

(19)



(11)

EP 3 303 671 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
08.07.2020 Bulletin 2020/28

(51) Int Cl.:
D04B 15/78 ^(2006.01) **D04B 15/32** ^(2006.01)
D04B 15/68 ^(2006.01)

(21) Application number: **16735687.2**

(86) International application number:
PCT/IB2016/053090

(22) Date of filing: **26.05.2016**

(87) International publication number:
WO 2016/193870 (08.12.2016 Gazette 2016/49)

(54) **SUPPORT AND CONTROL DEVICE FOR CIRCULAR KNITTING MACHINES**

STÜTZ- UND STEUERUNGSVORRICHTUNG FÜR RUNDSTRICKMASCHINEN

DISPOSITIF DE SUPPORT ET DE COMMANDE POUR MACHINES À TRICOTER CIRCULAIRES

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(30) Priority: **29.05.2015 IT UB20150954**

(43) Date of publication of application:
11.04.2018 Bulletin 2018/15

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Description

[0001] The present invention relates to a support and control device for circular knitting machines. In particular, the invention relates to a support and control device characterized by a specific structure and characterized by a peculiar integration of its component apt to interact with needles and selectors of a knitting machine.

[0002] Moreover, the present invention relates to a circular knitting machine comprising such device.

[0003] The present invention falls into the technical field of circular knitting machines for knitted items, seamless knitted items, hosiery items and the like.

[0004] In the present text the wording "knitting machine" generally means a circular knitting machines apt to manufacture knitted items and provided with at least one needle-holding unit or needle-holding cylinder turnably mounted in a supporting structure of the machine and supporting in suitable sliding compartments (or needle seats) a plurality of needles moving parallel to an axis of rotation of the needle-holding cylinder so as to produce a knitted fabric. The needle-holding unit further comprises a corresponding plurality of needle selectors, wherein each selector is typically coupled to a respective needle and phased with it, i.e. vertically aligned along the respective sliding compartment. Each selector is configured so as to interact with the respective needle and in particular to guide its longitudinal movement (along the sliding compartment) by lifting and lowering it so as to perform certain knitting operations.

[0005] Moreover, the knitting machine is provided with a plurality of yarn feeding points or yarn "feeds", in which the needles of the machine are supplied with yarn. This knitting machine can be e.g. single or double needlebed. Circular knitting machines can comprise a variable number of feeds, e.g. 2, 4, 6, 8 or more yarn feeds.

[0006] In the field of circular knitting machines, several modes for controlling needles and needle selectors are known.

[0007] Typically, a series of components and devices for controlling needles and needle selectors are mounted to the knitting machine on each yarn feed. These components and devices comprise at least: a stitch cam, which interacts with the needle butts for moving them longitudinally (up and down) in the respective sliding compartment; a selector cam, which interacts with the selector butts for moving them longitudinally (up and down) in the respective sliding compartment, so that they impart a given longitudinal movement to the respective needle. Basically, on each feed the movement (in particular the lifting movement) of each needle is the combination of the longitudinal motion imparted by the stitch cam directly to the needle and by the motion imparted by the selector cam to the respective selector and through it to the needle.

[0008] The needle butts are placed in a point of the longitudinal development of the needles, and so as to sequentially catch the stitch cam profile. In a similar man-

ner, the selector butts are placed in a point of the longitudinal development of the selectors, and so as to sequentially catch the selector cam profile.

[0009] Known knitting machines typically comprise for each feed also a selecting device, which consists of a box-shaped block or body carrying a series of levers individually actuated by respective actuators and configured so as to interact with suitable selector teeth. As a matter of fact, each selector is provided with at least a respective tooth protruding outside the needle-holding unit.

[0010] In a state-of-the-art solution shown by way of example, the levers are arranged in a vertical row, whereas the selector teeth are placed at different heights along the respective longitudinal development, and in particular progressively along a group of sequential selectors, thus forming a global sawtooth-shaped development of the teeth around the needle-holding unit. Each lever interacts with the teeth placed at the same height only, therefore when the needle-holding unit is rotating, due to the progressive development of the teeth of sequential selectors, the levers periodically abut onto a tooth arranged at their same height, with an actuating sequence of the levers along the vertical row of the levers themselves (e.g. from the bottom lever to the top lever and so on from the beginning).

[0011] At the state of the art, the actuators actuating the levers can exploit for instance a piezoelectric technology, which makes use of special ceramics changing their geometrical shape during the passage of electric current. In this solution, each ceramic acts upon a respective lever so as to selectively shift it between a first position, in which it does not get in contact with the selector tooth, and a second position, in which it touches the selector tooth and pushes it inside the needle-holding unit (using the technical jargon, the lever pushed the tooth and "drowns" the selector). Basically, in the first position the lever does not interfere with the selector tooth, which maintains its radial position (with respect to the axis of the needle-holding cylinder) resulting in its butt entering the path of the selector cam, and thus the selector makes a longitudinal movement transmitted to the respective needle: in this condition, the selector intervenes in the definition of the travel of the respective needle and thus of its law of motion. Conversely, in the second position, the lever interferes with the selector tooth by changing the radial position of the latter so that its butt does not enter the path of the selector cam; therefore, the selector is not led to make longitudinal movements and does not cooperate with the respective needle: in this condition, the selector does not intervene in the definition of the travel of the respective needle. Therefore, each needle makes a different trajectory depending on whether its selector has been guided by the selector cam, which depends in its turn on whether the lever has interacted with the selector tooth.

[0012] Typically, the selecting devices at the state of the art are complete commercial components, produced

by specialist manufacturers and mounted to the knitting machine. These devices are thus connected to the control unit of the knitting machine, which manages their operation.

[0013] In the field of knitting machines, it is known about the use of structures enabling to place the various devices (stitch cams, selector cams, selecting devices) in the correct positions for interacting with needles and selectors and for performing knitting operations.

[0014] A first solution makes use of a supporting block to be placed on the frame of the knitting machine and to which one or more stitch cams, one or more selector cams and one or more selecting devices have to be mounted. These blocks, in the technical jargon referred to as "sections" or "boxes", also "cam boxes" or "cam sections", are basically worked pieces receiving thereon the stitch cams, the selector cams and in particular the box-shaped block or body of the selecting device, which comprises inside the levers and the piezoelectric actuators. The elements mounted to the block are placed in a given manner with respect to the needle-holding unit.

[0015] Knitting machines comprise a plurality of the aforesaid blocks, typically one or more for each yarn feed; the number of blocks can also be very large, e.g. on knitting machines with large diameters or with a large number of yarn feeds.

