

May 25, 1937.

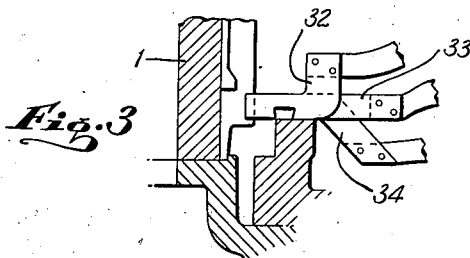
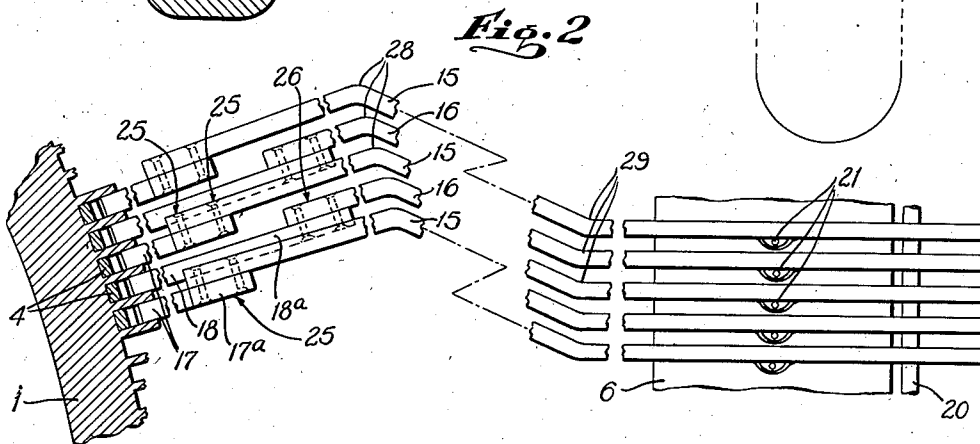
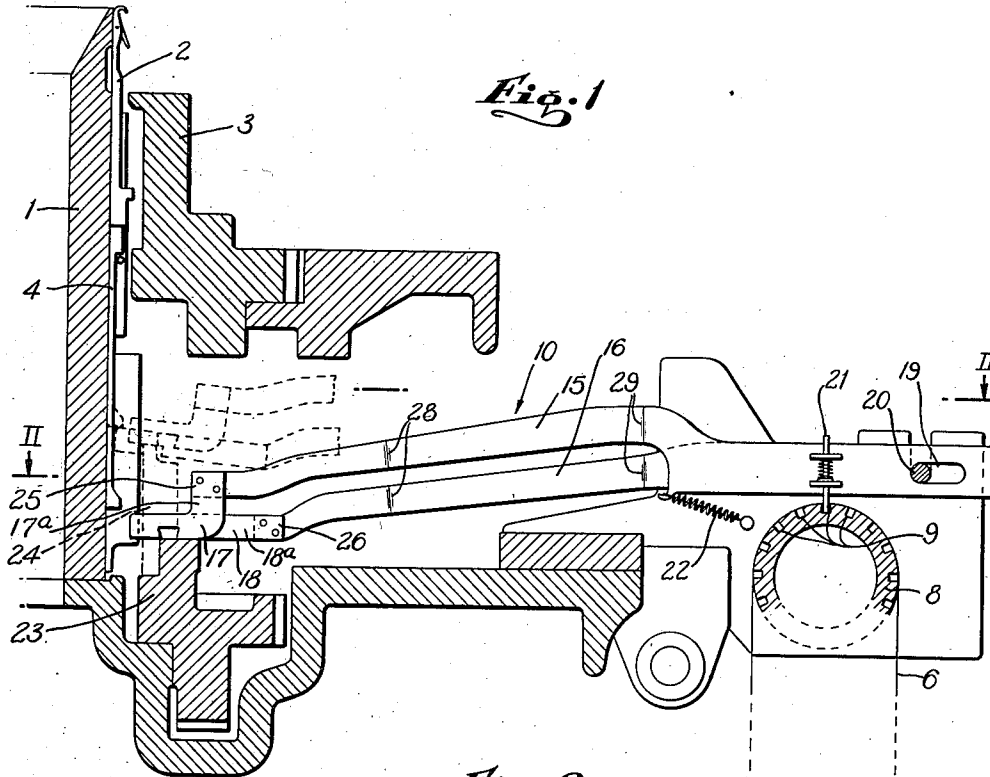
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2,081,637

