylinders, cam means forming a plurality of cam paths for actuating said sliders to cause their respective needles to perform varied knitting functions at each of said feeds, a plurality of selecting means serially disposed at each of said feeds to affect said needles for actuation by said cam means, said selecting means being effective through selection of said sliders individually at a given feed for actuation through said cam paths to cause said needles to perform a selected one of four knitting functions, said cam means at said given feed including movable gate-cams for selectively obstructing all but two of said cam paths to permit a single selection of said sliders by said selecting means to direct said sliders individually through one of two selected cam paths for actuation of said needles to perform a selected one of two knitting functions, and a further gate-cam in one of said two selected cam paths which is adapted to direct said sliders directed thereto by said first mentioned gate-cams toward a carry-over pathway when in a first position and toward a welt-height pathway when in a second position,

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2. The knitting machine as defined in claim 1 wherein said first mentioned gate-cams include a transfer gate-cam being adapted when in action to obstruct the one of said two selected cam paths which raises the sliders to a knitting height so as to raise said sliders to a transfer height irrespective of said selecting means.

3. The knitting machine as defined in claim 2 wherein said first mentioned gate-cams include a welt path guard cam having an active position for directing all said sliders upwardly to a knitting height and an inactive position whereby said sliders remain at a welt height.

4. The knitting machine as defined in claim 1 wherein said first mentioned gate-cams are each adapted to maintain preselected positions to cooperate in obstructing all but two of said cam paths whereby those sliders actuated by said single selection of said selecting means will follow one of said two selected cam paths and those sliders not actuated by said single selection will follow the second of said two selected cam paths.

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U.S. Cl. X.R.

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