[0016] In a further solution at the state of the art, the box-shaped blocks or bodies of the selecting devices are mounted to a plate, which in its turn is secured to the frame of the knitting machine. Moreover, there is an additional ring - typically placed above the selecting devices - supported by uprights and developing around the needle-holding unit: the stitch cams and the selector cams are secured onto this ring. Basically, in this case there is not a plurality of distinct blocks for supporting the various devices, but these are mounted on different levels based on the type they belong to.

[0017] Other examples of methods and apparatuses are known.

[0018] Document GB1578248 A describes a device for selecting and controlling needles of circular knitting machine wherein, at each feed of the knitting machine, a cam path and a series of selector and eraser cams are provided.

[0019] Document EP1219741 A1 discloses an actuator, using a piezoelectric element in a needle-selecting apparatus for a knitting machine, comprising: a piezoelectric element of which one end is fixed in a cantilevered fashion, and a voltage is applied to the piezoelectric element to cause it to move, a finger attached to the forward part of the piezoelectric element, said finger being moved by the motion of the piezoelectric element, a rear-end mount to which the piezoelectric element is fixed, and a front part of the rear-end mount being tapered towards the piezoelectric element.

[0020] Document US5027619 A discloses a knitting needle driving mechanism of a jacquard knitting machine for driving knitting needles by using piezo-electric ele-

ments.

[0021] The Applicant has found that known knitting machines, in particular as far as components and devices controlling the needles and needle selectors, are not without drawbacks and can be improved under various aspects.

[0022] A typical drawback of known solutions consists in the difficult mounting of the various devices for controlling needles and selectors. As a matter of fact, in the state-of-the-art solution making use of a supporting block (the aforesaid "section" or "box"), it is necessary to mount the stitch cams, the selector cams and the selecting device individually to the supporting block and then mount each supporting block to the machine frame. In the technical solution making use of plates and additional ring, the selecting devices have to be mounted to the plates and these to the frame of the knitting machines, and moreover the needle cams and the selector cams have to be mounted to the additional ring, which is in its turn placed and secured with respect the frame.

[0023] All these mounting operations of the needle and selector control devices are typically complex and require much time and manpower. Moreover, every mounting operation can lead to an erroneous mounting, which results in an erroneous positioning of the device with respect to the needle-holding unit. This is a huge drawback in the field of knitting machines, since an erroneous mounting of the cams and of the selecting devices - even though not so serious - leads to an erroneous interaction with the needles and with the selectors of the needle-holding unit, and thus to knitting mistakes or inaccuracies.

[0024] For these mistakes, at the state of the art the control devices for the needles and the selectors require complex and difficult operations involving adjustments and configurations with respect to the needle-holding unit.

[0025] A further drawback of known solutions consists in the large overall dimensions of the structure apt to place the various control devices for needles and selectors. As a matter of fact, both the supporting blocks and the plates as well as the additional ring have quite large dimensions and occupy considerable volumes around the needle-holding unit.

[0026] A further drawback of known solutions consists in the fact that, due to the overall dimensions of the structures apt to place the various control devices for needles and selectors, it is hard to attain in the knitting machine a large number of feeds, and in general it is difficult to integrate many control devices.

[0027] A further drawback of known solutions consists in the difficult execution of maintenance operations on control devices for needles and selectors, in particular to the complex structures for mounting these to the frame of the knitting machine.

[0028] Under these circumstances, the aim underlying the present invention in its various aspects and/or embodiments is to provide a support and control device

which can obviate one or more of the drawbacks referred to above.

[0029] A further aim of the present invention is to provide a support and control device which can accurately position the control devices for needles and selectors, and in particular the stitch cams, the selector cams and the selecting devices, with respect to the needle-holding unit.

[0030] A further aim of the present invention is to provide a support and control device which can simplify the mounting and/or maintenance operations of the control devices for needles and selectors.

[0031] A further aim of the present invention is to provide a support and control device characterized by a high operating reliability and/or by a lower susceptibility to failures and malfunctions.

[0032] A further aim of the present invention is to provide a support and control device for circular knitting machines characterized by a simple and rational structure.

[0033] A further aim of the present invention is to provide a support and control device characterized by low manufacturing costs as far as offered performance and quality are concerned.

[0034] A further aim of the present invention is to create alternative solutions to the state of the art for carrying out support and control devices for circular knitting machines and/or open new design possibilities.

[0035] A further aim of the present invention is to provide a support and control device for circular knitting machines which can enable a new design of the control devices for needles and selectors.

[0036] A further aim of the present invention is to provide a support and control device for circular knitting machines characterized by an innovative structure and configuration with respect to the state of the art.

[0037] These and other possible aims, which shall appear better from the following description, are basically achieved by a support and control device according to one or more of the appended claims, each one being considered alone (without those depending on it) or in any combination with the other claims, and according to the following aspects and/or embodiments, variously combined, also with the aforesaid claims. In a first aspect thereof, the invention relates to a support and control device for circular knitting machines for knitted or hosiery items, designed to be mounted in a circular knitting machine having a rotating needle-holding unit and carrying a plurality of needles and a corresponding plurality of selectors for these needles.

[0038] In one aspect, the device comprises at least one support body equipped at least with:

- a mounting portion configured so as to allow the device to be mounted to a supporting structure of a circular knitting machine;
- a first seat configured so as to house selecting units for controlling the plurality of needle selectors of the knitting machine;

- a second seat configured so as to house at least one cam for controlling the needles or the selectors of the knitting machine.

[0039] In one aspect, the device comprises:

- selecting units for controlling the plurality of needle selectors, housed in (or associated with) said first seat;
- at least one cam for controlling the needles or for controlling the selectors, housed in (or associated with) said second seat.

[0040] In one aspect, said selecting units for controlling the plurality of needle selectors comprise a plurality of levers, each one being configured so as to interact with the butts of a respective plurality of needle selectors, and a corresponding plurality of piezoelectric actuators, each piezoelectric actuator being configured so as to selectively move the respective lever at least between a first position, in which the lever interacts with the butts of the respective plurality of selectors, and a second position, in which the lever does not interact with the butts of the respective plurality of selectors.

[0041] In one aspect, said support body is made in one piece or as a single piece. In one aspect, the support body is monolithic. In one aspect, said at least one cam associated with said second seat is a stitch cam for controlling the needles.

[0042] In one aspect, said plurality of piezoelectric actuators is directly associated with, or directly engages, one or more surfaces of said first seat of the device body. In one aspect, said plurality of piezoelectric actuators is directly mounted inside the first seat of the device body.