PATTERN MECHANISM

Filed July 29, 1936

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 4

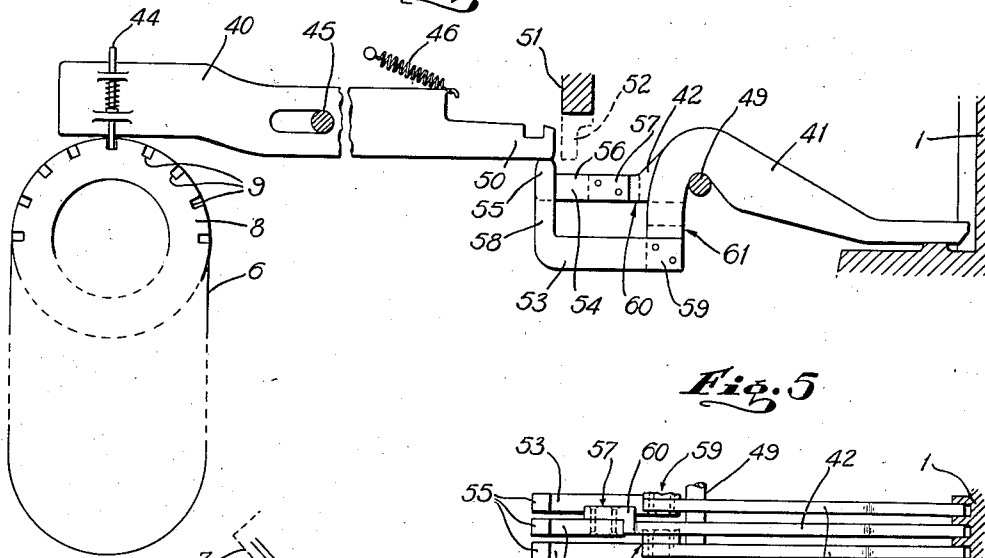


Fig. 5

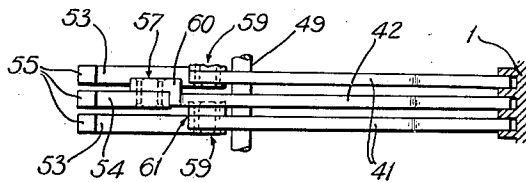


Fig. 7

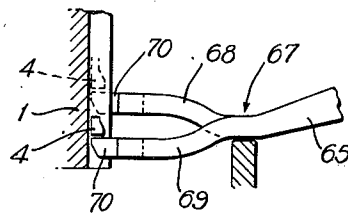


Fig. 8

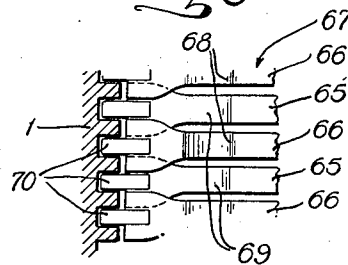
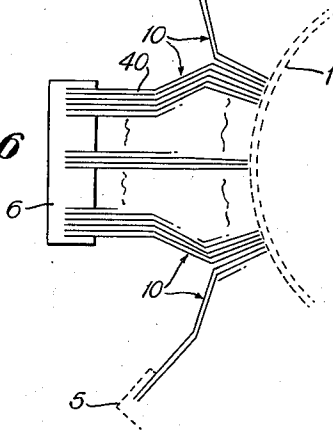


Fig. 6



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2,081,637

PATTERN MECHANISM

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Application July 29, 1936, Serial No. 93,193

7 Claims. (Cl. 66—50)

My invention relates to pattern mechanisms for knitting machines, and particularly for controlling the operations of the stitch-forming instruments, i. e. needles, sinkers, pressers, etc., of circular knitting machines, of the type wherein bar-like members, levers or the like (usually called selectors), say sufficient in number to control the formation of each stitch, are employed to effectuate the call of the pattern or patterns on the controlled devices.

