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(54) SYSTEM FOR SELECTING THE STITCH FORMING ORGANS FOR TEXTILE MACHINES

SYSTEM ZUR AUSWAHL VON MASCHENBILDENDEN INSTRUMENTEN FÜR TEXTILMASCHINEN

SYSTÈME DE SÉLECTION D'ORGANES DE FORMATION DE BOUCLES POUR MACHINES TEXTILES

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Description

[0001] The present invention relates to a system for selecting the stitch-forming organs for textile machines and, more particularly, for circular knitting machines.

[0002] The known textile machines, such as the circular knitting machines or the rectilinear looms, have a plurality of needles which are selected to be moved vertically according to an automatic operating procedure whose commands are saved in a memory, so as to obtain a certain design on the fabric.

[0003] In this way, it is possible to use different selectors of needles in order to actuate their vertical movement.

[0004] Currently, selection devices operating by means of control channels (or technical ways, which are made by special cams directly on the heel of said needles) and other selection devices operating through additional mechanisms (jacquard) are used.

[0005] In fact, while for making simple fabrics (such as jersey) a single control channel of the needles is need, in order to obtain complex drawings on a fabric it is necessary to have two, four or more control channels (for example, the interlock machines employ two control channels of the needles on each needle bed).

[0006] When a four-channel selection is employed, the needles have four levels of the heel, so that at each level corresponds one channel; a given needle, when comes to a stitch-forming system, makes a mesh, a bushing or a bridle, depending on whether the channel corresponding to its heel has, respectively, a meshing cam, a tufting cam or a cam that holds the needle in a non-working position (bridle); the weaving arises from the placement of the heels on said needles and from the arrangement of the cams in correspondence of the single systems of the machine.

[0007] In order to obtain a greater freedom for preparing the weavings, the selection heels can also be provided on a tab which is separated from the needle (a sub-needle) and the needle, in turn, has an its own heel, which is necessary for its lowering.

[0008] For example, a known jacquard selection system for circular knitting machines provides for a lift-up sub-needle, placed at the bottom of each needle with an intermediate heel, which may be located at different levels, for operating the selection, an upper heel for providing the lowering and a lower heel for controlling the upward motion.

[0009] At the level of the selection heels a selection lever can be controlled for having an inside or outside position, so that, when said lever is in outside position, all said sub-needles that have the selection heel on a same level remain in a vertical position and their lower heel rises on a control cam, while the corresponding needle is brought in a meshing position (the so-called technical two-way selection, with the needles in a working position and in a non-working position).

[0010] The fabric design therefore arises from the arrangement of the selection heels of said sub-needles and from the position of the selection levers at each level and the development of the design along the length direction is related to the possibility to change the position of the selection levers when each revolution of the machine's cylinder is completed.

[0011] The above mentioned jacquard selection systems have limited dimensions of the drawing pattern, but an extension to the whole circumference of the circular machine can be obtained with electronic control systems, according to which a sub-needle is placed under each needle and housed inside a first channel adjacent to the cylinder of the circular machine; said sub-needle is positioned with the heel placed inside a second channel and its position is controlled by a control magnet with a a spring, which acts as an actuator of the electrical pulses.

[0012] The selection process is a technical two-way selection and the dimensions of the drawing pattern becomes, therefore, virtually unlimited, since at the passage of each needle it is possible to change the state of the magnets (one for each drop of the machine); said possibilities depend on the control system and therefore the dimensions of the drawing pattern depend on the memory of the electronic control unit.

[0013] Circular knitting machines with single or double needle bed are also known (the so-called technical three-way machines), in which the needles are selected by means of guiding and coupling devices; in particular, the needles and the sub-needles of the circular machine are housed and move vertically within a plurality of slots, which are provided on the circumference of a rotating cylinder and which are longitudinally arranged with respect to said cylinder and parallel one to each other.

[0014] A selector having one or more selection teeth or heels is usually provided below each needle and sub-needle, so that said heels are configured to contact the levers of an actuator and said selector and its related sub-needle are pressed against the inside walls of the rotating cylinder and the heel of the sub-needle is released from the raising cam (non-working position).

[0015] The basic operation principle provides that each needle is moved vertically by said sub-needles (jacks), so as to make a bushing and to make (or not) each stitching point; the design of the fabric is achieved either by controlling the vertical movement of the needles (i.e. by forming a bushing and by taking the thread to make the stitching point) and allowing the advancement of the machine to a subsequent processing stage (dropping or feeding stage) without taking the thread (technical two-way selection).

[0016] Circular knitting machines with more technical ways are also known; they are able to work fabrics of different texture and are equipped with a plurality of yarn feeding stations and of top or sliver or carding tape feeding stations, wherein the needles are forced to rotate integrally to a rotating cylinder and are free to move vertically, i.e. in a direction which is parallel to the rotation

axis of the cylinder.

[0017] The machine can be equipped with a plurality of yarn and/or carding tape or top feeding stations, which are equally far one from each other, in a radial direction and along the circumference of the cylinder provided with the needles, and each station is positioned so as to feed the suitable yarn and/or the suitable threads to the needles during their rotation together with the cylinder.

[0018] In practice, the feeding stations are spaced apart from each other by a constant angular spacing and each station includes, respectively, the yarn feeding device and a known carding machine for feeding the carding tape or top; furthermore, each yarn feeding device comprises a yarn guide which is placed next to the angular position of the needles, in order to feed yarn to said needles.

[0019] The cylinder is provided with grooves, where the respective needles move, and said needles are actuated by a plurality of cams and control means for meshing at least one thread brought by a set of feeding devices of the circular knitting machine.

[0020] A programmable software management apparatus is provided so as to update the status of each lever of an actuator, as well as during first predetermined time intervals corresponding to angular positions existing between a first prefixed number of stitch-forming elements and during second time intervals corresponding to intermediate angular positions comprised between 1 and the first prefixed number of stitch-forming elements, wherein the first number of stitch-forming elements is equal to the number of levers of said actuator.

[0021] The angular positions are determined by the shape of each lever of the actuator and said actuator allows to move and engage at least one lever, so as to channel needles or groups of needles along a specific technical way in order to make different types of knitting; in particular, the needles are made with suitable shaped sub-needles and are moved so that some needles are able to raise upward with respect to other needles in order to take one or more threads and/or to remove or keep a bushing.

[0022] However, the above mentioned known selection systems have, in addition to problems of coupling between a needle and the other, a considerable overall size and, in particular, the longitudinal and vertical dimensions of the system do not allow the compatibility with the dimensions of a mechanical system with four heels and four tracks, as well as affect the accessibility to the area of the needles by an operator; as a consequence, the system is very expensive and a special processing is needed for making the whole selection system.