[0043] In one aspect, said plurality of piezoelectric actuators is without a box-shaped housing body, the actuators being directly housed in said first seat.

[0044] In one aspect, the levers of said plurality of levers are directly associated with, or directly engage, one or more surfaces of said first seat of the device body.

[0045] In one aspect, the levers of said plurality of levers are directly mounted inside the first seat of the device body and are moving with respect to the device body.

[0046] In one aspect, said first seat and said second seat are obtained directly in said device body.

[0047] In one aspect, the device further comprises:

- a third seat configured so as to house at least one further cam for controlling the needles or the selectors of the knitting machine;
- a further cam for controlling the needles or the selectors, housed in (or associated with) said third seat.

[0048] In one aspect, said at least one further cam associated with said third seat is a selector cam for controlling the selectors of the knitting machine.

[0049] In one aspect, said support body directly housing said selecting units acts as a support also for a stitch

cam and/or one or more selector cams. In one aspect, said third seat is obtained directly in said device body.

[0050] In one aspect, the needles are moving parallel to an axis of rotation of the needle-holding unit so as to produce a knitted fabric.

[0051] In one aspect, the device is designed to be placed on a needle-holding unit or needle-holding cylinder of the knitting machine.

[0052] In one aspect, the mounting portion is configured so as to allow the device to be directly mounted to a supporting structure of a circular knitting machine.

[0053] In one aspect, the piezoelectric actuators comprise a ceramic element which can be curved or extended as a result of an electric voltage, so as to place the respective lever in said first position or in said second position. In one aspect, the selecting units comprise electric and electronic components for the operation of the piezoelectric actuators.

[0054] In one aspect, the support body extends longitudinally or vertically between a lower side and an upper side, opposed to said lower side.

[0055] In one aspect, the support body comprises a front side, configured so as to face - with the device being mounted to the knitting machine - a needle-holding unit of the knitting machine, preferably in a radial, outer position with respect to an axis of rotation of the needle-holding unit.

[0056] In one aspect, said first seat is defined (or obtained) on said front side.

[0057] In one aspect, the first seat comprises a cavity turning inwards from said front side to the inside of the support body.

[0058] In one aspect, said cavity is at least partially open at least on said front side.

[0059] In one aspect, said second seat is defined (or obtained) on said front side.

[0060] In one aspect, said third seat is defined (or obtained) on said front side.

[0061] In one aspect, the support body is made of metallic material, preferably aluminum. In an alternative aspect, the support body is made of plastic material.

[0062] In one aspect, the stitch cam is configured so as to interact with the butts of the moving needles as a result of the rotation of the needle-holding unit.

[0063] In one aspect, the selector cam is configured so as to interact with the butts of the moving selectors as a result of the rotation of the needle-holding unit.

[0064] In one aspect, the body of the device is a box or section of a circular knitting machine, configured so as to support the control units associated with a feed or yarn feeding point on which the yarn is supplied to the machine needles.

[0065] In one aspect, the support device is configured so as to comprise the selecting units, the stitch cams and the selector cams associated with a single feed or yarn feeding point on which the yarn is supplied to the machine needles.

[0066] In one aspect, the stitch cam defines a guiding

path for the moving needles (in particular for the needle butts), apt to globally guide the movement thereof parallel to the axis of rotation of the needle-holding cylinder.

[0067] In one aspect, the selector cam defines a guiding path for the moving selectors (in particular for the selector butts), apt to globally guide the movement thereof parallel to the axis of rotation of the needle-holding cylinder.

[0068] In an aspect thereof, the present invention relates to a circular knitting machine for knitted or hosiery items comprising at least one support and control device according to one or more of the aforesaid aspects and/or claims.

[0069] In one aspect, the knitting machine comprises:

- a supporting structure (or frame);
- at least one needle-holding unit turnably mounted in said supporting structure so as to rotate around an axis of rotation;
- a plurality of needles movably inserted into sliding compartments of the needle-holding unit and moving so as to produce a knitted fabric;
- a plurality of selectors movably inserted into the sliding compartments of the needle-holding unit, each selector being associated with a respective needle and longitudinally arranged in phase with it inside the respective sliding compartment, the selectors being configured so as to impart certain movements to the respective needles;

the knitting machine comprising a plurality of feeds or yarn feeding points on which the yarn is supplied to the machine needles, the feeds being positioned circumferentially around the needle-holding unit and angularly spaced from each other, wherein each feed of said plurality of feeds comprises:

- at least one cam for controlling the needles or for controlling the selectors;
- selecting units for controlling said plurality of selectors, configured so as to interact with the selectors, in particular with respective butts of the selectors, to selectively determine the switching of each selector between an activation configuration, in which the selector interacts with the respective needle, and a deactivation configuration, in which the selector does not interact with the respective needle.

[0070] In one aspect, the knitting machine further comprises at least one support and control device according to any one of the aspects and/or claims, wherein the mounting portion of the support body is mounted to said supporting structure, wherein said first seat houses the selecting units of a feed and said second seat houses said at least one cam for controlling the needles or for controlling the selectors of the same feed. In one aspect, each feed of said plurality of feeds comprises a respective stitch cam and a respective selector cam, said second

seat housing said stitch cam and said third seat housing said selector cam of the same feed.

[0071] In one aspect, said needle-holding unit is a needle-holding cylinder or a needle-holding plate.

[0072] In one aspect, the knitting machine comprises a plurality of support and control devices, each of them being associated with a respect feed.

[0073] In one aspect, the circular knitting machine comprises a plurality of support and control devices placed circumferentially around said needle-holding unit, preferably each one on a respective feed.

[0074] In one aspect, the support and control devices are preferably angularly spaced from one another in a uniform manner around the axis of rotation.

[0075] In one aspect, the knitting machine comprises a plurality of support and control devices which are all basically identical to one another.

[0076] Each one of the aforesaid aspects of the invention can be considered alone or in combination with any one of the claims or of the other aspects as described.

[0077] Further characteristics and advantages shall be more evident from the detailed description of some embodiments, among which also a preferred embodiment, which are exemplary though not exclusive, of a support and control device according to the present invention. This description shall be made below with reference to the accompanying drawings, provided to a merely indicative and therefore non-limiting purpose, in which:

- Figure 1 shows a perspective front view of a possible embodiment of a support and control device for circular knitting machines according to the present invention;
- Figure 2 shows a perspective rear view of the support and control device of Figure 1;
- Figure 3 shows a side view of the support and control device of Figure 1;
- Figure 4 shows a front view of the support and control device of Figure 1.