In order that they may be made to better resist wear or for other reasons, it is desirable frequently that these selectors be made up of separate and distinct pieces suitably fastened together, rather than composed each of a single integral piece. Commonly these different parts of a selector are fastened together in such a manner as to make the selector thicker at the connections than elsewhere, and this extra thickness may impose a limitation on the number of selectors that can be disposed in a row, and accordingly impose a limitation on, for example, the number of stitches per inch of fabric that can be controlled individually.

My invention eliminates this limitation and permits the selectors to be located quite as close together, side by side, as would be possible if they were not thus extra thick at any part. To this end, briefly, I offset the connections between adjacent selectors in the manner hereinafter disclosed. For example: In order to place the greatest number of selectors controlling needles in the space available for them, it will be necessary to place certain of these distinct and separate parts as close together, in a row, or rows as possible. For brevity, I call these particular parts "shoes"; the remaining part or parts of each selector I call the body portion, although the latter need not be of greater extent than the shoes. As between each two adjacent shoes, I extend a part of one shoe beyond the other in one direction and extend the other shoe beyond the first in another direction so that the two shoes themselves have parts lying in other than a side by side relation, and I connect the body portions of the respective selectors to these shoes at these projecting parts. This displaces the extra thicknesses of adjacent selectors from each other and can be employed to place the extra thicknesses in sections of the selectors where they will not interfere with a close grouping of the selectors side by side.

Further, in circular knitting machines, this type of pattern mechanism usually requires that the feelers on the selectors, which engage the

pattern, be disposed in a straight line or straight lines, and to adapt the selectors to both the straight line disposition of their feelers and the circular forms of the knitting machines, one common form of this type of pattern mechanism uses selectors that are bent, or otherwise are offset transversely, intermediate their ends. This transverse offsetting may cause such interference between adjacent selectors, in operation, as to limit the number of selectors that can be used to a number less than the number otherwise permitted by the offsetting at the shoe connections. To avoid this, where necessary, I preferably employ the shoe offsetting with certain forms of selector arrangements as appears hereafter whereby this limitation is avoided. Additionally therefore my invention also permits full use to be made of advantages inherent in the offsetting at the shoe connections.

The accompanying drawings illustrate preferred forms of my invention. Fig. 1 is a section of part of a circular knitting machine with part of a pattern mechanism to control operation of the needles shown in elevation. Fig. 2 is a sectional plan view of parts of Fig. 1 at about the broken line II—II of Fig. 1. Fig. 3 is a sectional elevation illustrating a modification. Fig. 4, mostly in elevation, shows my invention embodied in another form of the same type of pattern mechanism. Fig. 5 is a plan view of a portion of the mechanism of Fig. 4. Fig. 6 is a diagrammatic plan view illustrating the general arrangement of pattern mechanisms of the forms illustrated with relation to circular knitting machines. Fig. 7 in sectional elevation, and Fig. 8 in sectional plan, illustrate a modified form of attachment and also the use of my invention to provide selectors with narrow ends, as may be desirable to control needle operation in quite fine gauge machines.

The figures of the drawings are somewhat diagrammatic, are more or less out of proportion, and are drawn to different scales, in order to better illustrate the subject matter.

The knitting machines illustrated have stationary needle cylinders 1 that are slotted to carry sliding latch needles 2. The latter are operated in part by the usual rotating cam ring 3 and cams carried thereby as will be understood. A jack 4 is provided in each needle slot, below each needle, to, in effect, extend the needles lengthwise in order that the pattern mechanism hereafter referred to may be conveniently located. The needles 2 and jacks 4 can be regarded as representative of the parts or instruments of

knitting machines that may be controlled by my invention. In the form of pattern mechanism illustrated, the pattern itself is divided into a number of sections that are distributed at appropriate places around the vertical axis of the machine (note 5, 6, 7, etc., Fig. 7), and each of which (e. g. 6) is carried by a rotatable pattern drum 8 (Fig. 1). The pattern or pattern sections (of which the section 6 is illustrative), is perforated in accordance with the desired operation of the needles, and the pattern holding drums 8 are slotted longitudinally as at 9 in such a manner that the perforations in the pattern fall above the slots. The selectors 10, say one for each needle of the knitting machine, are arranged in groups allocated one group to each pattern section and to an individual group of adjacent needles (Fig. 6). Generally speaking, the pattern mechanisms illustrated raise the jacks 4 selectively and thereby raise or control the raising of the needles 2 to yarn-taking position selectively as will be understood.

