

[54] **DEVICE FOR CONTROLLING THE JACKS OF JACQUARD MACHINES**

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[22] Filed: Sept. 30, 1969

[21] Appl. No.: 862,332

[30] **Foreign Application Priority Data**

Oct. 7, 1968 Germany.....P 18 00 793.7

[52] U.S. Cl.....66/75, 66/155

[51] Int. Cl.....D04b 15/70

[58] Field of Search.....340/147; 66/155, 154 A, 1, 66/50, 25, 75

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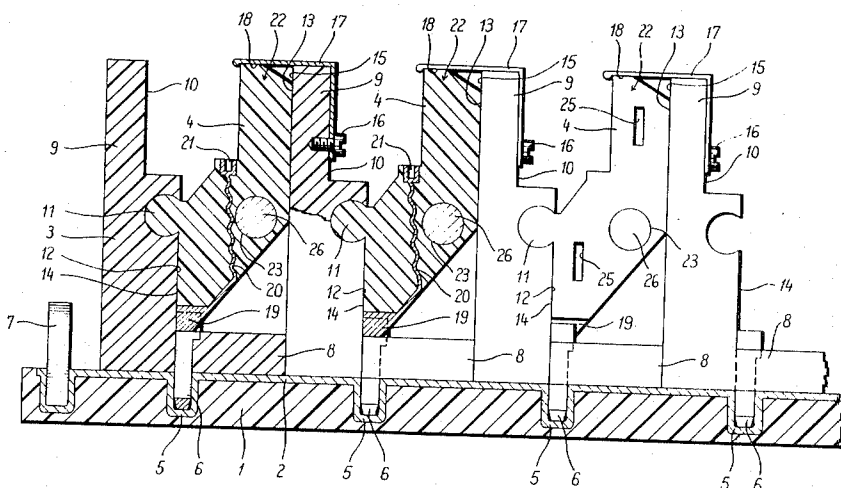
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[57] **ABSTRACT**

Knitting machine with needle selecting device enabling the needles to be selected by means of electro-magnets in accordance with a pattern stored in an information carrier including a read-out device for connecting the stored information into electrical signals which are fed to the electro-magnets, wherein the pattern of the total operative width of the knitting machine as provided on the information carrier is displaceable along the width of the machine by displacing a contact bank on said information carrier, the information carrier including a collector strip for each signal output of the read-out device disposed on a base plate, the collector strips being selectively connected to the contact bank containing individual contacts connected to at least one electro-magnet and being transversely disposed with respect thereto so that the contact bank may be slideably disposed by integral multiples of the collector strip spacing.

