

Feb. 9, 1971

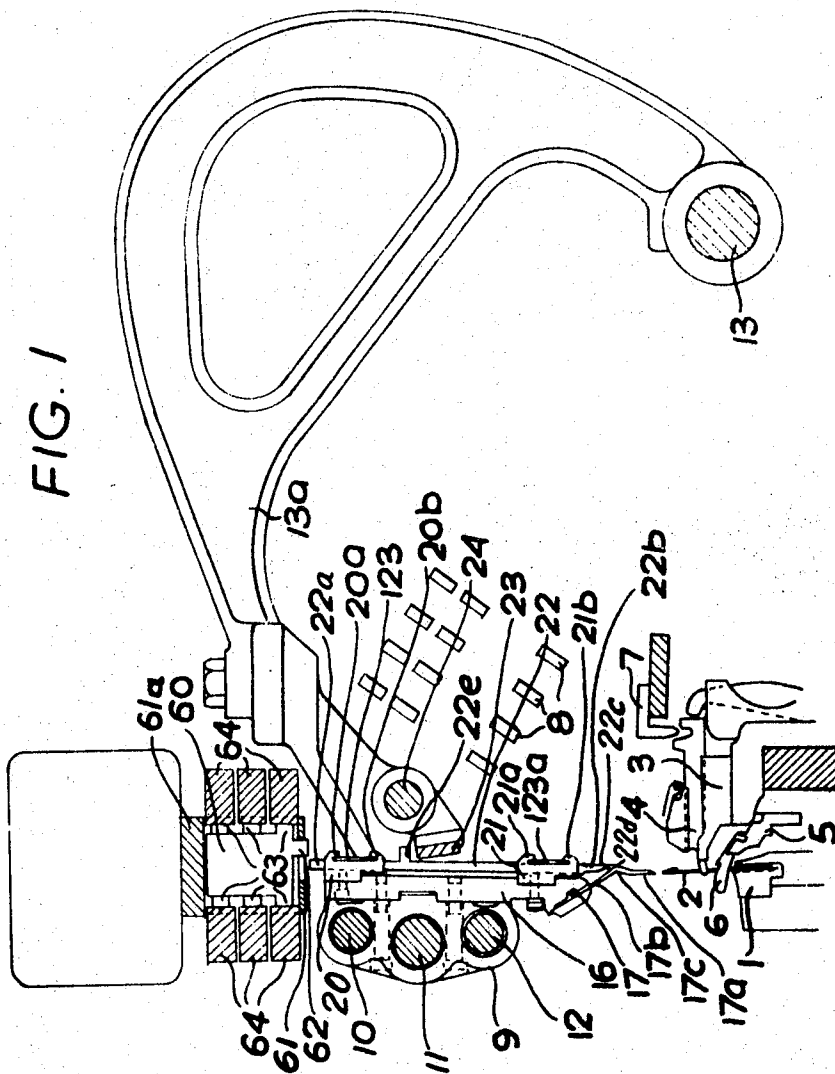
R. BLOOD

3,562,777

STRAIGHT BAR KNITTING MACHINES

Filed Dec. 9, 1968

4 Sheets-Sheet 1



Feb. 9, 1971

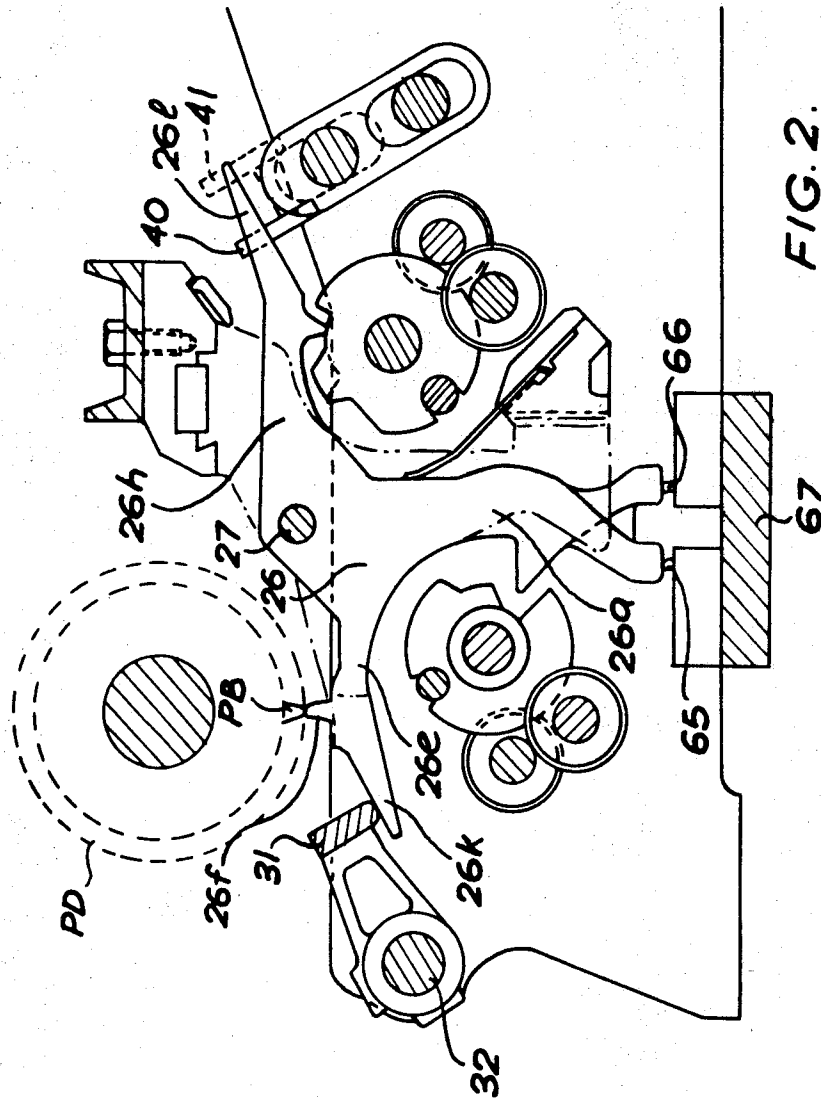
R. BLOOD

3,562,777

STRAIGHT BAR KNITTING MACHINES

Filed Dec. 9, 1968

4 Sheets-Sheet 2



Feb. 9, 1971

R. BLOOD

3,562,777

STRAIGHT BAR KNITTING MACHINES

Filed Dec. 9, 1968

4 Sheets-Sheet 3

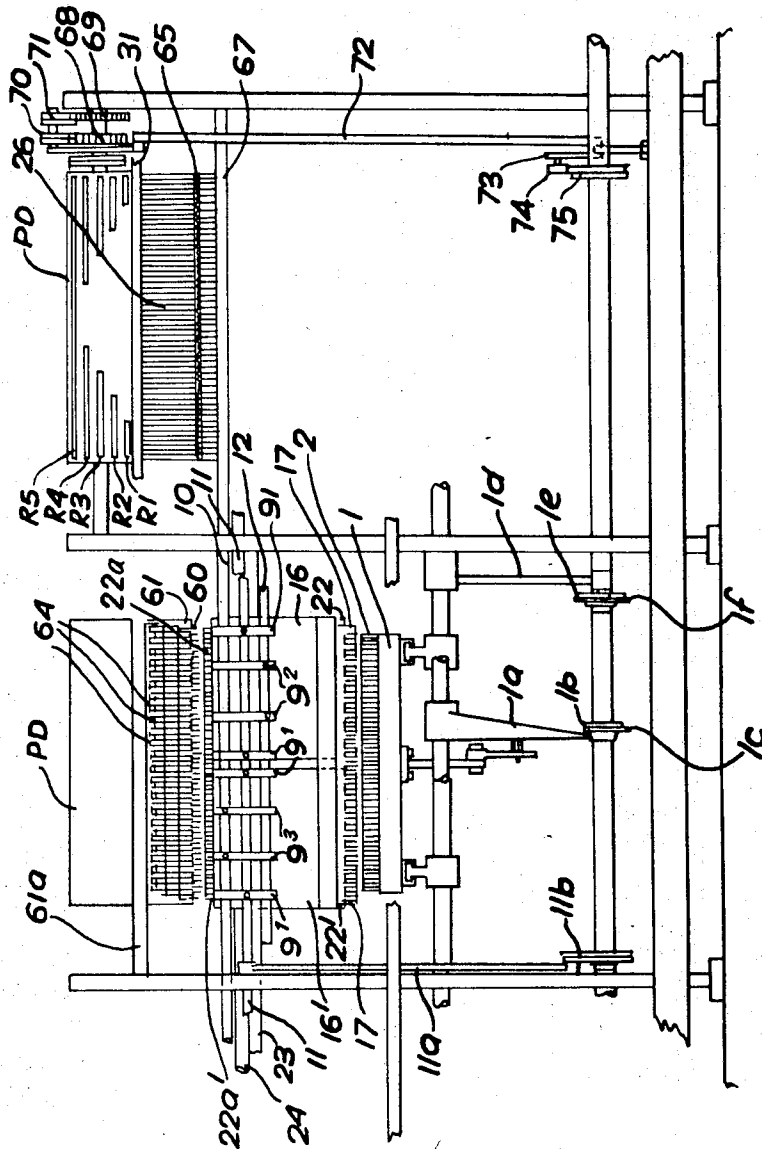


FIG. 3.

Feb. 9, 1971

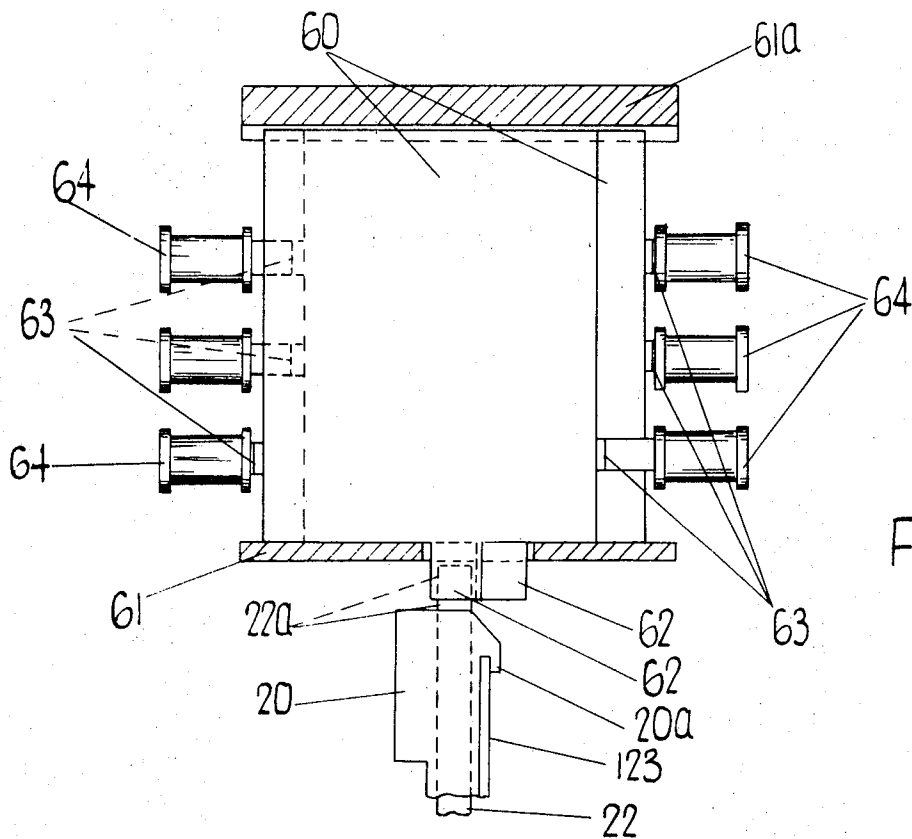
R. BLOOD

3,562,777

STRAIGHT BAR KNITTING MACHINES

Filed Dec. 9, 1968

4 Sheets-Sheet 4



1

3,562,777

STRAIGHT BAR KNITTING MACHINES

Raymond Blood, Shephed, Loughborough, England,
assignor to William Cotton Limited

Filed Dec. 9, 1968, Ser. No. 782,091

Claims priority, application Great Britain, Dec. 30, 1967,
59,288/67

Int. Cl. D04b 15/04

U.S. Cl. 66—96

10 Claims

ABSTRACT OF THE DISCLOSURE

In a straight bar knitting machine, common selecting means for control of fashioning, lace patterning, and loop doublings, the latter being at infinitely variable locations in a last knitted course of rib fabric to reduce the course length to that required for non-rib fabric to follow on, wherein the usual operable narrowing head has selector elements corresponding to the needles and selectively operable each bit its own associated electromagnetic device to render loop transfer points effective on the needles selectively, and wherein the electromagnetic devices are under control of a corresponding number of electric switches which are selectively operable by a variable pattern control means, or under control of a pattern drum or punched chart, or under control of endwise displaceable control bars and preset counter means for the loop doublings.