[0078] With reference to the mentioned figures, the numeral 1 globally designates a support and control device for circular knitting machines according to the present invention. Generally, the same numeral is used for identical or similar elements, if applicable in their variants of embodiment.

[0079] Figure 1 shows a possible embodiment of a device 1 according to the present invention, designed to be inserted into a circular knitting machine for knitted or hosiery items, and designed in particular to be placed on a needle-holding unit or needle-holding cylinder of the knitting machine.

[0080] The figures do not show the knitting machine for which the device 1 is designed; such a machine can be of conventional type and known per se. Generally, it should be assumed that a circular knitting machine, for knitted or seamless knitted items or for hosiery items, typically comprises a supporting structure, at least one

needle-holding unit or needle-holding cylinder or plate turnably mounted in this supporting structure, a plurality of needle supported by the needle-holding cylinder and moving parallel to an axis of rotation of the needle-holding cylinder so as to produce a knitted fabric, and a corresponding plurality of selectors for these needles, which are also supported by the needle-holding cylinder and each one is phased with a respective needle. The needle-holding cylinder can have a diameter varying depending on textile needs; accordingly, the needle-holding unit can be a needle-holding plate. Moreover, the knitting machine comprises a plurality of yarn feeding points or "feeds", in which the needles of the machine are supplied with yarn. These feeds are placed circumferentially around the needle-holding unit and angularly spaced from one another.

[0081] From the point of view of knitting technology, the operation of the whole knitting machine is not described in detail, since it is known in the technical field of the present invention.

[0082] The device 1 comprises at least one support body 2 equipped at least with:

- a mounting portion 3 configured so as to allow the device to be mounted to a supporting structure of a circular knitting machine;
- a first seat 4 configured so as to house selecting units for controlling the plurality of needle selectors of the knitting machine;
- a second seat 5 configured so as to house at least one cam for controlling the needles or the selectors of the knitting machine.

[0083] The device further comprises:

- selecting units 20 for controlling the plurality of needle selectors, housed in or associated with the aforesaid said first seat 4;
- at least one cam for controlling the needles or for controlling the selectors, housed in or associated with the aforesaid second seat.

[0084] The selecting units 20 for controlling the plurality of needle selectors comprise a plurality of levers 21, each one being configured so as to interact with the butts of a respective plurality of needle selectors, and a corresponding plurality of piezoelectric actuators. Each piezoelectric actuator is configured so as to selectively shift the respective lever 21 at least between a first position, in which the lever interacts with the butts of the respective plurality of selectors, and a second position, in which the lever does not interact with the butts of the respective plurality of selectors.

[0085] Basically, the selecting units 20 are piezoelectric selecting units.

[0086] In a preferred embodiment, shown by way of example in the figures, the support body 2 is made in one piece or a single piece. In other words, the support body

2 is monolithic, preferably not made as a composition of parts mounted to one another but as one block.

[0087] Preferably, as shown by way of example in the figures, the aforesaid at least one cam, associated with the second seat 5, is a stitch cam 30 for controlling the needles.

[0088] In the field of knitting machines, the wording "stitch cam" means an element designed to be placed on a feed so as to define the height of each needle moving on the stitch cam on this feed. When the needle moves in a feed, it receives the yarn so as to form the knitted fabric: the formation of the knitted fabric takes place for each yarn on a knitting plane placed vertically on top of the needle-holding cylinder. The stitch cam causes a vertical movement of the needles along a direction parallel to the longitudinal development of the needle (and parallel to the axis of rotation of the cylinder). The vertical movement of each needle, managed by the stitch cam, is such as to vertically position the upper end (or head) of the needle at a desired height, so that the needle receives the yarn from the feed which the stitch cam is associated with, and then to lower it so as to form a stitch. The stitch cam defined a guiding path, which intercepts the rotating needles: this causes a vertical shift of the needle according to a given law of motion defined by the guiding path itself. Depending on the vertical position of the stitch cam, the vertical height (in particular the minimum height) reached by the needle in the feed varies: as a result, also the length (or width) of the stitch (or loop) thus made varies, since this width depends on the distance between the knitting plane and the lower point reached by the needle head. Typically, the stitch cams interact with a specific portion of the needle, the so-called butt. With the knitting machine running, i.e. with the cylinder rotating, all the needles sequentially get through - on each cam - the respective stitch cam of the feed and interact with it.

[0089] Going back to the selecting units 20, preferably the aforesaid plurality of piezoelectric actuators is directly associated with, or directly engages, one or more surfaces of the first seat 4 of the body of the device. In the embodiment shown in the figures, levers and piezoelectric actuators are in direct contact with, i.e. directly mounted to the support body 2, in particular to the first seat 4.

[0090] Preferably, the first seat 4 and the second seat 5 are obtained directly in the body 2 of the device or are defined directly on the device body. Preferably, the first and the second seat represent respective portions of the device body, i.e. they are defined on these respective portions. The first and the second seat can be structured as a suitable surface of the device body, machined so as to house (or enable the mounting of) the selecting units and of the stitch cam or the cam.

[0091] Preferably, the device 1 further comprises:

- a third seat 6 configured so as to house at least one further cam for controlling the needles or the selectors of the knitting machine;

- a further cam for controlling the needles or the selectors, housed in or associated with the aforesaid third seat.

5 **[0092]** Preferably, as shown by way of example in the figures, the aforesaid further cam, associated with the third seat 6, is a selector cam 40 for controlling the selectors of the knitting machine.

10 **[0093]** Preferably, the third seat 6 is obtained directly in the body 2 of the device or is defined directly on the body 2 of the device.

[0094] Preferably, as in the embodiment shown by way of example in the figures, the device 1 further comprises:

- 15 - a fourth seat 7 configured so as to house a further selector cam for controlling the selectors of the knitting machine;
- a further selector cam 50 for controlling the selectors, housed in or associated with said fourth seat 7. Preferably, the fourth seat 7 is obtained directly in the body 2 of the device or is defined directly on the body 2 of the device.

25 **[0095]** Preferably, the mounting portion 3 is configured so as to allow the device 1 to be directly mounted to a supporting structure of a circular knitting machine.

[0096] As far as the selecting units 20 are concerned, some cooperating modes between the levers 21 and the selectors are described below.

30 **[0097]** First of all, each selector can be selected or not by the respective lever, depending on the effect on the selector determined by the position of the lever, which can be selected between said first and second position.