[0023] A system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, having the technical features of the preamble of the enclosed claim 1 is known for example from EP0496133A1.

[0024] An object of the present invention is therefore to provide a system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, which obviates the above mentioned drawbacks and, in particular, which has an overall size extremely low, with respect to the prior art, thus allowing compatibility with the dimensions of height and width of a mechanical system with four heels and four cam tracks.

[0025] Another object of the present invention is to provide a system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, which allows to reduce the total costs, with respect to the prior art, thanks to the saving of material and thanks to the saving of special processes that are needed for making a known selection system.

[0026] A further object of the present invention is to provide a system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, which allows to improve the accessibility to the area of the needles by an operator.

[0027] These and other objects are achieved by a system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, according to the appended claim 1; other technical features are contained in the dependent claims.

[0028] Advantageously, the use of only two flat elements, such as a needle and an elastic jack, which has six different positions of the selection heels, allows to reduce the vertical dimensions of the system, thus allowing the compatibility with the dimensions of a mechanical system with four heels and four cam tracks.

[0029] The reduction of the overall height of the system, with respect to the known selection systems, thus allows a reduction of costs, thanks to the savings in material and machining operations that are needed for making the system; furthermore, the reduction of vertical dimensions improves the accessibility to the area of the needles by an operator.

[0030] The use of cams with a double depth reduces the width overall dimensions of the selection system so as to make the system compatible with the dimensions of the mechanical selection systems, which have about 3 drops every inch of diameter, with respect to the 2.4 falls every inch of diameter of the selection systems which are currently available; therefore, the productivity of the machine increases by 25% at a given speed of rotation, with respect to the prior art.

[0031] Finally, the use of an actuator with small and flat levers, which are compressed (during the contact), allows to avoid the use of electrical or magnetic energy and the operation of the system even with an increase of force due to the spring of the selection jack; said increase of force allows a timing of release of the lower selection jack, which, at a given speed, also allows to reduce the overall size of the selection system.

[0032] The above feature also contributes to the width reduction of the selection system and allows to realize 3 drops for each inch of diameter.

[0033] Another advantage of the invention is constitut-

ed by the fact that the dimensional compatibility, both in height and in width, allows to make conversion kit for changing the mechanical systems into electronic selection systems for all known mechanical machines which are now used for jersey and/or interlock machining or for other simple fixed combinations, thus allowing to lower the related costs and to widen the machining to be performed, thus speeding up any change of processing.

[0034] The large amount of mechanical machines installed worldwide and the lower costs and reliability of said conversion allow to make an important upgrade of said known mechanical knitting machines.

[0035] Further purposes and advantages of the present invention will become more clear from the following description and from the enclosed drawings, relating to a preferred embodiment of the invention, in which:

- figures 1A, 1B and 1C respectively show a partial longitudinal sectioned front view, a partial longitudinal sectioned side view and a partial longitudinal sectioned perspective view of a textile machine, in particular a circular knitting machine, in which the system for selecting the stitch-forming organs is used, according to the invention;
- figure 2 shows an enlarged view of a technical detail of the device for selecting the stitch-forming organs of figures 1A, 1B, 1C, according to the present invention;
- figures 3 and 4 show enlarged, partial and detailed views of a plurality of device for selecting the stitch-formation organs of figures 1A, 1B, 1C, which are mounted on a textile machine and, in particular, on a circular knitting machine, according to the present invention.

[0036] With reference to the above mentioned figures, the system for selecting the stitch-formation organs, which is the object of the invention, comprises a plurality of needles 1, each equipped with a lower heel 3 and coupled with an elastic selection element (jack) 5, which includes a central portion 2, an upper heel 4 and a lower heel 5C; the needles 1, together with the respective elastic selection elements 5, are integral with the rotating cylinder of the knitting machine and rotate with said cylinder.

[0037] In particular, the elastic element 5 is inserted into a suitable channel of the rotating cylinder and can slide vertically, the upper heel 4 of the elastic element 5 is inserted in the cam 15, while the heel 5C may comes out from the seat of the rotating cylinder thanks to the elastic thrust of the spring placed inside the selection element or jack 5.

[0038] This causes a vertical sliding of the elastic selection element 5 inside the respective seat of the machine's cylinder and a rotation of the element 5, pivoted on the upper heel 4, inside the seat of the cam 15, so as to perform a movement which allows the lower heel 5C to radially exit from the machine's cylinder.

[0039] The cam 8, which is fixed to the support 12 and to the the base of the machine, allows to press the selection element 5, so that, during rotation of the machine's cylinder, the cam 8 engages the lower heel 5C by pushing the elastic selection element 5 inside the cylinder and by pressing the spring.

[0040] The area 20, shown in detail in the enclosed figure 3, is the selection area and corresponds to the area of contact between the cam 8 mounted on the support 12 and the cams 9 (raising cam) and 10 (draining cam) which are mounted on the adjacent support 12; as provided in the known circular knitting machines, the supports 12 of the cams 8, 9 and 10 surrounds the rotating cylinder of the machine so that the cams mounted on said cylinder are able to guide the selection elements and the needles at each position of the cylinder.

[0041] In the above zone 20, the lower heel 5C of the selection element (selector or jack) 5 is disengaged from the cam 8 and therefore the spring of the selector 5 is able to push the lower heel 5C towards the outside of the machine's cylinder; in this area, the tilting of the selector 5, which takes place by means of the spring effect, is checked by the selection system composed by the actuator 13, which has some movable selection levers 14, and by the heels or teeth 6 of the selection jack 5.

[0042] Each movable selection lever 14 of the actuator 13 is able to rotate with respect to its own pin, since it is actuated by a known piezo-ceramic or magnetic element.

[0043] The movement of said levers 14 is of a few mm and in any case it is sufficient to intercept or not the selection teeth 6 of the jack 5; furthermore, each selection jack 5 may have two or more selection teeth 6 of different length.

[0044] The cams 9, 10 have two different depths with respect to the machine's cylinder, so as to allow the rising of the needle 1 in a position of "retained" points, as well as to allow the lowering of the needle 1 in a non-working or "out of work" position of said needles 1 (with release of the spring of said elastic selection element 5).

[0045] In particular, the cam 9 allows to rise both the selector or jack 5 and the needle 1 by means of the heel 5C, up to the height of a "retained" point (the thread is taken without releasing the previously knitted point), while the cam 10 allows to rise the selector 5 and, consequently, the needle 1, by means of the lower heel 5C, up to the height corresponding to a working position of the needle 1 (the thread is taken and the knitted point which is already stitched is released).