21 Claims, 10 Drawing Figures



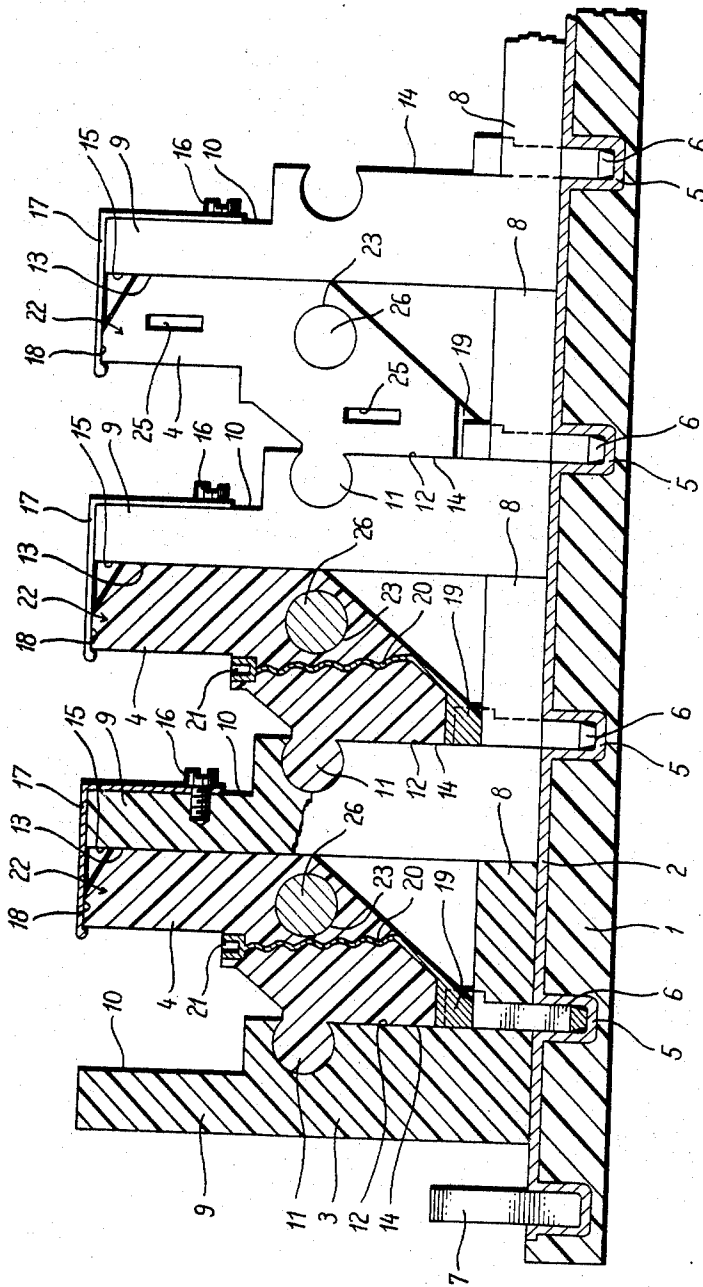


Fig. 1

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Fig. 2

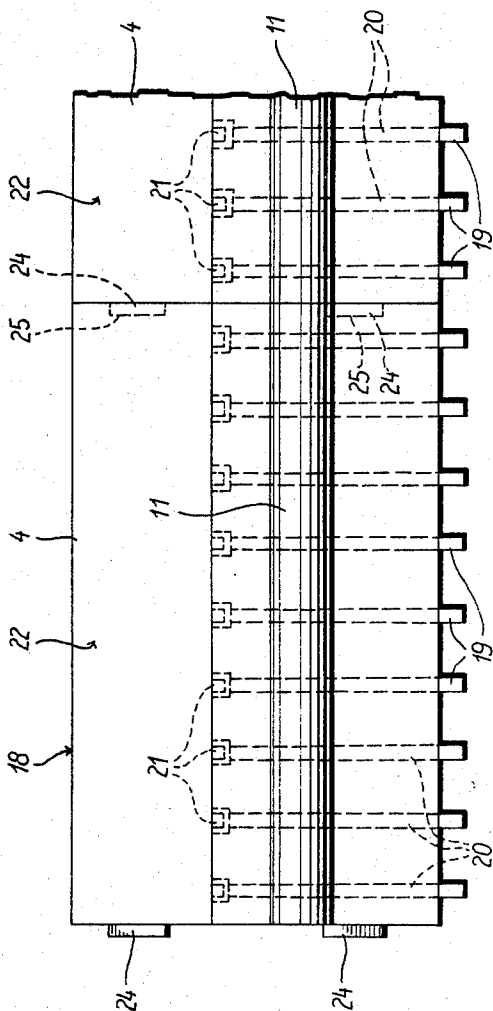
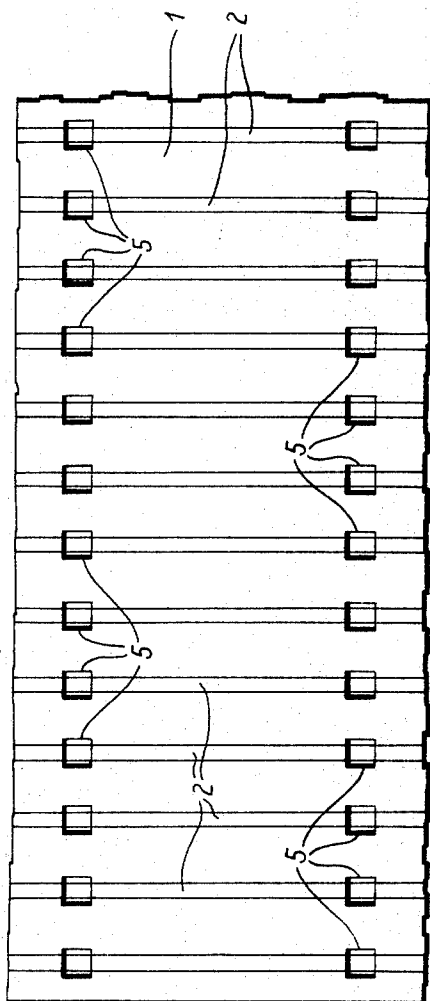


Fig. 3



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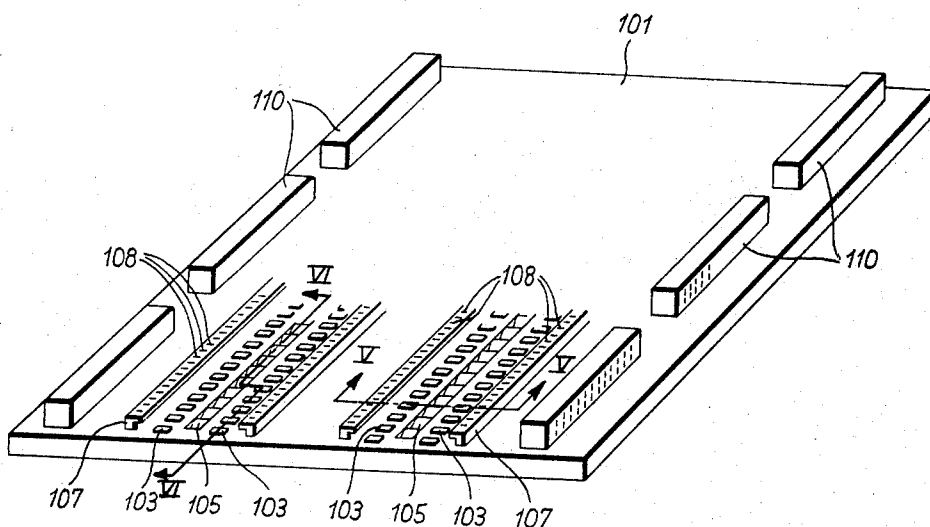