In the construction illustrated in Figs. 1 and 2, each of the selectors comprises a body portion 15 or 16 and a separate shoe 17 or 18 fastened to the end of the respective body portion 15 or 16 that is adjacent the needle cylinder 1. At their opposite or outer ends each body portion 15 and 16 is slotted at 19 and there hinged on a cross bar 20, and each body portion is provided with a sliding pin or other feeler 21 that is spring-pressed toward the pattern holder or drum 8 and the pattern 6 thereon. Individual springs 22 tend to hold the selectors in their right-hand positions as shown in Figs. 1 and 2. Normally the cylinder ends of the selectors rest in about the positions illustrated, preferably for guiding purposes within the slots or tricks containing their respective jacks or needles, and are supported by the top edge of a secondary or supplemental cam ring 23 that rotates synchronously with the cam ring 3. As one or more of the feelers 21 find perforations in the pattern 6 however, the subsequent rotation of the pattern drum 8 forces the corresponding selectors to the left (Fig. 1), thus differentiating selectors and thrusting the ends or shoes of certain of them underneath the respectively corresponding needle jacks 4, and while the thus selected or differentiated selectors are held in these inner positions the rotation of the secondary cam ring 23 passes a cam 24 underneath the respective shoes 17 and 18. This raises these ends of the selectors and the corresponding needle jacks 4 and their needles 2. This general form of pattern mechanism for knitting machines is well known, and the foregoing description of its general form and operation will be sufficient for the present purposes.

The shoes 17, 18, which receive the thrust of the raising cam 24 and directly act on the needles or the needle jacks, are made as parts separate and distinct from the body portions 15 and 16 of the respective selectors. Primarily the functions of the body portions 15 and 16 are simply to position the shoes 17, 18 with respect to the needles or jacks. The shoes 17, 18 extend away from the needle cylinder substantially radially, and parts of each of them, namely, the parts of them immediately adjacent the needle cylinder, lie side by side circumferentially around the cylinder (Figs. 1 and 2). Of any two adjacent shoes 17 and 18 however, one of these shoes, say the shoe 17, has another part 17a that projects beyond the other shoe 18 in one direction while said other shoe 18 has a part 18a that projects beyond the

first shoe 17 in another direction (Fig. 1), so that each two adjacent shoes have also parts (17a and 18a) that lie in other than a side by side relation. The body portions of the corresponding selectors are connected to these projecting parts of the shoes respectively; that is to say, each body portion 15 is connected to the projecting part 17a of its shoe 17, and each body portion 16 is connected to the projecting part 18a of its shoe 18. Each body 15 or 16 can be connected to the side of its shoe extension 17a or 18a for example (Fig. 2), and the connection can be by riveting or spot welding, as indicated at 25; or otherwise. From the connections the body portions extend from the shoes in generally parallel directions, e. g., toward the pattern 6. Preferably the shoe-parts 17a are projected generally transversely of these directions of extent of the body portions and the shoe-parts 18a are projected generally parallel to those directions. The result of this offsetting of the connections between the shoes and the body portion is that adjacent shoes 17 and 18 can lie close together regardless of the fact that at the connections of the body portions to the shoes the selectors are thicker than the shoes. Accordingly the number of selectors it is possible to crowd into a row around the outside of the needle cylinder 1 is limited only by the thickness of shoe required to give the shoes the necessary strength, rather than by the thickness at the connections as heretofore. Since in all instances adjacent shoes 17 and 18 are raised by the cam 24 substantially simultaneously (regardless of whether either or both shoes have been pushed in toward the needle cylinder at the call of the pattern), the additional thicknesses at the connections do not cause one selector to interfere with another during the raising operation even though these extra thicknesses cause one selector to stand above another to a certain extent (Fig. 2); the transverse direction of the projections 17a readily provides for any difference in raising motion there may be between adjacent shoes.