35 **[0098]** In a first mode, which corresponds to the most common mode in the field, the selector operates "passively": according to this mode, in the first position (or OFF position or inactive position or low lever) the lever does not get in contact with the tooth of the selector and thus does not push it inside the cylinder. In this case, the selectors remains outside (normally outside the cylinder with respect to the axis of rotation of the cylinder) and therefore interacts with the selector cam, which is placed outside and facing the cylinder. The selector interacts with the selector cam engaging a path of this selector cam, and therefore interacts with the respective needle, lifting and guiding it in its sliding compartment. Thus, in this case the OFF position of the lever corresponds to the activation of the selector.

40 **[0099]** In the second position (or ON position or active position or high lever) the lever gets in contact with the tooth of the selector and thus pushes it inside the cylinder: in this case the selector does not interact with the selector cam (i.e. does not get into the path of the selector cam) and therefore does not interact with the needle, i.e. does not lift and guide it into its sliding compartment. Thus, in this case the ON position corresponds to the deactivation of the selector.

45 **[0100]** This operation of the selector is therefore re-

ferred to as "passive".

[0101] In a second mode, the selector operates "directly": according to this mode, in the first position (or OFF position or inactive position or low lever) the lever does not get in contact with the tooth of the selector and thus the latter does not interact with the selector cam (i.e. does not get into the path of the selector cam) and therefore does not interact with the needle. In this case the OFF position corresponds to the deactivation of the selector.

[0102] In the second position (or ON position or active position or high lever) the lever gets in contact with the tooth of the selector and thus the latter interacts with the selector cam (i.e. engages the path of the selector cam) and therefore interacts with the needle. In this case the ON position corresponds to the activation of the selector.

[0103] The levers of the selecting units enable to control the selectors so as to define at least two technical modes for the needles of the knitting machine, i.e. two operating positions for the needles: non-operating and knitting (or operating).

[0104] Typically, the activation of the selector corresponds to the activation of the respective needle, which is therefore shifted to the operating position (or knitting position), whereas the deactivation of the selector corresponds to the non-activation of the respective needle, which therefore remains in its non-operating position.

[0105] Preferably, the piezoelectric actuators comprise a ceramic element which can be curved or extended as a result of an electric voltage, so as to place the respective lever 21 in one of the aforesaid first position or second position. The selecting units further comprise electric and electronic components for the operation of the piezoelectric actuators.

[0106] Preferably, the support body 2 extends longitudinally (or vertically) between a lower side 11 and an upper side 12, opposed to said lower side.

[0107] Preferably, the aforesaid mounting portion 3 is defined on the lower side 11 of the support body and is configured so as to be removably mounted to a supporting structure, e.g. a frame, of the knitting machine. Preferably, the support body 2 comprises a front side 13, configured so as to face - with the device being mounted to the knitting machine - a needle-holding unit of the knitting machine, preferably in a radial, outer position with respect to an axis of rotation of the needle-holding unit.

[0108] Preferably, the first seat 4 is defined (or obtained) on the front side 13.

[0109] Preferably, the first seat 4 comprises a cavity turning inwards from the front side 13 to the inside of the support body 2. Preferably, the cavity is at least partially open at least on the front side 13. Preferably, the second seat 5 is defined (or obtained) on the front side 13.

[0110] Preferably, the second seat 5 comprises a surface portion configured so as to allow at least one stitch cam 30 to be mounted; this surface portion is suitably machined and can comprise one or more mounting holes.

[0111] Preferably, the third seat 6 is also defined (or obtained) on the front side 13. Preferably, the third seat

comprises a surface portion configured so as to allow at least one selector cam 40 to be mounted; this surface portion is suitably machined and can comprise one or more mounting holes.

[0112] Preferably, also the fourth seat 7 is defined (or obtained) on the front side 13. Preferably, the fourth seat 7 comprises a surface portion configured so as to allow at least one further selector cam 50 to be mounted; this surface portion is suitably machined and can comprise one or more mounting holes.

[0113] Basically, preferably all the seats, i.e. the first 4, the second 5, the third 6 and the fourth seat 7, are positioned on the front side 13 of the device body, so as to face - with the device mounted - the needle-holding unit and perform their respective control function for needles and selectors.

[0114] Preferably, the first seat 4 is positioned in a proximal position with respect to the lower side 11 of the support body 2, and the second seat 5 is positioned in a proximal position with respect to the upper side 12 of the support body.

[0115] Preferably, the third seat 6 is longitudinally placed between the first seat 4 and the second seat 5. Preferably, the fourth seat 7 is placed between the first seat 4 and the lower side 11 of the support body. Preferably, as shown by way of example in the figures, the second seat 5, the third seat 6, the first seat 4 and, if present, the fourth seat 7 develop vertically on the front side 13 in sequence from the upper side 12 to the lower side 11.

[0116] Preferably, the support body is made of metallic material, e.g. aluminum. As an alternative, the support body can be made of plastic material.

[0117] Preferably, the first seat 4, the second seat 5 and the third seat 6 respectively house the selecting units 20 for controlling the plurality of selectors, the stitch cam 30 and the selector cam 40 in a removable manner. Preferably, the device can further comprise a fifth seat configured so as to house an intermediate selector cam for controlling intermediate selectors of the knitting machine. These intermediate selectors are similar to the selectors and are placed longitudinally between a respective selector and a respective needle inside a sliding compartment. Basically, each intermediate selector acts upon the respective needle and contributes, together with the respective selector, to define the law of motion of the needle, i.e. the vertical positioning of the needle during the rotation of the needle-holding cylinder. The intermediate selectors are typically controlled by a respective cam, which is indeed the intermediate selector cam.

[0118] In a possible embodiment (not shown), the device comprises a mounting unit (or plate) configured so as to be placed between a stationary structure of the knitting machine and the support body and to enable an adjustment of the position of the support body with respect to the needle-holding unit.

[0119] Preferably, the mechanical coupling between support body and mounting unit grants the support body

a certain degree of translational freedom with respect to the mounting unit, preferably along a radial direction moving to and away from the needle-holding unit.

[0120] Preferably, this adjustment of the position of the support body comprises at least an adjustment of the radial distance of the support body (and therefore of the levers and/or of the cams) from the needle-holding unit, in particular from the axis of rotation of the needle-holding unit.

[0121] Preferably, the mechanical coupling between support body and mounting unit allows the support body to slide with respect to the mounting unit, along a radial direction with respect to the needle-holding unit. Preferably, the mounting unit comprises a first portion configured so as to be mounted in a given position of the stationary structure of the machine, so that the mounting unit is integral with the stationary structure and uniquely positioned with respect thereto.

[0122] The first portion is preferably defined on a lower side of the mounting unit.

[0123] Preferably, the mounting unit comprises a second portion configured so as to receive the mounting portion of the support body and to movably mount the support body to the mounting unit.