Fig. 4

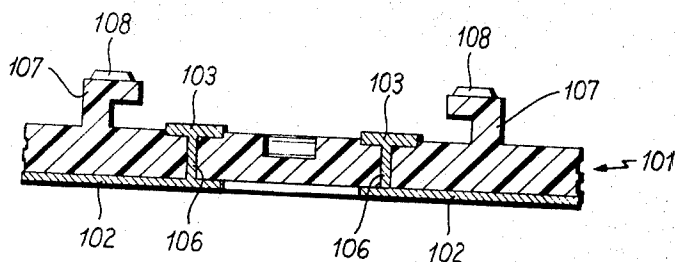


Fig. 5

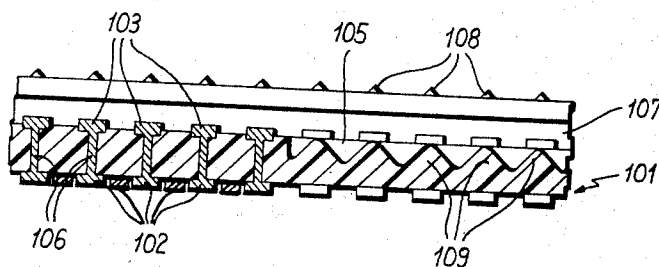


Fig. 6

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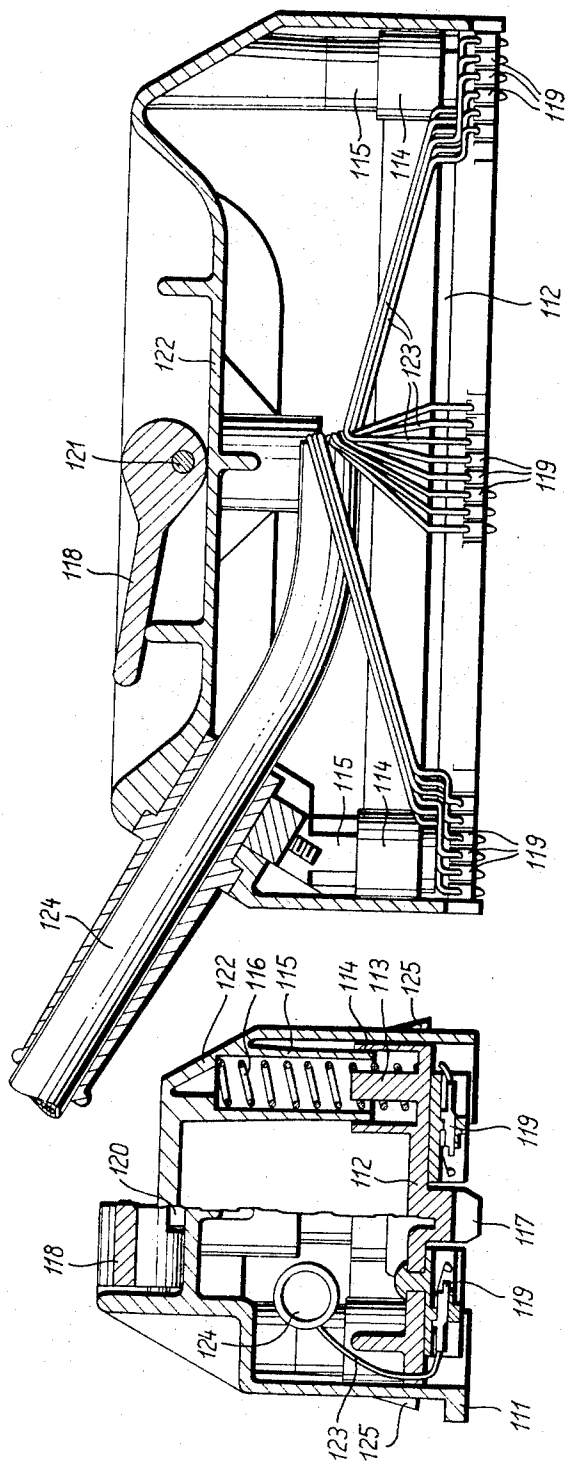


Fig. 7

Fig. 8

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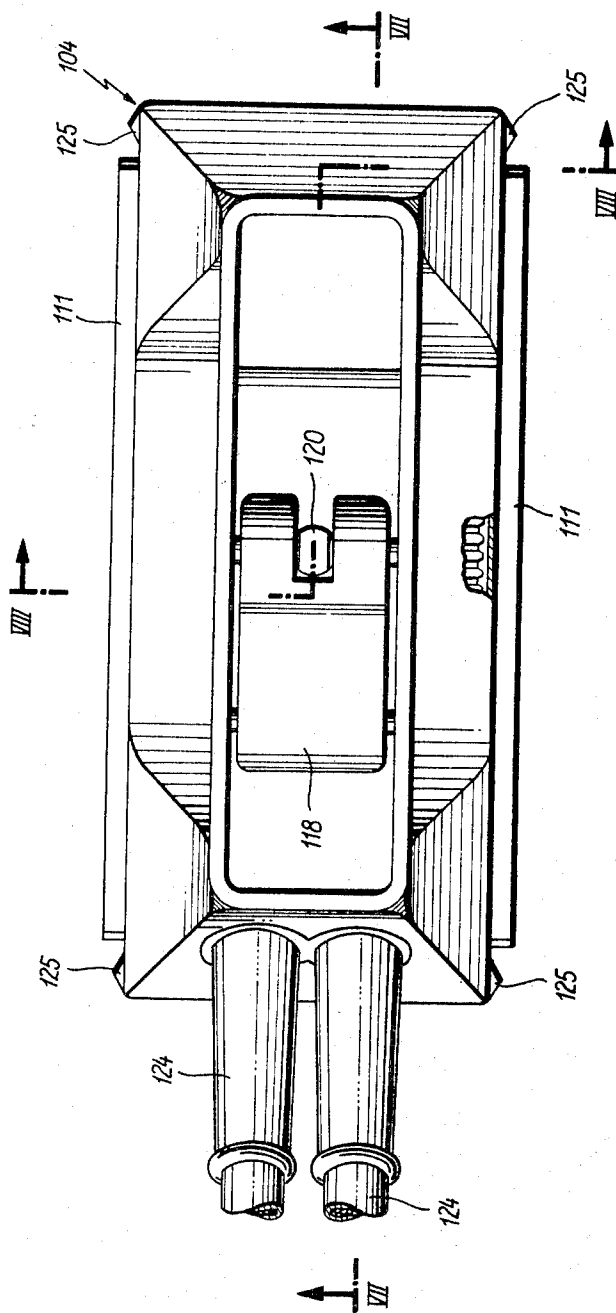


Fig. 9

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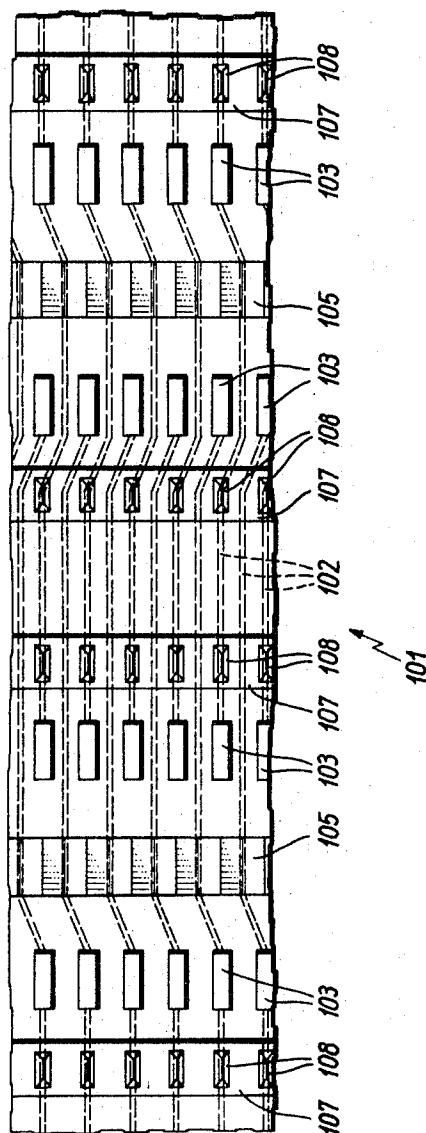