As before indicated, the shoes 17, 18 preferably extend radially from the needle cylinder 1. Also in view of the form of the pattern or each pattern section 6 and its holder 8 it is preferable that the feelers 21 be arranged in something like a straight line (or that the feelers 21 of each group of selectors be arranged in a straight line), and at these feelers 21 the selectors are generally extended parallel to each other and must be spaced far enough apart to provide room for the feelers and the holders for the feelers. To meet these conditions, most of the selector bodies 15, 16 are given two bends as at 28 and 29 in accordance with common practice and as shown in Fig. 2. Usually heretofore the selectors have been arranged on a single level as it were. If however the number of selectors (per group) is increased to the extent permitted by the offsetting of the connections at the shoes 17, 18 previously described, the transverse offsets in the selector bodies resulting from the bends at 28 and 29 may cause one selector to interfere with the independent lengthwise movement of an adjacent selector that is necessary to provide the individual needle control previously described. Thus this transverse offsetting in the selector bodies may limit the number of selectors that can be used to less than the offsetting of the connections at the shoes will permit. To avoid this limitation, the sections of adjacent selectors containing this transverse offsetting 28, 29 may be placed at different levels as it were, as shown

in Fig. 1. That is to say, while all the selectors extend generally in substantially parallel directions, the part of each selector body 15 that includes the offset portion between the bends 28 and 29 may be disposed at a higher level than the corresponding part of each of the selector bodies 16. This placing of the offset portions of adjacent selector bodies at different levels provides additional room for each selector to slide lengthwise without striking or being struck by an adjacent selector.

This part of the invention is not limited to placement of the transverse offset portions 28, 29 of the selector bodies at two different levels; they may be placed at more than two different levels if necessary as is suggested by Fig. 3. As indicated in Fig. 3 also, the extension of the connecting parts of the shoes is not limited to two directions only, nor to the two directions shown in Fig. 1. For example, the extension part 32 of one shoe may reach upwardly, the extension part 33 of the adjacent shoe reach out horizontally, and the extension part 34 of the third shoe may reach more or less downwardly, this arrangement being repeated in each group of three shoes. The connections of the respective selector bodies to the shoes are made to the ends of these extensions as before. This arrangement places still farther apart such extra thicknesses at the connections as lie on the same level.

Figs. 4 and 5 illustrate another application of my invention, and also illustrate my invention in association with a second well-known form of pattern mechanism of the same general type that is especially well suited for fine gauge machines; that is to say, for example, machines in which a large number of needles 2 are employed per inch of circumference of the needle cylinder. The pattern 6 and pattern holder 8 may be like those before described. Each selector however comprises two levers 40 and 41, or 40 and 42, in series with each other. As before, the selectors are customarily disposed around the machine axis in groups (of the series) allocated to groups of needles or other devices to be controlled and each group is served by a pattern section and pattern holder 8 as illustrated specifically in Fig. 6. Each of the selector levers 40 carries a feeler 44 to engage the pattern, is mounted to hinge and slide on a transverse bar 45 that serves for the group, and normally is held in position away from the machine axis by an individual spring 46. Each of the second selector levers 41 or 42 is hinged on a transverse bar 49 that serves for the group, and each engages the underside of its respective lever 40 and extends thence to the needle cylinder 1 or other bank of or bed for the instruments to be controlled. For guiding purposes or otherwise the instrument end of each selector lever 41 or 42 may extend into a slot in the needle or other instrument bed substantially as before and as shown in Figs. 4 and 5. The machine cam ring, or a synchronously rotating supplemental or secondary cam ring 51, carrying a cam or cams 52 for actuating the selectors in response to the calls of the pattern 6 thereon, is located near the inner ends 50 of the levers 40. Normally these ends 50 of the levers 40 are outside the path of the cam or cams 52, but as a feeler 44 finds a perforation in the pattern 8 the respective lever 40 is pushed into the path of this cam ring and there is held until the cam 52 or one of them passes over the respective lever 40. This depresses its end 50 and thereby depresses the adjacent end of the corresponding lever 41

or 42, thus raising the opposite end of the latter and thereby raising the needle or other instrument controlled by this respective selector. This form of pattern mechanism also being well known, the foregoing description of its construction and operation will suffice for the present purpose.