[0046] With reference to the selection area 20, if the selection levers 14 are placed in a position according to which they do not contact the teeth 6, the jack or elastic selector 5 is pushed by the spring in a position which is completely outside the machine's cylinder and therefore the lower heel 5C turns towards a position such that, at a subsequent rotation of the cylinder, said heel 5C will engage the working cam 11 (the rising cam at a "mesh-working" position), so as to drive vertically the jack 5 and consequently the needle 1 up to the working position of

the needle 1.

[0047] If at least one selection lever 14 is in a position such as to contact the upper heel 4 (short-heel), always in the selection area 20, the elastic jack 5 may goes out from the machine's cylinder until the lever 14 is able to stop the upper heel 4; therefore, the upper heel 4 cannot go out completely from the cylinder, but only for a portion so as to engage, during the rotation of the machine's cylinder, the rising cam 9 for making the retained point.

[0048] Moreover, if at least one of the selection levers 14 contacts the lower heel 5C (long heel), always in the selection area 20, the elastic jack 5 cannot go outside the cylinder and the spring of the jack 5 is maintained pressed; therefore, during the rotation of the machine's cylinder, the lower heel 5C cannot engage any of the cams 9 and 11 and thus cannot raise vertically. Consequently, also the needle 1 does not rise and therefore remain in a state of non-working or "out of work" (no thread is taken and the point previously knitted is maintained).

[0049] The function of the guiding cam 15 of the elastic jack 5 in the area 15B limits the vertical rising of the upper heel 4 of the jack 5, so as to prevent to push the needle 1 at a not proper height, while the same cam 15 in the area 15A allow to take all the upper heels 4 of the elastic selection jacks 5 (coupled with the needles 1) to a same vertical height, before moving towards the new selection area 20.

[0050] When the selection jacks 5 are in the area 21 (the area where a compression of said jacks 5 starts), they are all released (the spring is released) and, therefore, all the lower heels 5C are outside the machine's cylinder, even if at different heights.

[0051] Thus, the lower heels 5C going on along the selection of non-working (out of work) enlarge the spring by following the inclined plane of the cam 10, while the lower heels 5C which follow the cam 9 and which therefore are rised in correspondence of a working position with retained points are suddenly released in an area 21 where the compression starts.

[0052] Finally, the lower heels 5C, which follow the cam 11 and thus rise in a working position, are already outside and, from the area 21, the lower heels 5C which are completely outside get back on the way following the cam 8 which presses the jack 5 inside the cylinder.

[0053] The upper contrast cam 16 limits the vertical rising of the heel 3 of the needle 1, when said heel 3 is subjected to the thrust and acceleration of the jack 5, while the stitch formation cam 17, which is adjustable in height by sliding the key 18, brings down the needles 1, by driving the heels 3 up to a lower regulating stitching point.

[0054] From the above description the technical feature of the system for selecting the stitch-forming organs of a textile machine, in particular of a circular knitting machine, which is the object of the present invention, are clear as well as the related advantages.

[0055] In particular, the specific characteristics of the present invention are the following.

[0056] The use of the rising cams 9 and 11 having different depths allows, through the partially or completely coming out of the lower heel 5C, the selection elastic element (jack) 5 and the needle 1 to travel two different rising paths corresponding to the positions of "retained stitches" and "working position"; specifically, the double depth allows the lower heel 5C to travel three different paths starting from the same point.

[0057] Furthermore, the use of an elastic selection jack 5 with heels (an upper heel 4 and a lower heel 5C) having different length causes the persistence of the lower heel 5C inside the machine's cylinder or the exit of said lower heel 5C at two different positions, namely together with the cam 9 and with the cam 11; this allows to select three different paths at the same point.

[0058] Finally, the use of a selection actuator 13 with small and flat selection levers 14 allows a quick change of state of said levers 14, which, in a working position, act as shutters for a complete or partial exit of said selection elastic element 5; furthermore, the selection levers 14 are mechanically pressed also supporting high forces and this allows to strengthen the spring of the jack 5 and to make faster, with respect to the prior art, the exit of the lower heel 5C (which is carried out in less space).

[0059] As already mentioned above, further advantages of the invention are the following:

- reducing, with respect to the prior art, the vertical size of the system, thanks to the use of only two flat elements (the needle and the selection elastic jack);
- compatibility with the dimensions of a mechanical system with four heels and four cam tracks;
- reducing, with respect to the prior art, the overall height of the system;
- reducing, with respect to the prior art, the production and operation costs, thanks to the saving of material and thanks to the fact that special processing are not required for making the whole system;
- improving accessibility for an operator, with respect to the prior art, to the area where the needles move upwards and downwards;
- reducing, with respect to the prior art, the overall dimensions of the system and compatibility with the dimensions of the known mechanical selection systems;
- increasing, with respect to the prior art, the productivity of the machine, with the same speed of rotation;
- reducing, with respect to the prior art, the consumption of electric and/or magnetic energy;
- greater speed in releasing the selection jack, with respect to the prior art;
- reducing, with respect to the prior art, the selection spaces, with the same speed;
- dimensional compatibility both in height and width and consequent possibility of making a conversion kit for known textile machines with mechanical selection systems, so as to make electronic selection

systems, in order to speed any machining change of the known machines still installed worldwide.

[0060] Finally, it is clear that many variations may be made to the selection system of the invention, without departing from the principles of novelty inherent in the inventive idea as claimed in the appended claims.

Claims

1. A system for selecting the stitch-forming organs for textile machines, in particular for circular knitting machines, comprising a plurality of needles (1), which are integral with a rotating cylinder of the textile machine and which rotate with said cylinder, and a plurality of shaped cams (8, 9, 10, 11), mounted on respective supports (12) surrounding said rotating cylinder and configured to guide said needles (1) in each position of the rotating cylinder, wherein each of said needles (1) is coupled with a selection elastic element (5), which is inserted into a respective channel or seat of said rotating cylinder and which slides in a vertical direction, said elastic element (5) also having an elastic central portion (2) and at least one upper heel (4), which can be inserted within a guide cam (15) mounted on a respective support which surrounds said rotating cylinder, and a lower heel (5C), which is housed into said seat of the rotating cylinder, thanks to the action of at least one first shaped cam (8), or which is radially disengaged from said seat of the rotating cylinder, thanks to the action of said elastic central portion (2) of said selection elastic element (5) when said lower heel (5C) is disengaged from said first shaped cam (8), wherein said selection elastic element (5) is provided with two or more teeth (6) which are placed between said at least one upper heel (4) and said lower heel (5C), and wherein an actuator (13) is configured to control a tilting motion of said selection elastic element (5), said actuator (13) having some selection levers (14), each movable and rotatable with respect to its own pin, so that each of said selection levers (14) is able to contact one or more of said teeth (6) of said selection elastic element (5), **characterized in that** at least two of said shaped cams (9, 11) have different depths with respect to the rotating cylinder of the machine and said upper and lower heels (4, 5C) have different lengths, so as to allow a movement of said needles (1), respectively upwards and downwards, through the partially or completely coming out of said lower heel (5C), so that said selection elastic elements (5) and said needles (1) are placed in a non-working position or travel two different rising paths, corresponding to the positions of knitting the yarn without releasing the previously stitched points and of placing said needles (1) in a working position according to which said needles (1) knit the yarn by releasing the previously stitched points, said lower heel (5C) thus travelling three different paths starting from the same point.