CROSS REFERENCES TO RELATED APPLICATIONS

Reference is made to British patent application No. 59,288/67 of Dec. 30, 1967, William Cotton Limited, from which priority is claimed.

This invention is for improvements in or relating to straight bar knitting machines and concerns operations such as loop doubling, lace patterning and fashioning.

According to one development in the art, lace patterning and fashioning is effected by use of a narrowing head in each knitting section and each having a row of flexible transfer points under control of a row of points controlling elements, the latter being selected for operation by use of a row of selector blade elements disposed above the narrowing head and selectively displaceable for lace patterning by a pattern drum, and for fashioning by recessed drums, at outer selvages and if required at inner selvages of a V neck. An advantage of this arrangement is that the selections are made automatically by usual raising movements of the narrowing head which in this instance carry the point controlling elements into co-operation with the selector elements. Evidently if changes are required in the lace patterning, the pattern drum arrangement must be changed in each knitting division.

According to another development, the arrangement according to the first mentioned development is modified for automatic loop doubling, as required for the last course of rib welts before having non-rib fabric knitted onto them, by use of parallel slide bars acting on the selector elements in the different knitting sections and adjusted stepwise along the selector elements by common lead screw mechanism, say in a non-knitting section, under control of an electric control including a pre-settable counter. An advantage of this arrangement is that the frequency of loop doubling is readily varied for different garments to suit requirements simply by pre-setting the counter to different numbers. Evidently lace patterning and fashioning can be effected as in the previous development changing of the lace patterning again requiring changing of the pattern drum arrangement in each knitting section.

2

An object of the invention is to provide a further improved arrangement for lace patterning, fashioning and loop doubling.

The invention provides a straight bar knitting machine having in each knitting section a narrowing head carrying a row of individually controllable loop transfer point selector elements displaceable each by its own associated electromagnetic device for selecting the transfer points to be effective and non-effective on the needles, and a control mechanism comprising variable pattern control means, and selectively controlling electric switches which are selectively operable by the variable pattern control means and are connected to the electromagnetic devices in each knitting section. The variable pattern control means is either of pattern drum or punched chart form, or of endwise displaceable bar form under control of pre-set counter means. Conveniently the transfer points are selectable through the intermediary of point controlling elements which are slidably displaceable in the narrowing head when the latter rises, by the selector elements to deflect or not deflect the points selectively between positions to be effective or non-effective on the needles. The selector elements are conveniently slidable plates disposed over the point controlling elements and slidable under a stationary bearing plate. The electromagnetic devices may be disposed in staggered arrangement and on opposite sides of the selector plates for sliding them positively in opposite directions. Conveniently the variable pattern control means is disposed in a non-knitting section and operates a row of control elements for the electric switches. These control elements are conveniently pivotal plates having projections for control by a pattern drum or a punched chart, and staggered arms for control of associated staggered electric switches.

The pattern drum or programme chart may be set out to provide selective control of the transfer points for lace patterning as well as loop doubling. Alternatively the loop doubling control can be obtained from a pair of parallel control bars acting on tail portions of the selector elements and which are oppositely displaceable by adjustable lead screw mechanism under control of an electric control system embodying a predetermining electric impulse counter with automatic re-setting to control operation of an electric motor for rotating the lead screws.

The pattern drum or programme chart, or the preset counter means, is adapted to provide for the loop doubling to any required frequency by either setting out the pattern bits, or the punched holes, or pre-setting the counter, such that the transfer points are selected for effective operation in groups which, for each of a plurality of fashion motions of the machine have added to, or subtracted from them, similar size groups.

The variable pattern control means may include selvedge control drums.

The foregoing and other features of the invention set out in the appended claims are incorporated in the specific embodiments to be hereinafter particularly described by way of example with reference to the accompanying drawings in which:

FIG. 1 is a sectional view of part of a knitting section of a straight bar knitting machine according to the invention.

FIG. 2 is a sectional view of part of a non-knitting section of the machine.

FIG. 3 is a somewhat diagrammatic view of relevant parts of the machine.

FIG. 4 is an enlarged cross-sectional view of sole-noid operated selecting plates in the machine.