The foregoing described arrangement of off-set connections can be employed to provide some or all such levers with shoes at their engaging ends. For example, in order that the ends of the levers 41 and 42 adjacent the needle cylinder 1 may be thin so that a large number of them can be placed around the cylinder, and at the same time their ends receiving the thrust of the levers 40 made adequately strong and durable, these latter ends can be supplied with shoes 53 and 54 connected to the body parts of the levers 41 and 42 in the manner shown. As shown, the extreme end parts 55 of all these shoes lie side by side beneath their respective levers 40 to receive the thrusts of the latter. Another part 56 of each shoe 54 projects beyond the adjacent shoe 53 however, generally in the direction of the extent of the levers 41 and 42, and a second part 58 of each shoe 53 projects beyond the adjacent shoes 54 in another direction, specifically downwardly for example, and also thence toward the needle cylinder 1 if desired. To the sides of projections 56 the body portions of the respective levers 42 are connected at 57, and to the projections or extensions 58 the body portions of the respective levers 41 are connected in the same manner to the shoes 53, as at 59. As before therefore, the connections 57 and 59 are made at parts of the shoes that lie in other than a side by side relation, and accordingly where the extra thickness of these connections imposes no limitation on the closeness with which the operating parts 55 of the shoes may be placed.

In the particular form of pattern mechanism illustrated in Figs. 4 and 5, only such of the levers 41 and 42 as are picked out for operation by the pattern 6 are turned on their axes 49 at any one time, the unselected levers 41, 42 then remaining at rest. Where members are thus operable individually, the extending parts or projections 56 and 58 of the shoes must be located such a distance beyond the adjacent shoes or connections, in the direction of the shoe movement, as to place the respective shoes and connections out of the paths of the adjacent shoes and connections (e. g., each shoe 53 out of the path of the connection 57, that lies above it, see Fig. 5). This result is secured by making the transverse or downward reach of the extensions 58 of adequate length (see Fig. 4).

As shown in Figs. 1 and 2, the body portions of the selector members can extend away from the shoes entirely at one side of the shoes. If desired however the body portions can be extended in the same plane as their respective shoes. An example of this is illustrated in Figs. 4 and 5 where it will be observed that while the body portion of lever 42 is laid against and connected at 57 to the side of the extension 56 of its respective shoe 54, the body portion is bent at 59 around the end of the extension (Fig. 5) so as to extend away from the shoe in the same plane as the shoe. Similarly, while the body portion of each of the selector lever members 41 is connected at 59 to a side face of the extension 58 of its respective shoe 53, above the shoe the body portion is bent inwardly at 61

to place the center line of the body portion of each lever 41 above the center line of its shoe 53.

Figs. 7 and 8 illustrate another form of connection between shoe and body part whereby both may be located in the same plane, and also an arrangement whereby relatively heavy or thick selectors or selector members can be used to control needles or other instrument in narrow slots or tricks. In the form shown or in so much of the mechanism as is shown in the Figs. 7 and 8, the major part of each selector or selector member comprises the "shoe" 65 or 66 as I use that term, inasmuch as the closeness to which these parts can be placed determine in this instance, the number of selectors than can be assembled in a given space. From the locality 67 where parts of the shoes are disposed side by side, alternate shoes 66 have parts or extensions 68 reaching upward as well as toward the needle cylinder 1 and the intermediate shoes 65 have parts or extensions 69 preferably reaching in another direction as well as toward the needle cylinder, say downwardly as shown. The cylinder end of each of these extensions is split on the center centerline, the two split ends are spread apart, and an additional or "body portion" part 70 say just narrow enough to ride in the jack slot or trick, is inserted in the space in the shoe thus provided; it may be fastened in place by rivets, spot welding, etc., as before. The offsetting of the connections resulting from extending the shoe parts 68 and 69 in different directions permits the overlapping of the connections (Fig. 8) without one shoe interfering with, say, the needle raising operation of an adjacent shoe as will be apparent from the foregoing. The jacks 4 may be of different lengths to accommodate the placement of the part 70 at different levels as it were, as indicated in Fig. 7. The selector members may be controlled and operated like the levers 41 and 42 of Figs. 4 and 5, or otherwise.

It will be understood that my invention is not limited to the details of construction and operation herein illustrated and described, except as appears hereafter in the claims.