2. A system according to claim 1, **characterized in that**, when said selection levers (14) of said actuator (13) are placed in a position so as not to contact said teeth (6) of said selection elastic element (5), said selection elastic element (5) is elastically pushed externally with respect to said rotating cylinder of the machine and said lower heel (5C) is brought in a position such that, at a subsequent rotation of said cylinder, said lower heel (5C) is engaged with at least one of said shaped cams (11), thus rising said selection elastic element (5) in a vertical direction and placing said needle (1) in said working position.

3. A system according to claim 1, **characterized in that**, when at least one of said selection levers (14) of said actuator (13) contacts said at least one upper heel (4) of said selection elastic element (5), said selection elastic element (5) is able to come out from said rotating cylinder of the machine until said selection lever (14) stops said at least one upper heel (4), said at least one upper heel (4) being thus able to come out only partially from said rotating cylinder, thus carrying out said step of knitting the yarn without releasing the previously stitched points.

4. A system according to claim 1, **characterized in that**, when at least one of said selection levers (14) contacts said lower heel (5C), said selection elastic element (5) is not able to come out from said rotating cylinder and, during the rotation of said cylinder, said lower heel (5C) and said needle (1) are not able to rise in said vertical direction, said needle (1) thus keeping in said non-working position.

5. A system according to claim 1, **characterized in that** said guide cam (15) is shaped so as to restrict the motion in the vertical direction of said at least one upper heel (4) of the selection elastic element (5), in order to push the needle (1) to a given height, and in order to bring the upper heels (4) of the selection elastic elements (5) to a same height, during a rotation of said cylinder and when said selection elastic elements (5) are placed in a first selection zone (20) of said rotating cylinder.

6. A system according to claim 1, **characterized in that**, when said selection elastic elements (5) are placed in a first compression zone (21) of said rotating cylinder, said selection elastic elements (5) are placed in a released state and said lower heels (5C) are placed outside the cylinder of the machine at different heights.

7. A system according to at least one of the preceding

claims, **characterized in that** a contrast cam (16) is configured to limit the vertical movement of said needle (1), while a stitch-formation cam (17), which is adjustable in height, allows to bring down the needles (1), by guiding said at least one upper heel (3) up to a stitch-adjustment lower point.

Patentansprüche

1. System zur Auswahl maschenbildender Elemente für Textilmaschinen, insbesondere für Rundstrickmaschinen, umfassend eine Vielzahl von Nadeln (1), die in einem Drehzylinder der Textilmaschine integriert sind und die mit dem Zylinder drehen, und eine Vielzahl geformter Nocken (8, 9, 10, 11), die an entsprechenden Halterungen (12) montiert sind, die den Drehzylinder umgeben und ausgestaltet sind, die Nadeln (1) in jeder Position des Drehzylinders zu führen, wobei jede der Nadeln (1) mit einem elastischen Auswahlelement (5) gekoppelt ist, das in einen entsprechenden Kanal oder Sitz des Drehzylinders eingesetzt ist, wobei das elastische Element (5) auch einen elastischen Mittelabschnitt (2) und mindestens eine obere Ferse (4), die in einer Führungsnocke (15) eingesetzt werden kann, die an einer entsprechenden Halterung montiert ist, die den Drehzylinder umgibt, und eine untere Ferse (5C), die in dem Sitz des Drehzylinders aufgenommen ist, aufweist, und das aufgrund der Wirkung der mindestens einen ersten geformten Nocke (8) in einer vertikalen Richtung gleitet oder welches aufgrund der Wirkung des elastischen Mittelabschnitts (2) des elastischen Auswahlelements (5) radial von dem Sitz des Drehzylinders gelöst ist, wenn die untere Ferse (5C) von der ersten geformten Nocke (8) gelöst ist, wobei das elastische Auswahlelement (5) mit zwei oder mehr Zähnen (6) bereitgestellt ist, die zwischen der mindestens einen oberen Ferse (4) und der unteren Ferse (5C) platziert sind, und wobei ein Stellglied (13) ausgestaltet ist, eine Kippbewegung des elastischen Auswahlelements (5) zu steuern, wobei das Stellglied (13) einige Auswahlhebel (14) aufweist, die jeweils in Bezug auf ihren eigenen Stift beweglich und drehbar sind, so dass jeder der Auswahlhebel (14) imstande ist, mit einem oder mehreren der Zähne (6) des elastischen Auswahlelements (5) in Kontakt zu gelangen, **dadurch gekennzeichnet, dass** mindestens zwei der geformten Nocken (9, 11) unterschiedliche Tiefen in Bezug auf den Drehzylinder der Maschine aufweisen und die oberen und unteren Fersen (4, 5C) unterschiedliche Längen aufweisen, um so eine Bewegung der Nadeln (1) nach oben bzw. nach unten durch das teilweise oder vollständige Herauskommen der unteren Ferse (5C) zu erlauben, sodass die elastischen Auswahlelemente (5) und die Nadeln (1) in einer Nicht-Arbeitsposition platziert sind oder sich auf zwei unterschiedlichen ansteigenden Pfaden entsprechend den Strickpositionen des Garns bewegen, ohne die vorherigen Maschenpunkte freizugeben, und die Nadeln (1) in einer Arbeitsposition platziert werden, in der die Nadeln (1) das Garn durch Freigeben der vorherigen Maschenpunkte stricken, wobei die untere Ferse (5C) sich somit ausgehend von demselben Punkt über drei verschiedene Pfade bewegt.

2. System nach Anspruch 1, **dadurch gekennzeichnet, dass** wenn die Auswahlhebel (14) des Stellglieds (13) in einer Position platziert sind, in der sie mit den Zähnen (6) des elastischen Auswahlelements (5) nicht in Kontakt sind, das elastische Auswahlelement (5) extern in Bezug auf den Drehzylinder der Maschine angeschoben wird und die untere Ferse (5C) in eine derartige Position gebracht wird, dass bei einer anschließenden Drehung des Zylinders die untere Ferse (5C) mit mindestens einer der geformten Nocken (11) in Eingriff steht, wodurch das elastische Auswahlelement (5) in einer vertikalen Richtung ansteigt und die Nadel (1) in der Arbeitsposition platziert.