Referring to FIGS. 1 and 3 a Cotton's straight bar knitting machine having a plurality of knitting sections and a non-knitting section is provided, and each knitting

3

section is represented by a needle bar 1 of bearded needles 2, operable by usual cam follower means 1a, 1d and knitting and fashioning cams 1b, 1c, 1e, 1f, a sinker bar 3 of sinkers 4, a knocking over bar 5 of knocking over bits 6, catch bar 7, thread carrier means 8, and a narrowing head, this being represented by blocks such as 9 (FIG. 1) and rods 10, 11, 12, and side arms such as 13a carrying the rod 11 and mounted on a pivot shaft 13. For operating the narrowing head to have dipping and rising motions about the axis of the shaft 13, as well known in this type of machine for fashioning, the rod 11 is connected by a link 11a to cam operating mechanism 11b.

Spaced blocks 91 (FIG. 3) are secured to the rod 11. To blocks 92 is fixed a half length bed plate 16 to which is fitted a half length row of loop transfer points 17, and to blocks 93 is similarly fixed a half length bed plate 16¹ to which is fitted a half length row of similar points 17. These points 17 are of bent flexible type comprising a downwardly projecting point portion 17a, and an inclined shank portion 17b, which joins with the point portion at a bend 17c.

Secured to the bed plates 16, 16¹ are guide bars such as 20, 21 having tricks for half length rows of point-controlling blade elements 22, 22¹ which are frictionally held such as by a cover plate 123, 123a inserted behind flanges 20a, 20b, 21a, 21b of the guide bars 20, 21 and which correspond to the row of elements 22.

In the position shown in FIG. 1, the narrowing head is in an upper position, and the elements such as 22 have upper portions such as 22a of at least some of the elements projecting upwardly from the bars such as 20.

The lower ends 22b of the elements such as 22, FIG. 1, have a recess 22c and a lower inclined face 22d, and the elements such as 22 are relatively slidable in the guide bars 20, 21 first for their inclined face 22d to bear against the bends 17c of the points 17 and deflect the latter and then for the recess 22c to fit on the bends 17c thereof with a releasable engagement.

The elements such as 22 also have a butt 22e engageable by a re-set bar 23 on a rocking rod 24.

Also in each knitting section is a row of control plates 60, FIGS. 1 and 4, which are mounted by suitable means 61 to be horizontally slidable transversely above the row of point controlling elements 22 and under a stationary bearing bar 61a.

Each plate 60 has a depending butt 62 and the plates are also formed with laterally projecting butts 63 at opposite sides and in a staggered arrangement.

For acting on the butts 63 there is a staggered arrangement of solenoids 64 at opposite sides of the plates 60.

It will thus be seen that the plates 60 are positively slidable in opposite directions by the solenoids 64 to selectively dispose the butts 62 over the point controlling elements 22, so that when the narrowing machine rises, the point controlling elements are selectively controlled some to deflect the points 17 into a position for effective operation on the needles, and the remainder not to deflect the points which remain in non-effective position. In the example of FIG. 4, the front plate 60 has been moved to the right and the rear plates 60 have been moved to the left. Consequently the front butt 62 has held the front blade 22 down when the narrowing head with the bar 20 was last raised as indicated by the part 22a in full lines, so that the corresponding transfer point has been deflected into operative position, whereas the rear blades 22 have not been thus held so that their corresponding points have not been deflected and they remain in inoperative position as indicated by the part 22a in broken lines.

This arrangement provides that by suitable selective operations of the solenoids, the points can be selected for lace patterning, fashioning, and loop doubling.

For loop doubling the arrangement is that, in one instance, first there is selected a small group of the point at the selvage locations, so that in a first operation of

4

the narrowing machine, only these small groups of points transfer loops inwardly to provide outer loop doublings. Then for a following operation of the narrowing machine, there is added to each of the outer groups of points, a similar group of the points at the inner side of the outer groups, so that these four groups of points transfer there loops inwardly to provide a second pair of loop doublings, and so on until all required loop doublings are provided.

A particular advantage of this arrangement is that by providing a suitable pre-settable control means for the solenoids, it can be arranged for the loop doublings to be at any practical frequency and spacing, and lace patterning and fashioning can also be effected.

A suitable control means is shown in FIGS. 2, 3 and is provided in the machine's non-knitting section.

The control means comprises, a row of selector elements 26 pivoted at 27. Each element 26 has a downwardly projecting arm 26a, FIG. 2, conveniently in staggered relation and operable on staggered micro switches 65, 66 which are connected to the solenoids 64 in each knitting section of the machine.