I claim:

1. In a pattern mechanism of the kind indicated, a plurality of selector members, each including a body portion and a separate shoe fastened to said body portion, said plurality of shoes having parts lying substantially side by side and of each two adjacent shoes one having a part projecting beyond the other shoe in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction, so that said two adjacent shoes have parts lying in other than side by side relation, and each of said body portions being connected to the said projecting part of its respective shoe.

2. In a pattern mechanism of the kind indicated, a plurality of selector members, each including a body portion and a separate shoe fastened to said body portion, said body portions of the selector members extending from said shoes in generally parallel directions, said plurality of shoes having parts lying substantially side by side and of two adjacent shoes one having a part projecting beyond the other shoe transversely of said directions of extent of said body portions and said other shoe having a part projecting beyond the first mentioned shoe in a direction generally parallel to the directions of extent of said body portions, and the corresponding body

portions being connected to the said projecting parts of the shoes respectively.

3. In a pattern mechanism, a plurality of selector members, each of said selector members including a body portion and a separate shoe fastened to said body portion, said body portions extending from said shoes in generally parallel directions, said plurality of shoes having parts lying substantially side by side and of each two adjacent shoes one having a part projecting beyond the other shoe in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction, so that said two adjacent shoes have parts lying in other than side by side relation, and each of said body portions being connected to the said projecting part of its respective shoe, and means to differentiate the selector members in response to pattern calls and actuate the called selector members to effectuate the calls and to actuate the uncalled selector members also in substantially the same direction.

4. In a pattern mechanism, a plurality of selector members, each of said selector members including a body portion and a separate shoe fastened to one end of said body portion, said body portions extending from said shoes in generally parallel directions, said plurality of shoes having parts lying substantially side by side and of each two adjacent shoes one having a part projecting beyond the other shoe in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction, so that said two adjacent shoes have parts lying in other than side by side relation, and each of said body portions being connected to the said projecting part of its respective shoe, and means to actuate the selector members to effectuate the calls of the pattern, connections between body portions of selector members and said projecting part of their respective shoes being disposed so far away from respectively adjacent selector members in the direction of movement of the selectors as actuated by said means as not to strike or be struck by an adjacent selector member when one selector member is moved by the said means and an adjacent selector member remains at rest.

5. In a circular knitting machine, a circular bank of instruments therein, a plurality of shoes adjacent said instruments to actuate the same, said shoes being allocated each to not more than a few adjacent instruments and having parts lying substantially side by side and of each two adjacent shoes one having a part projecting beyond the other shoe in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction so that each two adjacent shoes have parts lying in other than side by side relation, a plurality of bar-like members engaging said shoes at said projecting parts of the latter, and a pattern means to actuate said members and therethrough actuate said shoes.

6. In a circular knitting machine, a circular bank of instruments therein, a plurality of shoes adjacent said instruments to actuate the same, said shoes being allocated each to not more than a few adjacent instruments and having parts lying substantially side by side and of each two adjacent shoes one having a part projecting beyond the other shoe in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction so that each two adjacent shoes have parts lying in other

than side by side relation, a plurality of bar-like members engaging said shoes at said projecting parts of the latter, and a pattern means to move said members substantially lengthwise
5 selectively, the ends of said members adjacent said pattern means lying substantially in line with each other, and at least some of said members having portions offset transversely and adjacent of said members having offset portions
10 having said portions disposed at different levels.

7. In a circular knitting machine, a circular bank of instruments therein, a plurality of selector members adjacent said instruments to actuate the same and allocated each to not more
15 than a few adjacent instruments, a second plurality of selector members allocated to and to actuate the first mentioned selector members, the selector members of at least one of said pluralities having each a body portion and a sep-

arate shoe fastened to that end of the body portion which is adjacent to one of the selector members of the other of said pluralities, said shoe engaging the last mentioned member, and said shoes having parts lying substantially side by side
5 and of each two adjacent shoes one having a part projecting beyond the other in one direction and said other shoe having a part projecting beyond the first mentioned shoe in another direction, so that said two adjacent shoes have parts
10 lying in other than side by side relation, the respective body portions being connected to said shoes at said projecting parts, and a pattern mechanism to actuate said second plurality of selector members selectively and therethrough
15 the first mentioned selector members to cause selective operation of said instruments.

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