3. System nach Anspruch 1, **dadurch gekennzeichnet, dass**, wenn mindestens einer der Auswahlhebel (14) des Stellglieds (13) mit der mindestens einen oberen Ferse (4) des elastischen Auswahlelements (5) in Kontakt gelangt, das elastische Auswahlelement (5) imstande ist, aus dem Drehzylinder der Maschine herauszukommen, bis der Auswahlhebel (14) die mindestens eine obere Ferse (4) stoppt, wobei die mindestens eine obere Ferse (4) daher imstande ist, nur teilweise aus dem Drehzylinder herauszukommen, wodurch der Schritt zum Stricken des Garns, ohne die vorherigen Maschenpunkte freizugeben, ausgeführt wird.

4. System nach Anspruch 1, **dadurch gekennzeichnet, dass**, wenn mindestens einer der Auswahlhebel (14) mit der unteren Ferse (5C) in Kontakt gelangt, das elastische Auswahlelement (5) nicht imstande ist, aus dem Drehzylinder der Maschine herauszukommen, und während der Drehung des Zylinders die untere Ferse (5C) und die Nadel (1) nicht imstande sind, in der vertikalen Richtung zu steigen, wodurch die Nadel (1) in der Nicht-Arbeitsposition gehalten wird.

5. System nach Anspruch 1, **dadurch gekennzeichnet, dass** die Führungsnocke (15) so geformt ist, dass sie die Bewegung der mindestens einen oberen Ferse (4) des elastischen Auswahlelements (5) in der vertikalen Richtung begrenzt, um die Nadel (1) zu einer gegebenen Höhe zu schieben und um die oberen Fersen (4) der elastischen Auswahlelemente (5), während einer Drehung des Zylinders und wenn die elastischen Auswahlelemente (5) in einer ersten

Auswahlzone (20) des Drehzylinders platziert sind, auf eine selbe Höhe zu bringen.

6. System nach Anspruch 1, **dadurch gekennzeichnet, dass**, wenn die elastischen Auswahlelemente (5) in einer ersten Kompressionszone (21) des Drehzylinders platziert sind, die elastischen Auswahlelemente (5) in einem freigegebenen Zustand platziert sind und die unteren Fersen (5C) außerhalb des Zylinders der Maschine bei unterschiedlichen Höhen platziert sind.

7. System nach mindestens einem der vorstehenden Ansprüche, **dadurch gekennzeichnet, dass** eine Gegennocke (16) ausgestaltet ist, die vertikale Bewegung der Nadel (1) zu begrenzen, während eine Maschenbildungsnocke (17), die höheneinstellbar ist, erlaubt, die Nadeln (1) durch Führen der mindestens einen oberen Ferse (3) nach oben zu einem unteren Mascheneinstellungspunkts nach unten zu bringen.

Revendications

1. Système pour sélectionner les organes de formation de point pour des machines textiles, en particulier pour des machines à tricoter circulaires, comprenant une pluralité d'aiguilles (1), qui font partie intégrante d'un cylindre rotatif de la machine textile et qui pivotent avec ledit cylindre, et une pluralité de cames façonnées (8, 9, 10, 11), montées sur des supports respectifs (12) entourant ledit cylindre rotatif et configurées pour guider lesdites aiguilles (1) dans chaque position du cylindre rotatif, dans lequel chacune desdites aiguilles (1) est couplée à un élément élastique de sélection (5), qui est inséré dans un canal ou siège respectif dudit cylindre rotatif et qui coulisse dans une direction verticale, ledit élément élastique (5) présentant également une partie centrale élastique (2) et au moins un talon supérieur (4), qui peut être inséré dans une came de guidage (15) montée sur un support respectif qui entoure ledit cylindre rotatif, et un talon inférieur (5C), qui est logé dans ledit siège du cylindre rotatif, grâce à l'action d'au moins une première came façonnée (8), ou qui est radialement désengagé dudit siège du cylindre rotatif, grâce à l'action de ladite partie centrale élastique (2) dudit élément élastique de sélection (5) lorsque ledit talon inférieur (5C) est désengagé de ladite première came façonnée (8), dans lequel ledit élément élastique de sélection (5) est pourvu de deux ou plusieurs dents (6) qui sont placées entre ledit au moins un talon supérieur (4) et ledit talon inférieur (5C), et dans lequel un actionneur (13) est configuré pour commander un mouvement d'inclinaison dudit élément élastique de sélection (5), ledit actionneur (13) présentant plusieurs leviers de sélection (14), chacun pouvant être déplacé et pivoté par rapport à sa propre épingle, de sorte que chacun desdits leviers de sélection (14) soit capable d'entrer en contact avec une ou plusieurs parmi lesdites dents (6) dudit élément élastique de sélection (5), **caractérisé en ce qu'**au moins deux desdites cames façonnées (9, 11) présentent différentes profondeurs par rapport au cylindre rotatif de la machine et lesdits talons supérieur et inférieur (4, 5C) présentent différentes longueurs, de manière à permettre un mouvement desdites aiguilles (1), respectivement vers le haut et vers le bas, à travers la sortie partielle ou complète dudit talon inférieur (5C), de sorte que lesdits éléments élastiques de sélection (5) et lesdites aiguilles (1) soient placés dans une position de non-fonctionnement ou parcourent deux trajets montants différents, correspondant aux positions de tricot du fil sans relâcher les points précédemment cousus et de placement desdites aiguilles (1) dans une position de fonctionnement selon laquelle lesdites aiguilles (1) tricotent le fil en relâchant les points précédemment cousus, ledit talon inférieur (5C) parcourant donc trois trajets différents en commençant du même point.

2. Système selon la revendication 1, **caractérisé en ce que**, lorsque lesdits leviers de sélection (14) dudit actionneur (13) sont placés dans une position de manière à ne pas entrer en contact avec lesdites dents (6) dudit élément élastique de sélection (5), ledit élément élastique de sélection (5) est poussé de manière élastique extérieurement par rapport audit cylindre rotatif de la machine et ledit talon inférieur (5C) est amené dans une position de sorte que, dans une rotation ultérieure dudit cylindre, ledit talon inférieur (5C) soit engagé avec au moins une desdites cames façonnées (11), levant donc ledit élément élastique de sélection (5) dans une direction verticale et plaçant ladite aiguille (1) dans ladite position de fonctionnement.