[0124] Preferably, the mechanical coupling between the mounting portion of the support body and the second portion of the mounting unit is of skid or slide type and enables a shift of the support body with respect to the mounting unit (and therefore with respect to the stationary structure of the knitting machine), preferably along a radial direction basically perpendicular to the axis of rotation of the needle-holding unit.

[0125] The second portion is preferably defined on an upper side of the mounting unit.

[0126] Preferably, the mounting unit comprises clamping means configured so as to stably secure the position of the support body after adjusting its radial distance from the needle-holding unit.

[0127] The support body can thus be slidably mounted to a plate, the latter stiffly secured to the frame of the knitting machine; this allows to adjust the radial position of the support body and, as a result, the radial position of the levers of the selecting units. This is particularly important since during the mounting and setup of the knitting machine, the radial position of the levers must be such as to precisely contact the butts of the selectors during the passage of the latter. As a matter of fact, were the levers radially at too short a distance from the cylinder, they might incorrectly interfere with the butts (e.g. hitting them), whereas conversely, were the levers radially at too large a distance from the cylinder, they might incorrectly control the butts (e.g. they might not contact the butts).

[0128] Preferably, the body of the device is a box or section of a circular knitting machine, configured so as to support the control units associated with a feed or yarn feeding point on which the yarn is supplied to the machine needles.

[0129] Preferably, the support device is configured so as to comprise the selecting units, the stitch cams and the selector cams associated with a single feed or yarn feeding point on which the yarn is supplied to the machine needles.

[0130] In a possible embodiment, shown by way of example in the figures, the support body 2 comprises a pair of first seats 4a and 4b, configured so as to respectively house first selecting units 20a and second selecting units 20b for controlling the plurality of selectors of the needles of the knitting machine. Preferably, the first seats 4a and 4b of said pair of first seats are both defined on the front side 13 and are laterally placed one beside the other. Preferably, each first seat of the pair of first seats comprises a respective cavity turning inwards from the front side to the inside of the support body. Preferably, the respective cavity of each first seat of the pair of first seats is at least partially open at least on the front side. Preferably, the support body has an inner partition placed between the two first seats of the pair of first seats and configured so as to define and separate the cavities of the two first seats from one another.

[0131] Preferably, the two first seats of the pair of first seats are basically identical to each other.

[0132] Preferably, the device comprises the aforesaid first selecting units 20a and the aforesaid second selecting units 20b for controlling the plurality of selectors of the needles of the knitting machine, wherein the first selecting units 20a are housed in or associated with a first seat 4a of the pair of first seats, and the second selecting units 20b are housed in or associated with a second seat 4b of the pair of first seats.

[0133] Preferably, the first selecting units and the second selecting units are basically identical to each other from a structural point of view.

[0134] The presence of first selecting units and second selecting units, i.e. of a double series of levers actuated by a double series of piezoelectric actuators, associated with one support body and designed for the same feed, allows to control the selectors so as to define three technical modes for the needles of the knitting machine, i.e. three operating positions for the needles: non-operating, knitting (or operating), stopped. Preferably, the first seat 4 (or each first seat of the pair of first seats) is laterally open at least on a lateral face 15, or side, of the support body. Preferably, the support body 2 comprises a wall 16 (or panel or carter) configured so as to laterally close the first seat 4, housing therein the selecting units 20, and to define a portion of the lateral face 15. Preferably, the two first seats of the pair of first seats are open on opposite lateral faces, or sides, of the support body. Preferably, the support body 2 comprises two walls 16 (or panels or carters) each configured so as to laterally close the respective first seat, housing therein the respective selecting units, and to define a portion of the respective lateral face.

[0135] Preferably, the aforesaid wall 16 is a structural element configured so as to strengthen the support body

and prevent the support body from bending due to the absence of material from the first seat 4 on the respective lateral face 15.

[0136] Concerning this point, it should be pointed out that the device body undergoes in use stresses generated by the interaction between the needles and the selectors with the body itself. As a matter of fact, the device body is secured to a supporting structure of the knitting machine and faces the needle-holding unit; the rotation of the latter causes the passage of the needles in the stitch cam of the device and the interaction of the selectors with the selecting units (levers) of the device. This gives rise to a series of strains and stresses on the body of the device, in particular, in the sense of rotation of the needle-holding unit. The particular shape of the device body according to the present invention is preferably characterized by the cavity turning inwards from the front side to inside of the support body and defining the aforesaid first seat. This cavity can weaken the device body, which can bend or deform as a result of the aforesaid strains and stresses.

[0137] In the embodiment in which the first seat 4 is laterally open at least on a lateral face 15, or side, of the support body, the bending action involves in particular the portions of the body above and below the cavity (i.e. the first seat). This bending can be due to a compression of the body, which tends to bring the portions of the body above and below the cavity near each other (basically "narrowing" the opening of the cavity on the lateral face), or to a traction, which tends to bring the portions of the body above and below the cavity away from each other (basically "widening" the opening of the cavity on the lateral face).

[0138] Therefore, the aforesaid wall 16, in order to represent a structural element apt to strengthen the support body and prevent the body itself from bending, is stiffly secured to the support body so as to avoid deformations under compression and under traction, and to keep the size of the support body, and in particular of the cavity defining the first seat, constant.

[0139] Preferably, the wall 16 is placed on a respective lateral face of the body and is secured above to a proximal portion of the body with respect to the upper side 12 of the body itself, and below to a proximal portion of the body with respect to the lower side 11 of the body itself.

[0140] Preferably, the wall 16 has an upper tooth configured so as to be secured to a proximal portion of the body with respect to the upper side 12 of the body itself, and a lower tooth configured so as to be secured to a proximal portion of the body with respect to the lower side 11 of the body itself.

[0141] Preferably, the wall 16 is secured above to the support body by means of one or more screws, inserted into dedicated slots of the body itself, and is secured below to the support body by means of further one or more screws, inserted into dedicated slots of the body itself. These screws enable a mounting of the wall ensuring a friction hold, between the screws themselves and the

support body.

[0142] In a possible embodiment, the wall 16 is secured to the support body, both above and below, by means of one or more stop pins (or rivets) inserted (preferably forced) into suitable seats (typically holes) of the support body. These stop pins enable a mounting of the wall ensuring a size coupling hold, between the pins themselves and the aforesaid seats of the support body.

[0143] The aforesaid upper and lower teeth and/or the aforesaid screws and/or the aforesaid stop pins allow to obtain a stiff and stable mounting of the wall to the support body, so that the wall represents a structural element configured so as to strengthen the support body and prevent the thrusts and stresses acting upon the support body from generating therein bending or deformations.