Fig. 10

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DEVICE FOR CONTROLLING THE JACKS OF JACQUARD MACHINES

The present invention relates to a knitting machine with a needle selecting device enabling the needles to be selected by means of electro-magnets in accordance with a pattern stored in an information carrier and with a read-out device converting the information stored on the information carrier into electric signals which are fed to the electro-magnets, as described in U.S. Pat. No. 3,509,738.

In the knitting machine described in this patent, the information for the positions of jacks displacing the needles for a course extending over the whole width of the knitting machine is contained in a plurality of rows disposed transversely to the conveyance direction of the information carrier, the read-out device scanning a plurality of rows to adjust a course extending over the whole width of the knitting machine. It is an object of the present invention to improve the device for adjusting the jack positions in accordance with the information on the information carrier. According to the invention, this objective is accomplished by an arrangement in which the number of signal outputs of the read-out device corresponds to the number of needles of a portion of the total operative width of the knitting machine only and in which the signal outputs are connected to a signal distributor by means of which the signal of one output is simultaneously fed to a plurality of electro-magnets spaced at intervals corresponding to integral multiples of the width of one pattern. The particular advantages of the invention reside in the fact that, compared with a read-out device which must have as many outputs as stitches are knitted over one width of the machine, the read-out device according to the present invention may be reduced in size and assembled from a fraction of the components needed for said other read-out device and that the number of individual items of information to be stored on the information carrier may be reduced in like measure. On the one hand, this reduces the amount of work involved in producing the information carrier, e.g. the number of holes to be punched in a tape, and, simultaneously, the risk of storing wrong information, which increases in proportion to the number of individual items of information to be stored. Storage of incorrect information which is not detected until the respective pattern is knitted leads to rejects in production and additional downtimes of the knitting machine to enable the information carrier to be replaced by an information carrier with correct information. On the other hand, the invention affords an additional advantage in that it enables the feed rate of the information carrier to be substantially reduced during transition from one course to the next course. In order to avoid disturbing the working speed of the knitting machine, this feeding motion must be performed within a very brief period of time so that the feed rate is directly proportional to the stepping width, which for a given width of the information carrier and a given packing density, is, in turn, proportional to the number of individual items of information to be read per cycle. A reduced feed rate means reduced accelerations and thus less wear of the conveying elements and reduced requirements with respect to the mechanical strength of the information carrier. Reducing the number of individual components of the read-out device not only reduces the amount of construction and thus the costs of material and labour but also increases the dependability of the read-out device, since the probability of equipment failure depends on the number of components used. High dependability, however, is of decisive importance for production equipment inasmuch as a machine stoppage may easily cause substantial production losses.

An arrangement in which the lines leading to the electro-magnets spaced at intervals corresponding to the width of one pattern each are connected to, or plugged into, each output of the read-out device is, of course, possible. However, with 1,000 or more needles along the width of a knitting machine, this would result in a tangle of lines and wires and a great deal of time and work would be needed to reconnect or replug all, or nearly all, of the lines when changing from one pattern width to another. The use of multiple plugs is disadvantageous

because of the unwieldiness of very large plugs and the large forces required to insert and remove such plugs. Furthermore, the use of plugs is impeded by the requirement that it should be possible to start a pattern at any desired point of a course.

In a preferred embodiment of the invention, each signal output of the read-out device is, therefore, associated with a collector strip to which contact bank assemblies may be connected, which contain individual contacts connected to one electro-magnet each, said individual contacts being electrically connected to one collector strip each when the contact bank assembly is in the operative position. The contact bank assemblies may have any desired length and may be connected starting with any desired collector strip so that the pattern may be started at any desired point.

In a preferred embodiment of the invention, the collector strips are equidistantly disposed on a base plate of insulating material so as to run parallel to each other. A modification of the invention provides for an arrangement in which the contact bank assemblies are disposed transversely to the collector strips in a manner permitting them to be slidably displaced by integral multiples of the collector strip spacing. This is a very simple and inexpensive arrangement.

The number of individual contacts in a contact bank assembly may be selected at will, e.g. so as to ensure convenient handling. However, in embodiments of the invention, the number of the individual contacts of the contact bank assemblies corresponds to the number of stitches in the pattern to be knitted. The number of contact bank assemblies may correspond to the number of patterns being knitted simultaneously along the width of one machine. This results in a very neat configuration of signal feeding from the read-out device to the magnets of the knitting machine. Pattern displacements as well as repetitions of patterns within one course may thus be effected in a convenient, rapid, and simple manner.

The contact bank assemblies may be constructed as single pieces, e.g. by an injection molding process. However, according to one embodiment of the invention, the contact bank assemblies consist of individual components, each of which comprises one group of contacts, so that larger contact bank assemblies may be assembled from a number of individual components. This enables the lengths of contact bank assemblies and thus the widths of feasible patterns to be varied extensively without calling for a correspondingly large number of production tools and stocked parts.

In a preferred embodiment of the invention, partitions extending transversely to the collector strips are secured to the base plate of insulating material, said partitions featuring a recess in which the contact bank assemblies are guided in a manner permitting them to be swivelled and slidably displaced transversely to the collector strips.