3. Système selon la revendication 1, **caractérisé en ce que**, lorsque au moins un desdits leviers de sélection (14) dudit actionneur (13) entre en contact avec ledit au moins un talon supérieur (4) dudit élément élastique de sélection (5), ledit élément élastique de sélection (5) est capable de sortir dudit cylindre rotatif de la machine jusqu'à ce que ledit levier de sélection (14) arrête ledit au moins un talon supérieur (4), ledit au moins un talon supérieur (4) étant donc capable de sortir uniquement partiellement dudit cylindre rotatif, exécutant donc ladite étape de tricot du fil sans relâcher les points précédemment cousus.

4. Système selon la revendication 1, **caractérisé en ce que**, lorsque au moins un desdits leviers de sélection (14) entre en contact avec ledit talon inférieur

(5C), ledit élément élastique de sélection (5) n'est pas capable de sortir dudit cylindre rotatif et, durant la rotation dudit cylindre, ledit talon inférieur (5C) et ladite aiguille (1) ne sont pas capables de se lever dans ladite direction verticale, ladite aiguille (1) gardant donc ladite position de non-fonctionnement.

5. Système selon la revendication 1, **caractérisé en ce que** ladite came de guidage (15) est façonnée de manière à limiter le mouvement dans la direction verticale dudit au moins un talon supérieur (4) de l'élément élastique de sélection (5), afin de pousser l'aiguille (1) à une hauteur donnée, et afin d'amener les talons supérieurs (4) des éléments élastiques de sélection (5) à une même hauteur, durant une rotation dudit cylindre et lorsque lesdits éléments élastiques de sélection (5) sont placés dans une première zone de sélection (20) dudit cylindre rotatif.

6. Système selon la revendication 1, **caractérisé en ce que**, lorsque lesdits éléments élastiques de sélection (5) sont placés dans une première zone de compression (21) dudit cylindre rotatif, lesdits éléments élastiques de sélection (5) sont placés dans un état relâché et lesdits talons inférieurs (5C) sont placés à l'extérieur du cylindre de la machine à différentes hauteurs.

7. Système selon au moins une des revendications précédentes, **caractérisé en ce qu'**une came de contraste (16) est configurée pour limiter le mouvement vertical de ladite aiguille (1), tandis qu'une came de formation de point (17), qui peut être réglée en hauteur, permet de baisser les aiguilles (1), en guidant ledit au moins un talon supérieur (3) jusqu'à un point inférieur de réglage de point.