[0144] In one embodiment, not shown, the support body comprises one first seat 4 only, which is laterally open on both lateral faces 15, or sides, of the support body. In this case, the support body 2 preferably comprises two walls 16 configured so as to laterally close the first seat 4, housing therein the selecting units 20, each wall 16 defining a portion of the respective lateral face 15.

[0145] In a possible embodiment, not shown, the device can comprise a base configured so as to house and carry thereon the support body of the support and control device, said base being - with the device mounted to the knitting machine - vertically placed between the support body and a frame of the knitting machine. Preferably, the base corresponds to the aforesaid mounting unit.

[0146] Preferably, the aforesaid base is configured so as to enable the adjustment of the position of the device body with respect to the needle-holding unit of the circular knitting machine. More preferably, the base allows to adjust the radial position of the device body with respect to the needle-holding unit, i.e. the radial distance of the device body from the axis of rotation of the needle-holding unit. The position adjustment preferably occurs by means of coupling means placed between the device body and the base. These coupling means can comprise a translational coupling, e.g. a rectilinear guide, which allows to shift the device body towards or away from, along a radial direction, the axis of rotation of the needle-holding unit. Preferably, the aforesaid coupling means between the device body and the base can enable further adjustments of the position of the device body on a plane orthogonal to the axis of rotation of the needle-holding unit. Preferably, the aforesaid base is configured so as to carry a pair of support and control devices, one beside the other, so that the devices are associated with two adjacent feeds or yarn feeding points of the knitting machine; each device supports the control units (i.e. selecting units, stitch cams and/or selector cams) associated with a respective feed.

[0147] Preferably, the two devices associated with a single base are basically identical to each other.

[0148] As shown by way of example in the figures, the device 1 comprises, preferably on a rear portion of the support body 2 opposite the front side 13, connecting

means configured so as to be connected, e.g. by means of a data cable, to a control unit of the knitting machine, so that the latter can manage the operation of the device, and in particular the operation of the selecting units, more specifically of the piezoelectric actuators. The connecting means preferably comprise a plurality of electric/electronic connectors (e.g. one or more connectors coupled to each piezoelectric actuator), which can be removably connected to the aforesaid data cable.

[0149] A circular knitting machine for knitted or hosiery items according to the present invention is described below. This machine comprises at least:

- a supporting structure (or frame);
- a needle-holding unit turnably mounted in the supporting structure so as to rotate around an axis of rotation;
- a plurality of needles movably inserted into sliding compartments of the needle-holding unit and moving so as to produce a knitted fabric;
- a plurality of selectors movably inserted into the sliding compartments of the needle-holding unit, wherein each selector is associated with a respective needle and is longitudinally arranged in phase with it inside the respective sliding compartment; the selectors are configured so as to impart certain movements to the respective needles;
- a plurality of feeds or yarn feeding points on which the yarn is supplied to the machine needles; the feeds are positioned circumferentially around the needle-holding unit and angularly spaced from each other. Each feed comprises in its turn:
 - at least one stitch cam;
 - selecting units for controlling the plurality of selectors;
 - if necessary, a selector cam.

[0150] The knitting machine further comprises at least one aforesaid support and control device, having the mounting portion of the support body mounted to the supporting structure and carrying the selecting units, the stitch cam and/or the selector cam. Preferably, the knitting machine comprises a plurality of support and control devices placed circumferentially around said needle-holding unit, wherein each of them is associated with a respective feed. Preferably, the support and control devices are angularly spaced from one another in a uniform manner around the axis of rotation. Preferably, the knitting machine comprises a plurality of support and control devices which are all basically identical to one another.

[0151] The invention thus conceived can be subjected to various changes and variants, all of which fall within the scope of the claims, and the components mentioned here can be replaced by other technically equivalent elements, falling within the scope of the claims.

[0152] The present invention can be used both on new and on existing machines, in the latter case replacing traditional structures for mounting components and de-

vices for controlling needles and selectors. The invention achieves important advantages. First of all, the invention allows to overcome at least some of the drawbacks of known technique.

[0153] Moreover, the device of the present invention is structured so as to enclose and integrate into one device the functions of support of the needle cams and of the selector cams and at the same time of support of the selecting units. In particular, as the selecting units are concerned, the device of the present invention is characterized in that it comprises a support body being suitably machined so as to mount and position the levers, the piezoelectric actuators and the electronics required for controlling these actuators.

[0154] Basically, in the present device the support body directly housing the selecting units also acts as a support for the stitch cams and the selector cams. Therefore, the device represents a box or section for circular knitting machines, configured so as to support the control units associated with a feed, and enables to eliminate the complex support structures used at the state of the art. In particular, with respect to the solution making use of supporting blocks (the so-called "cam boxes" or "cam sections"), the present invention allows to avoid the structural weakening of the cam box due to the large hollow designed to house the box-shaped block or body of the selecting device. The device of the present invention is stiffer and structurally better than the solutions at the state of the art. Moreover, with respect to the solution making use of plates and additional ring, the present invention allows to completely eliminate the additional ring.

[0155] A further advantage of the device of the present invention consists in that it can accurately position the control devices for needles and selectors, and in particular the stitch cams, the selector cams and the selecting devices, with respect to the needle-holding unit. Moreover, the device of the present invention allows to eliminate the complex and difficult operations involving the adjustment and configuration of the control devices for needles and selectors with respect to the needle-holding unit.

[0156] Moreover, the device of the present invention allows to reduce the overall dimensions of the supporting portion for stitch cams and selectors and of the selecting units with respect to the solutions at the state of the art. In particular, the vertical dimensions can be highly reduced, even to the half or more, with respect to known supporting structures (making use of a block (cam box or cam section) or of an intermediate ring). Also the lateral (or horizontal) dimensions - i.e. the size of the device between the lateral walls - are highly reduced with respect to the solutions at the state of the art, thanks to the integration of the control devices for needles and selectors directly into the support body of the device.

[0157] Therefore, the device of the present invention - having small overall dimensions both in vertical and above all in lateral (or horizontal) direction - allows to increase the number of devices that can be positioned on each feed, and therefore allows to increase the se-

lecting points inside a single feed. The selecting points allow to select in a given manner the movement of the needles and of the selectors: a larger number of selecting points therefore allows to impart a larger number of possible movements to the needles and to the selectors, and thus to obtain a higher variety of knitting operations that can be executed by the machine.