Each element 26 may have a second arm 26e with an upward projection 26f for co-operation with pattern bits such as PB of a pattern drum PD or a punched programming chart, and a tail part 26k for co-operation with a reset bar 31 on a rocking shaft.

Evidently the pattern drum or programme chart can be set out with pattern bits or holes in necessary manner to provide for selection control of the switches 65, 66 and consequently of the solenoids 64 and points 17 to provide for lace patterning by individual selection, and/or for necessary group selection to provide for fashioning and/or the required loop doubling control as hereinbefore described.

In the instance of the pattern drum PD for forming the loop doubling, the pattern drum D has progressively increasing length rows R1-R5, FIG. 3, of the pattern bits such as PB for acting on progressively increasing length rows of the selector elements 26. The drum is racked on or back when required by operation of oppositely toothed ratchet wheels 68, 69 engaged by pawls 70, 71 respectively and which are operated by a link connection 72 to a cam follower 73 having a cam follower lever 74 engaging a cam 75, with suitable selection control means for the pawls 70, 71.

In an alternative arrangement for the loop doubling control, each selector element has a third arm 26 formed with a tail portion 261 for co-operation with a pair of control bars 40, 41 which are progressively adjustable inwards by suitable means to locations under the tail portions 261 for holding progressively increasing size groups of the selector elements 26 in position for their butts 65, 66 to operate progressively increasing size groups of the switches 65, 66 whereby the corresponding plates 60 are operated and the corresponding points 17 become deflected into operative position for transferring loops in progressively increasing size groups to form the loop doublings.

A particular advantage of the foregoing arrangements is that whenever changes are required for lace patterning or frequency of loop doubling, this is achieved by change of controls in the non-knitting section only which will automatically effect the changes required in all the knitting sections.

I claim:

1. A straight bar knitting machine having in each knitting section a narrowing head carrying a row of individually controllable loop transfer points and selector elements therefor, electromagnetic devices one to each selector element, for the latter to be selectively displaceable by the electromagnetic devices into position to render the transfer points effective and non-effective on the needles, and in a non-knitting section of the machine, a control mechanism comprising a variable pattern control device and electric switches selectively operable by operation of the variable pattern control device and con-

5

nected to the electromagnetic devices in each knitting section.

2. A machine according to claim 1 wherein the variable pattern control device is a pattern drum.

3. A machine according to claim 1 wherein the variable pattern control device is of endwise displaceable bar form.

4. A machine according to claim 1 having point-controlling elements which are slidably displaceable in the narrowing head when the latter rises, and are slidable through the intermediary of the selector elements to deflect and not deflect the points selectively between positions to be effective and non-effective on the needles.

5. A machine according to claim 1 having point-controlling elements which are slidably displaceable in the narrowing head when the latter rises, and are slidable through the intermediary of the selector elements to deflect and not deflect the points selectively between positions to be effective and non-effective on the needles, and wherein the selector elements are slidable plates disposed over the point controlling elements and slidable under a stationary bearing plate.

6. A machine according to claim 1 wherein the electromagnetic devices are disposed in staggered arrangement and on opposite sides of the selector elements for sliding them positively in opposite directions.

7. A machine according to claim 1 having disposed in the non-knitting section a row of control elements operable by the variable pattern control means and operable on the electric switches.

8. A machine according to claim 1 having control elements in the form of pivotal plates, projections on the control elements for control by the variable pattern con-

6

trol means, and arms on the control elements for control of the electric switches.

9. A machine according to claim 1 having control elements between the variable pattern control device and the electric switches, tail portions on the control elements, and a pair of parallel control bars which are oppositely displaceable to be operable on the control elements selectively.

10. A machine according to claim 1 wherein the variable pattern control device is adapted to provide for loop doubling to any required frequency by setting out the pattern bits such that the transfer points are selected for effective operation in groups which, for each of a plurality of fashion motions of the narrowing head have added to, or subtracted from them, similar size groups.

References Cited

UNITED STATES PATENTS

3,141,316	7/1964	McCarthy et al.	66—89
3,292,395	12/1966	Bentley et al.	66—89
3,376,717	4/1968	Scheller et al.	66—89X
3,398,554	8/1968	Start et al.	66—96X
3,435,638	4/1969	Start et al.	66—89
3,439,313	4/1969	Hill et al.	66—89X

FOREIGN PATENTS

558,991	1932	Germany	66—96
---------	------	---------------	-------

RONALD FELDBAUM, Primary Examiner

U.S. Cl. X.R.

66—89