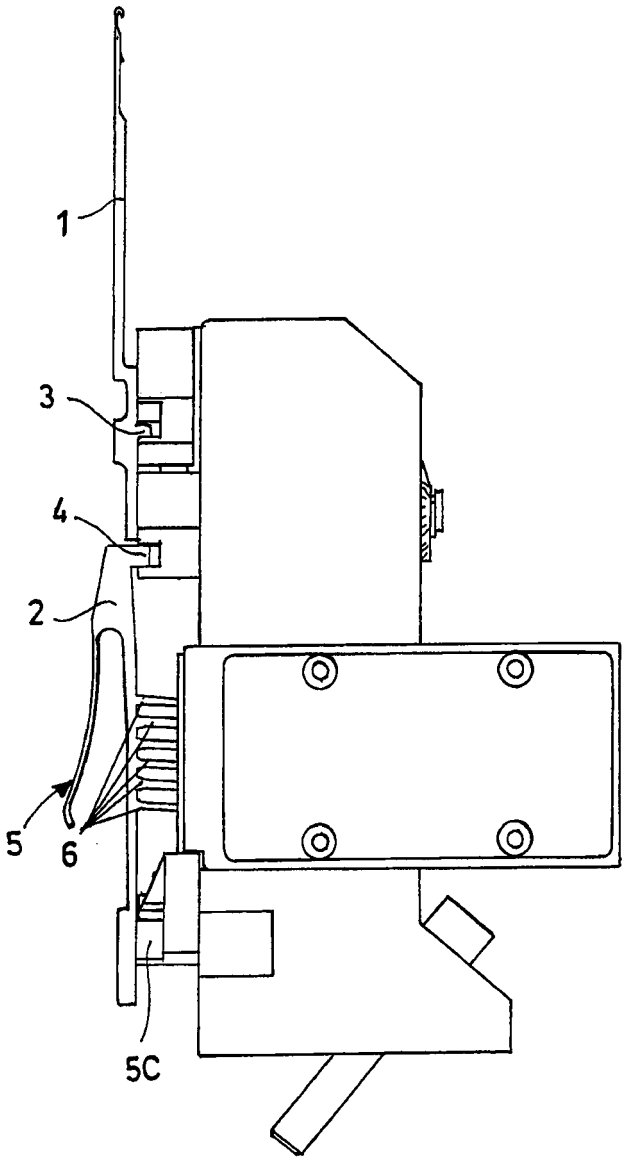


Fig.1A

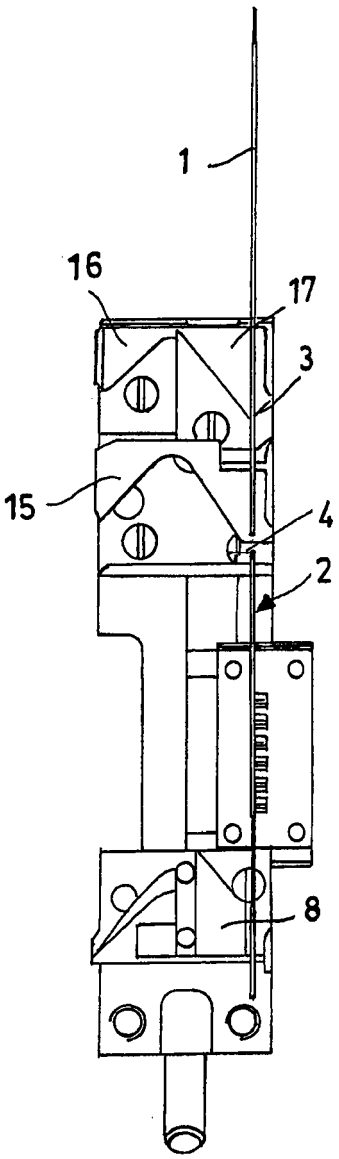


Fig.1B

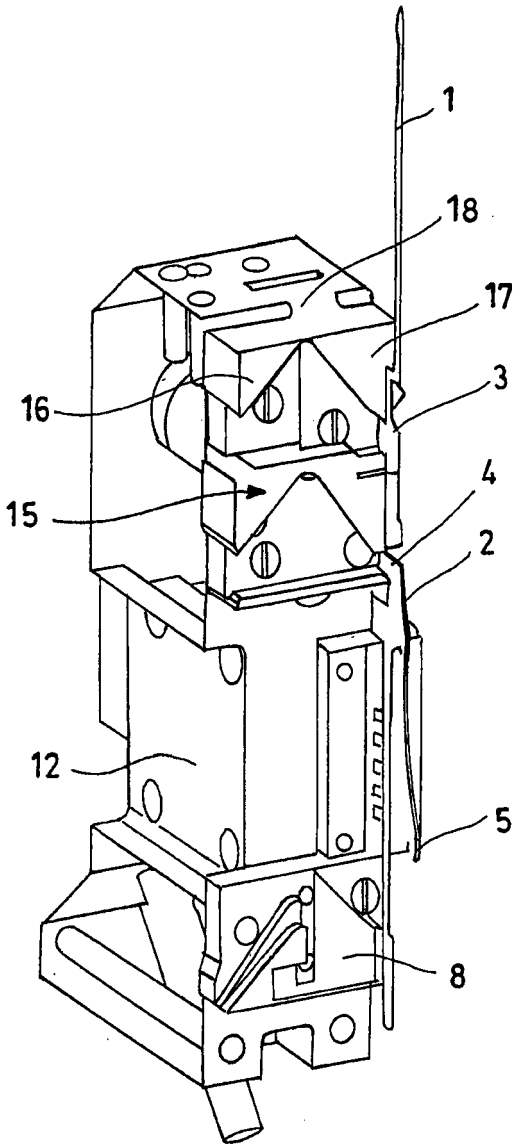


Fig.1C

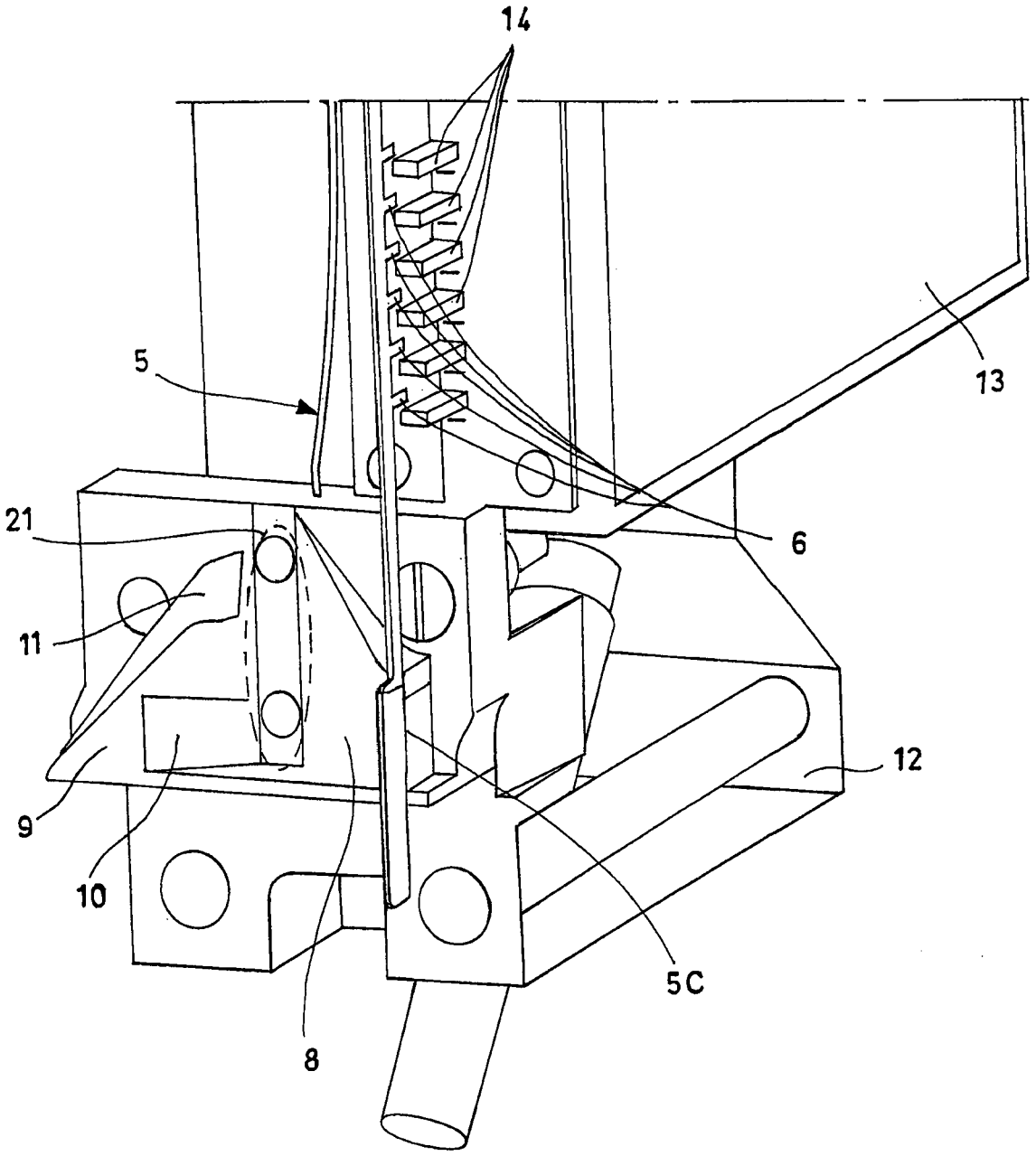


Fig.2