In this manner a very practical and conveniently controlled signal distributor is obtained, by means of which the signal outputs may be connected to the electro-magnets in the desired combinations without any difficulty. According to one embodiment of the invention, intermediate contact bridges, which are electrically connected to the collector strips, are secured to the partitions and/or the base plate of insulating material, the individual contacts of the contact bank assemblies taking the form of V-type contacts which engage the intermediate contact bridges when the contact bank assemblies are in the operative position. The point of breakable contact is thus shifted from the collector strips to the intermediate contact bridges with V-type contacts, which results in a very high dependability of the signal distributor owing to the well-known favourable qualities of V-type contacts, such as reliability of contact and self-cleaning action.

The V-type contacts, which have a certain arresting effect owing to mechanical friction, protect the contact bank assemblies from undesired looseness of contacts. However, in order to further improve this feature, one embodiment of the invention includes special detent elements arresting the contact bank assemblies not only in the position, in which the contacts are closed, but also in the position, in which the contacts are

open. In a practical embodiment of the invention, said detent elements take the form of leaf springs secured to the partitions such that on the one hand the contact bank assemblies may be swivelled without excessive force, while on the other hand the contacts are securely retained in the two final positions.

In another preferred embodiment of the invention, one of the surfaces of the base plate of insulating material is provided with small collector plates disposed in rows extending transversely to the collector strips and with guides, extending in parallel relationship to said rows, for a slide serving as contact bank assembly, said slide being provided with flexible individual contacts which may be pressed against, and lifted off, the small collector plates of the base plate made of insulating material. This embodiment has the special advantage that the slide may be slidably displaced along the row of small collector plates in an easy and simple manner. In this arrangement, the mechanical guides of the slide are entirely separate from the electrical contacts which need not perform any guiding or retaining functions. According to one embodiment of the invention, the slide includes at least one contact plate to which the individual contacts are flexibly secured, said contact plate being disposed in parallel relationship to the surface of the base plate in a manner permitting it to be moved perpendicularly to said surface. This arrangement has the advantage that in spite of a large number of contacts the force required to press the individual contacts against, or lifting them off, the small collector plates may be kept within easily controllable limits, whereas in the case of plugs featuring a large number of contacts the forces required to insert and remove such plugs become so large as to place a limitation on the number of contacts which may be provided in one plug.

In a preferred embodiment of the invention the contact plate is operated by means of an eccentric lever, in the unlocked position of which the individual contacts are lifted off, and in the locked position of which the individual contacts are flexibly pressed against, the small collector plates.

According to one embodiment of the invention the contact plate is lifted off the base plate against the force exerted by springs when the eccentric lever is in the unlocked position. Moving the eccentric lever into the locked position causes the contact plate to be pressed against the base plate by the springs so that the individual contacts are brought into contact with the small collector plates.

According to a preferred embodiment of the invention, the longitudinal centerline of each flexible individual contact forms an acute angle with the plane of the contact plate. Unless there is elastic deflection of the flexible individual contact, this angle will be changed as the contact plate is unlocked and locked. This has the advantage that whenever the slide is locked and the contact plate is moved against the base plate the flexible individual contacts will scrape along the small collector plates, thus providing a very reliable contact with low transfer resistance. A certain self-cleaning effect is also achieved in this manner.

The lines may be connected to the individual contacts of the slide by soldering or squeezing. In one embodiment of the invention the lines are connected to the individual contacts by means of plugs, which facilitates interchanging of individual conductors.

According to one embodiment of the invention, the base plate is provided with rack-type profiled strips disposed in parallel relationship to the rows of small collector plates, said rack-type profiled strips being engaged by a projection, which may be moved together with the contact plate, when the eccentric lever is in the locked position. Cooperating with the rack-type profiled section, this projection ensures that the individual contacts of the contact plate are accurately positioned with respect to the small collector plates of the base plate. To this end, the pitch of the rack-type profiled strip corresponds to the spacing of the small collector plates in each row. If the projection and the profiled strip are fashioned into suitable shapes, the projection engaging the profiled strip when the slide is being locked will reliably locate the slide, at

any desired point, in that position, in which the individual contacts will contact the small collector plates in the desired configuration without any additional guiding elements being required and without the contacts themselves having to perform any guiding functions.

In one embodiment of the invention, the slide is provided with at least one indicator projection which, cooperating with a scale provided on the base plate of insulating material, provides a position indication enabling the signal outputs handled by the slide in each position to be ascertained at a single glance.

Connection of the collector strips to the outputs of the read-out device may be effected by means of soldered lines or lines connected by some other method. According to a preferred embodiment of the invention, multipoint connectors the contacts of which are connected to the collector strips, are provided in the marginal areas of the base plate made of insulating material. By means of these multipoint connectors, the collector strips may be connected to the signal outputs of the read-output device via plugs inserted into said multipoint connectors and cables connected to said plugs. In this manner, a reliable and easily modifiable and exchangeable connection is obtained between the signal outputs of the read-output device and the collector strips of the base plate of insulating material. In a preferred embodiment of the invention, which is intended for knitting machines with paired (upper and lower) jacks, the multipoint connectors are disposed along the outer edges of the base plate parallel to the rows of small collector plates, the multipoint connectors of the one side being associated with the upper jacks while the multipoint connectors of the other side are associated with the lower jacks, the multipoint connectors of the one side preferably differing from those of the other side so that a plug intended for the multipoint connector of one side can only be inserted into the multipoint connectors disposed at that side. This ensures that signals intended for upper jacks are not fed to lower jacks and vice versa.

The collector strips may take the form of metal strips secured to the base plate. In a preferred embodiment of the invention, the collector strips are formed by printed circuitry and preferably disposed at the underside of the base plate made of insulating material. The advantage of this arrangement resides in the fact that the device may be manufactured at very low cost, because any of the known methods may be employed in producing the printed circuitry.