Fig.3

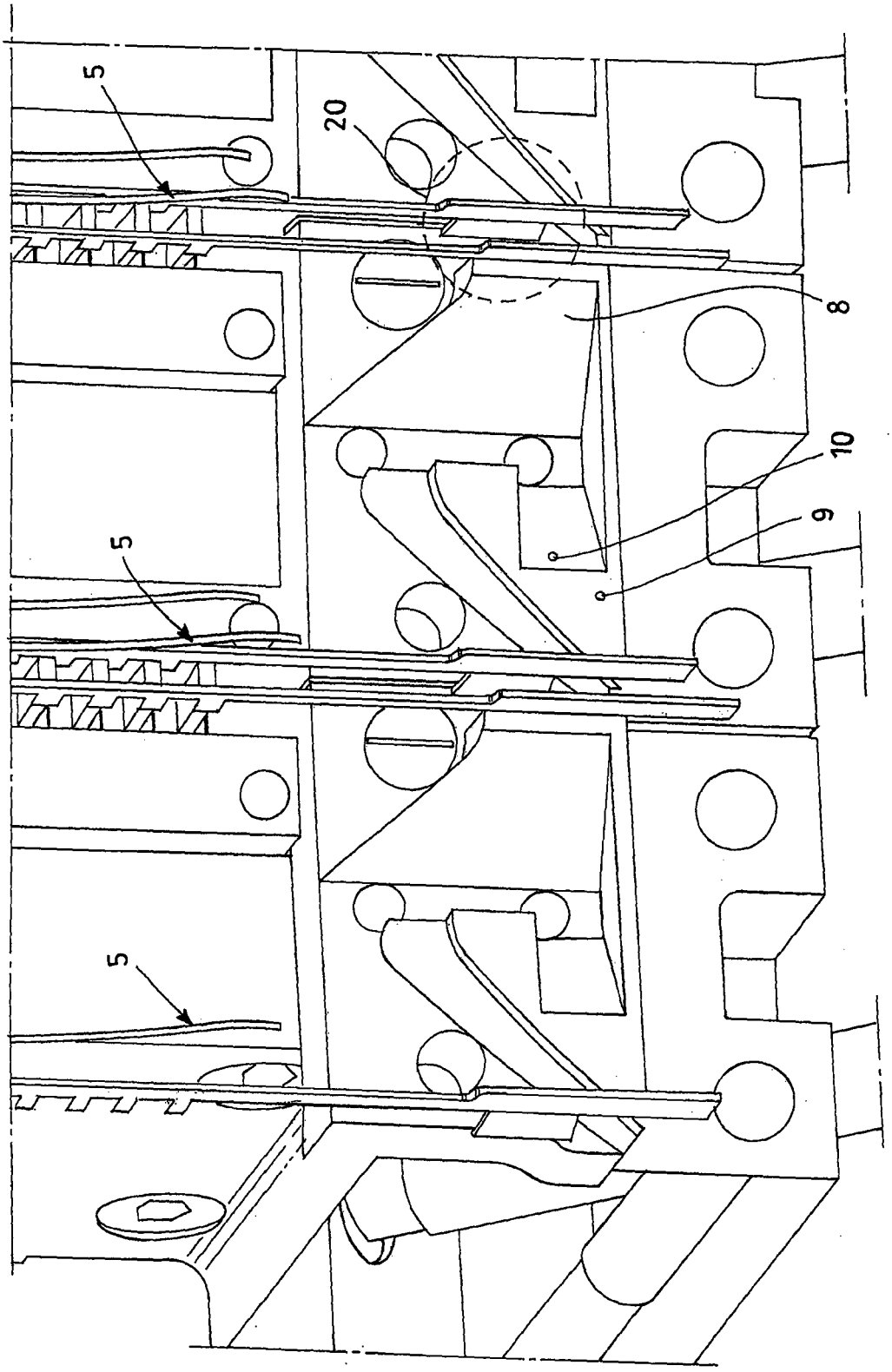
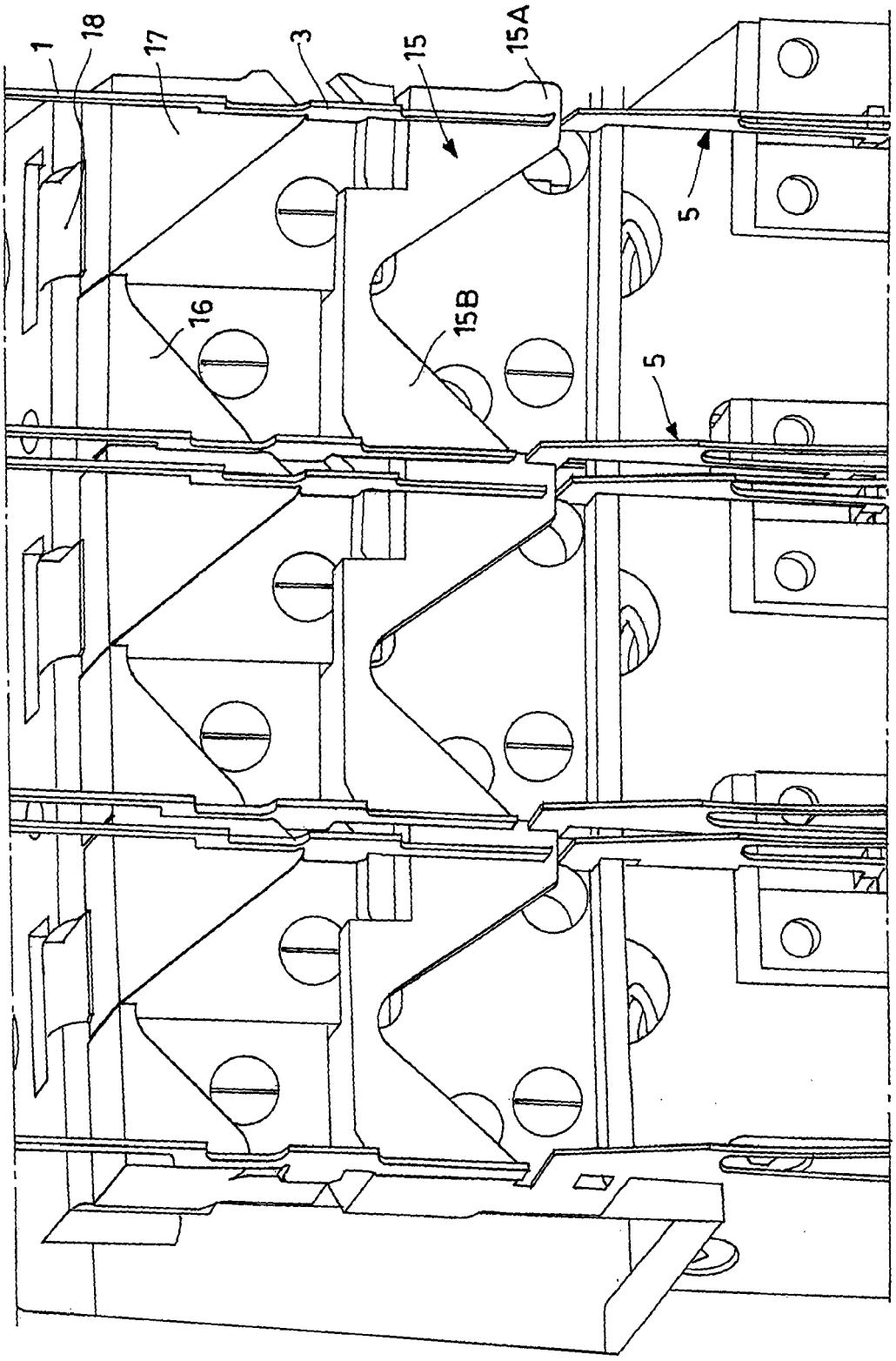


Fig.4



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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