The small collector plates may be adhesively bonded to the base plate or fastened by means of rivets. In preferred embodiments of the invention, the small collector plates of the base plate are provided with a stud, the length of which is approximately equal to the thickness of the base plate, so that the stud extends down to the associated collector strip on the underside of the base plate. This affords a simple method of fastening the small collector plates to the base plate and simultaneously connecting them to the collector strips. Where this method of fastening and connection is employed, it is easy to dispose the small collector plates of the base plate so that the tops are in one plane without requiring any subsequent machining. This has a favourable effect upon the quality and reliability of contact at the points of contact formed by the individual contacts of the slide and the small collector plates of the base plate.

In one embodiment of the invention, studs are also provided for the multipoint connectors in order to provide a convenient and reliable connection between the contacts of the multipoint connectors and the collector strips.

Connection of the studs with the collector strips at the underside of the base plate is effected by soldering, applying one of two alternative methods, according to which either each stud is individually soldered to the collector strip or, preferably, all studs are connected to the collector strips in a single operation by the flow-solder method, which has the additional advantage that the thin collector strips are faced with a layer of solder which increases their mechanical resistance and, above all, makes them less sensitive to hairline cracks.

Details and embodiments of the invention will become apparent from the following description, in which the invention is described and explained in more detail, reference being made to the embodiments shown by way of example in the accompanying drawing, in which

FIG. 1 is a section through a signal distributor according to the invention,

FIG. 2 is an elevation of a contact bank assembly component,

FIG. 3 is a top plan view of a portion of a base plate of insulating material with collector strips, broken away from the rest of the base plate,

FIG. 4 is a view of a base plate according to a further embodiment of the invention,

FIG. 5 is a section taken along the line V—V in FIG. 4,

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

FIG. 7 is a longitudinal section through a slide taken along the line VII—VII in FIG. 9,

FIG. 8 is a section taken along the line VIII—VIII in FIG. 9,

FIG. 9 is a top plan view of a slide; and

FIG. 10 is a diagrammatic section view of the base plate.

The signal distributor according to the present invention comprises a base plate 1 of insulating material with collector strips 2 secured to said base plate and partitions 3 disposed transversely to said collector strips 2, said partitions 3 pivotably supporting contact bank assemblies 4 in a manner permitting said contact bank assemblies to be slidably displaced in the longitudinal direction within a certain swivelling range. The collector strips 2 are equidistantly disposed in parallel relationship to each other. The number of collector strips 2 corresponds to the number of signal outputs of a read-out device which is not shown. The collector strips 2 are provided with recesses 5, equally spaced along the lengths of said collector strips, in which contact bridges 6 are conductively secured, e.g. plugged in or soldered in position. At one end, the collector strips 2 have a connection 7 from which a line, which is not shown, leads to the corresponding output of the read-out device so that the signal existing at the corresponding output of the read-out device is constantly available at each of the collector strips 2.

The partitions 3 having an approximately L-shaped cross-section are secured to the base plate of insulating material. A short leg 8 of the L-shape rests flat on the surface of the base plate 1 of insulating material or on the collector strips 2 which are slightly recessed into the base plate 1 of insulating material such that their surfaces lie in the plane of the surface of said base plate of insulating material. The length of the short leg 8 corresponds to the spacing of the recesses 5 along the collector strip 2. The short leg is provided with an opening through which project the contact bridges 6 conductively secured in the collector strips 2 such that the free ends of said contact bridges 6 come out at the free surface of the short leg 8. A long leg 9 of the L-shaped partitions 3 projects perpendicularly from the base plate 1 of insulating material and has a recess 10 in the area of its free end on the side facing the short leg 8. Approximately at mid-height, the long leg 9 of the partition 3 has a recess in the form of a circular segment, disposed transversely to the collector strips 2 and in parallel relationship to the plane of said collector strips, which recess, cooperating with a mating projection 11 of the contact bank assemblies 4, forms a swivel bearing for the contact bank assemblies. The contact bank assemblies 4 have two parallel outer surfaces 12 and 13 on opposite sides of each contact bank assembly 4. The outer surface 12 extends downward from the projection 11 and bears against an inner surface 14 of the long leg 9 when the contact bank assembly 4 is in the operative position. At the same time, the outer surface 13 bears against an outer leg surface 15 in the upper area of the long leg 9 of the adjacent partition. An angularly bent leaf spring 17 is secured to each partition 3 by means of a screw 16 in the area of the recess 10. The leg of said spring 17 which is secured by said screw 16 extends perpendicularly to the surface of the base plate 1 of insulating material, while the other

leg extends in parallel relationship to said surface, resting on the free end of the long leg 9 of the partition 3 and projecting beyond the end of the leg in parallel relationship to the short leg. In its operative position, the contact bank assembly 4 extends over the same distance from the surface of the base plate 1 of insulating material as the partition 3, a surface 18 of said contact bank assembly bearing against the projecting length of the leaf spring 17. The bearing surface 18 and the leaf spring 17 together form a detent for the contact bank assembly 4. The contact bank assembly 4 consist of an injection-molded plastic component with an integrally molded V-type contact 19 projecting from the lower end of the assembly, said V-type contact 19 being conductively connected, through an extension 20, to a connection 21 which is freely accessible from that side of the partitions which faces away from the base plate, a line, which is not shown, leading from said connection 21 to electro-magnets, which are not shown either, controlling striker members for jacks of the knitting machine. The connection 21 is located at a point from which the connecting line may be led out without interfering with the swivelling motion of the contact bank assembly. When the contact bank assembly 4 is swivelled about the swivel axis of the projection 11, the V-type contacts 19, which in the operative position of the contact bank assembly 4 engage the corresponding contact bridges 6, thus establishing a connection from the corresponding collector strips 2 to the associated electro-magnets via the corresponding extension 20 and the connection 21, are disengaged from the contact bridges 6. In the disengaged position of the V-type contacts 19, the contact bank assemblies 4 may be slidably displaced in the direction of the swivel axis. This enables the electro-magnets of a contact bank assembly connected to the V-type contacts to be connected to any desired group of collector strips 2 disposed adjacent to each other.

The contact bank assemblies 4 are assembled from individual components, each of which comprises one group of contacts. In the example being described, the number of V-type contacts 19 of one group of contacts of one individual component 22 equals nine. In order to enable contact bank assemblies of any desired length to be assembled in which the number of contacts is an integral multiple of nine, the individual components 22 are provided with a longitudinal bore 23 and with projections 24 at one end and mating recesses 25 at the opposite end. The bore 23 receives a tie rod 26 which locks the individual elements 22 against each other, combining them into a single unit, i.e. a contact bank assembly 4. In the example being described, the base plate of insulating material is equipped with 252 collector strips, providing for a maximum pattern width of 252 stitches in accordance with the 252 outputs of the read-out device. However, the number of stitches producing one operating width of the machine is a multiple of the number of stitches corresponding to the width of one pattern, because the same pattern is repeated several times along the width of the machine. In the example being described, the contact bank assembly has 126 contacts, thus covering half the width of the base plate of insulating material, one contact bank assembly comprising 14 individual components with nine V-type contacts each.

In the embodiment of the invention illustrated in FIGS. 4 through 9, the V-type contacts are replaced by a number of flat small collector plates 103 arranged on a base plate 101 of insulating material. Each of the small collector plates 103, which are disposed in groups of two parallel rows each with a rack-type profile strip 105 arranged between said rows, is provided with a stud 106, the length of which is approximately equal to the thickness of the base plate 101 of insulating material and the end of which is connected to collector strips 102, this connection being preferably effected by soldering. Parallel to each pair of rows of small collector plates a guide rail 107 is provided on either side of said pair of rows, each of said guide rails being provided with a scale 108 on its upper surface. The rack-type profiled strip 105 has teeth 109, one for each small collector plate 103, such that the number of

teeth 109 is always equal to the number of small collector plates 103 of one row. The number of scale divisions of the scale 108 is also equal to the number of small collector plates of one row. At two opposite sides, the base plate 101 is provided with multipoint connectors 110, the contacts of which are connected to the collector strips 102 in a manner which is not illustrated, said collector strips 102 being in turn connected to the corresponding small collector plates 103. Connection between the multipoint connectors 110 and the signal outputs of the read-out device is effected in a known manner, which is not illustrated, by means of cables and connected plugs fitting into the multipoint connectors 110. The multipoint connectors may be of different constructions, such that the different plugs cannot be inserted into the wrong connectors.

Each strip 102 leads from a multi-contact connector 110 at the edge of the base plate 101 to all contact plates 103 which assume the same position relatively to the profiled strip 105 associated therewith. Thus, for example, a contact strip 102 leads from a connector 110 disposed on the left-hand side of the base plate 101 to all contact plates 103 disposed on the left-hand side of the associated profiled strip 105 and associated with the same graduation line of the scale 108. In the same manner, the contact strips 102 lead from the connectors 110 disposed on the right-hand side of the base plate 101 to all corresponding contact plates 103 arranged on the right-hand side of the associated profiled strip 105. The two groups of contact strips 102 emanating from the right and from the left are interdigitated. FIG. 10 shows a fragment of such a base plate 101. The base plate illustrated in FIG. 10 comprises only two profiled strips 105; on the right-hand side and on the left-hand side thereof, respectively, one row of contact plates and one scale are disposed.

The slide 104 illustrated in FIGS. 7 through 9 has two lateral ledges 111 engaging the guide rails 107 so that the slide is slidably displaceable along the row of small collector plates. The slide 104 includes a contact plate 112 disposed in parallel relationship to the surface of the base plate and guided in a manner permitting it to be slidably displaced perpendicularly to the surface of the base plate. For guidance, pins 113 are provided at the four corners of the contact plate 112, said pins 113 being surrounded by one sleeve 114 each which together with hollow pins 115 provided on the slide casing 122 form the guiding arrangements. The pin 113 is surrounded by a helical spring 116 bearing against the contact plate 112 at one end and, within the hollow pin 115, against the slide casing 122 at the other end. Consequently, the contact plate 112 is pressed against the base plate 101 by the helical springs 116, while the force exerted by the helical springs presses the ledges 111 against the guide rails 107. At the surface facing the base plate 101, the contact plate 112 is provided with a projection 117 engaging the rack-type profiled strip 105. The profiled strip 105 and the projection 117 are provided with mating profiles so that the slide 104 will assume the desired position with respect to the small collector plates 103 when the projection 117 locks in the profiled strip 105.

To disengage the contact plate 112 against the force exerted by the helical springs 116, use is made of an eccentric lever 118 which, through a pull rod 120 swivably mounted on an eccentric shaft 121, is connected with the contact plate 112. The eccentric lever 118 is supported on the slide casing 122. When the eccentric lever 118 is moved into the unlocked position, the contact plate 112 is lifted off the base plate 101 against the force exerted by the helical springs 116 with the result that the projection 117 is disengaged from the profiled strip 105 so that the slide 104 may now be slidably displaced within the guide rails 107.

At the surface of the contact plate 112 facing the base plate 101, flexible individual contacts 119 are disposed with the same spacing as the small collector plates 103. The longitudinal centerline of the individual contacts 119 forms an acute angle with the plane of the contact plate, such that when the contact plate 112 is moved in the direction of the base plate

101 the flexible individual contacts 119 will slide along their point of contact with the small collector plates 103 in a scraping motion, while the angle at which the longitudinal centerlines of the flexible individual contacts 119 are disposed with respect to the plane of the contact plate is being reduced. The scraping motion of the flexible individual contacts 119 along the small collector plates 103 ensures a very good contact characterized by low transfer resistance, self-cleaning action, dependability, and long life. Like the small collector plates 103, the flexible individual contacts 119 are disposed transversely to the direction in which the slide 104 is displaceable. The flexible individual contacts 119 have connected to them conductors 123 of a cable 124. The cable 124 leads to the electro-magnets selecting the jacks.

The walls of the slide casing 122 running parallel to the guide rails 107 are provided with indicator projections 125 which, cooperating with the scale 108 on the guide rails 107, indicate the position of the slide 104.

The collector strips 102 of this embodiment of the invention correspond to the collector strips 2 of the embodiment described before. Similarly, the components identified by the numerals 119 and 104 correspond to the components identified by the numerals 19 and 4 respectively.

FIG. 10 shows a section of the base plate 101 with the arrangement of the strips 102 in dotted lines. The strips 102 are like two combs with the teeth of one comb inserted in the teeth of the other comb. It shall be understood, that the present invention is not restricted to the embodiment shown by way of example and that deviations from said embodiment are possible without exceeding the scope of the invention. Especially, such deviations may occur if in embodiments of the invention individual features of the invention are realized either individually by themselves or in any desired combination of a plurality of such features. In particular, it shall be understood that the number of collector strips disposed on a base plate of insulating material and the number of V-type contacts per contact bank assembly and per individual component of a contact bank assembly may vary. It is also possible to dispose the collector strips along the generating line of a drum made of insulating material rather than on a level plate of insulating material and to use sliding contacts instead of V-type contacts. In this case, transverse displacement is effected by a relative rotary motion between the drum and the sliding contacts rather than by laterally displacing the contact bank assembly 4.

The present invention may be applied in combination with read-out devices with parallel as well as series scanning and may then include a commutator for distributing the signals from each output.

Having thus fully described my invention, what I claim as new and wish to secure by Letters Patent is:

1. A knitting machine including needle selecting means for enabling a plurality of needles to be selected by means of electro-magnets in accordance with a pattern stored in an information carrier, said information carrier comprising read-out means for converting stored information into electric signals which are fed to the electro-magnets, said readout means generating a plurality of signal outputs corresponding in number to the number of needles of only a portion of the operating width of the knitting machine, and signal distributor means for simultaneously feeding the signal of each output of said read-out means to a plurality of said electro-magnets spaced at intervals corresponding to integral multiples of the width of one pattern, wherein one collector strip is provided for each signal output of said read-out means and said collector strips are connected with contact bank assemblies containing individual contacts each connected to at least one electro-magnet, said individual contacts each being electrically connected to one of said collector strips when said contact bank assemblies are in the operative position, wherein the contact bank assemblies are disposed transversely to the collector strips and in that said contact bank assemblies are slidably displaceable by integral multiples of the collector strip spacing.

2. A device according to claim 1, characterized in that the number of individual contacts of the contact bank assemblies corresponds to the number of stitches of the pattern to be knitted.

3. A device according to claim 1, wherein the number of contact bank assemblies corresponds to the number of patterns knitted simultaneously per machine width.

4. A device according to claim 1, characterized in that the contact bank assemblies consist of individual components, each of which comprises one group of contacts.

5. A device according to claim 4, characterized in that partitions are secured to the base plate of insulating material, said partitions extending transversely to the collector strips and being provided with a recess in which the contact bank assemblies are pivotably guided in a manner permitting them to be slidably displaced transversely to said collector strips.

6. A device according to claim 5, characterized in that intermediate contact bridges are secured to the partitions and the base plate of insulating material, said intermediate contact bridges being electrically connected to the collector strips, and in that the individual contacts of the contact bank assemblies take the form of V-type contacts engaging said intermediate contact bridges when the contact bank assemblies are in the operative position.

7. A device according to claim 1, characterized in that detent elements are provided which arrest the contact bank assemblies in either of the positions in which the contacts are either closed or open.

8. A device according to claim 9, characterized in that said detent elements take the form of leaf springs secured to the partitions.

9. A device according to claim 1, characterized in that the base plate of insulating material, on one of its surfaces, is provided with small collector plates disposed in rows extending transversely to the collector strips and with guides for a slide serving as the contact bank assembly, said guides extending in parallel relationship to said rows and said slide featuring individual contacts which may be flexibly pressed against, and lifted off, said small collector plates of said base plate of insulating material.

10. A device according to claim 9, characterized in that said slide includes at least one contact plate to which said individual contacts are flexibly secured and in that said contact plate is disposed in parallel relationship to the surface of the base plate in a manner permitting said contact plate to be moved perpendicularly to said surface.

11. A device according to claim 10, characterized in that said contact plate is operated by means of an eccentric lever in

the unlocked position of which said individual contacts are lifted off the small collector plates of the base plate of insulating material and in the locked position of which said individual contacts are flexibly pressed against said small collector plates.

12. A device according to claim 11, characterized in that in the unlocked position of said eccentric lever said contact plate is lifted off the base plate against the force exerted by springs.

13. A device according to claim 11, characterized in that the longitudinal centerline of each flexible individual contact (119) forms an acute angle with the plane of the contact plate.

14. A device according to claim 11, characterized in that the base plate is provided with rack-type profiled strips disposed in parallel relationship to the rows of small collector plates, said rack-type profiled strips being engaged by a projection, which may be moved together with the contact plate, when the eccentric lever is in the locked position.

15. A device according to claim 11, characterized in that the slide is provided with at least one indicator projection which, cooperating with a scale provided on the base plate of insulating material, affords a position indication.

16. A device according to claim 11, characterized in that the marginal area of the base plate of insulating material multipoint connectors are provided, the contacts of which are connected to the collector strips and which enable the collector strips to be connected to the signal outputs of the read-out device by means of plugs with connected cables inserted into said multipoint connectors.

17. A device according to claim 16, characterized in that the multipoint connectors of the one side differ from the multipoint connectors of the other side and in that a plug intended for the multipoint connectors of the one side may be inserted into the multipoint connectors of that side only.

18. A device according to claim 11, characterized in that the collector strips take the form of printed circuitry and are preferably disposed at the underside of the base plate of insulating material.

19. A device according to claim 11, characterized in that the small collector plates of the base plate of insulating material are provided with a stud extending down to the associated collector strip disposed on the underside of said base plate.

20. A device according to claim 18, characterized in that said multipoint connectors are provided with studs for connecting the contacts of said multipoint connectors with the collector strips.

21. A device according to claim 20, characterized in that connection of the studs with the collector strips is effected by soldering according to the flow-solder method.

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