[0158] In addition or as an alternative, the small overall dimensions (in particular in a lateral direction of the device) allow - the type of knitting machine being the same - to increase the number of feeds of the machine itself, since all the control devices for needles and selectors are integrated into the device of the present invention and therefore occupy a smaller volume.

[0159] Moreover, the device of the present invention allows to simplify the mounting and maintenance operations of the control devices for needles and selectors.

[0160] Furthermore, the device highly improves the access to the needle-holding cylinder also with the knitting machine mounted, and does not require to dismount many components in case of maintenance of the needle-holding cylinder.

[0161] Moreover, the device of the present invention is characterized by a high operating reliability and by a lower susceptibility to failures and malfunctions.

[0162] Moreover, the device of the present invention is characterized by a competitive cost and by a simple and rational structure.

Claims

1. A support and control device (1) for circular knitting machines, designed to be mounted in a circular knitting machines equipped with a needle-holding unit, with a plurality of needles and with a corresponding plurality of selectors for such needles, the device comprising at least one support body (2) equipped at least with:

- a mounting portion (3) configured so as to allow the device to be mounted to a supporting structure of a circular knitting machine;
- a first seat (4) configured so as to house selecting units for controlling the plurality of needle selectors of the knitting machine;
- a second seat (5) configured so as to house at least one cam for controlling the needles or the selectors of the knitting machine;

wherein the device (1) comprises:

- selecting units (20) for controlling the plurality of needle selectors, associated with said first seat (4);
- at least one cam (30; 40) for controlling the needles or for controlling the selectors, associated with said second seat (5),

wherein said first seat (4) is directly obtained in or directly defined on said support body (2) of the device, **characterised in that** said selecting units (20) for controlling the plurality of needle selectors comprise a plurality of levers (21), each one being configured so as to interact with the butts of a respective plurality of needle selectors, and a corresponding plurality of piezoelectric actuators, each piezoelectric actuator being configured so as to selectively move the respective lever (21) at least between a first position, in which, in use, the lever interacts with the butts of the respective plurality of selectors, and a second position, in which, in use, the lever does not interact with the butts of the respective plurality of selectors, and wherein said plurality of piezoelectric actuators is directly associated with or directly engages one or more surfaces of said first seat (4) of the support body (2) of the device.

2. The device (1) according to claim 1, wherein said support body (2) is made in one piece or as a single piece.

3. The device (1) according to any one of the preceding claims, wherein said at least one cam, associated with said second seat (5), is a stitch cam (30) for controlling the needles, configured so as to interact with the butts of the moving needles as a result of the rotation of the needle-holding unit, or wherein said second seat (5) is directly obtained in or directly defined on said support body (2) of the device, or wherein the support body (2) extends longitudinally or vertically between a lower side (11) and an upper side (12), opposed to said lower side, and wherein the aforesaid mounting portion (3) is defined on said lower side (11) of the support body (2) and is configured so as to be removably mounted to a supporting structure, e.g. a frame, of the knitting machine.

4. The device (1) according to any one of the preceding claims, further comprising:

- a third seat (6) configured so as to house at least one further cam for controlling the needles or the selectors of the knitting machine;
 - a further cam (30; 40) for controlling the needles or the selectors, associated with said third seat (6);
- and wherein said at least one further cam is a selector cam (40) for controlling the selectors of the knitting machine, configured so as to interact with the butts of the moving selectors as a result of the rotation of the needle-holding unit, and wherein said third seat (6) is directly obtained in or directly defined on said support body (2) of the device.

5. The device (1) according to any one of the preceding claims, wherein the support body (2) comprises a front side (13), configured so as to face - with the device being mounted to the knitting machine - a needle-holding unit of the knitting machine, preferably in a radial, outer position with respect to an axis of rotation of the needle-holding unit, and wherein said first seat (4) is defined on said front side (13) and comprises a cavity turning inwards from said front side to the inside of the support body, and wherein said cavity is at least partially open at least on said front side.
6. The device (1) according to any one of the preceding claims, wherein the first seat (4) is laterally open at least on a lateral face (15) of the support body (2), or wherein the support body (2) comprises a wall (16) configured so as to laterally close the first seat (4), housing therein the selecting units (20), and define a portion of the lateral face (15).
7. The device (1) according to the preceding claim, wherein said wall (16) is a structural element configured so as to strengthen the support body and prevent the support body from bending due to the absence of material from the first seat (4) on the lateral face (15), wherein said wall (16) is stiffly secured to the support body so as to avoid deformations under compression and under traction, and to keep the size of the support body constant.
8. The device (1) according to claim 6 or 7, wherein the wall (16) is placed on a respective lateral face (15) of the body and has an upper tooth, configured so as to be secured to a proximal portion of the support body with respect to the upper side (12) of the support body, and a lower tooth, configured so as to be secured to a proximal portion of the support body with respect to the lower side (11) of the support body, or wherein the wall (16) is secured above to the support body by means of one or more screws, inserted into dedicated slots of the support body, and is secured below to the support body by means of further one or more screws, inserted into dedicated slots of support body, or wherein the wall (16) is secured to the support body, both above and below, by means of one or more stop pins inserted or forced into suitable seats of the support body.
9. The device (1) according to any one of the claims 6 to 8, wherein the support body (2) comprises one first seat (4) only, which is laterally open on both lateral faces (15), or sides, of the support body, and wherein the support body (2) is laterally open at least on a lateral face (15) of the support body (2), and wherein the support body (2) comprises two walls (16) configured so as to laterally close the first seat (4), housing therein the selecting units (20), each wall (16) defining a portion of the respective lateral face (15).
10. The device (1) according to any one of claims 1 to 8, wherein the support body (2) comprises a pair of first seats (4a, 4b), configured so as to respectively house first selecting units (20a) and second selecting units (20b) for controlling the plurality of selectors of the needles of the knitting machine, said first seats (4a, 4b) of the said pair of first seats being both defined on the front side (13) and laterally placed one beside the other, wherein each first seat of the pair of first seats comprises a respective cavity turning inwards from the front side to the inside of the support body, wherein the respective cavity of each first seat of the pair of first seats is at least partially open at least on the front side, and wherein the support body has an inner partition placed between the two first seats of the pair of first seats and configured so as to define and separate the cavities of the two first seats from one another.
11. The device (1) according to the preceding claim, comprising the aforesaid first selecting units (20a) and the aforesaid second selecting units (20b) for controlling the plurality of selectors of the needles of the knitting machine, wherein the first selecting units (20a) are housed in or associated with a first seat (4a) of the pair of first seats, and the second selecting units (20b) are housed in or associated with a second seat (4b) of the pair of first seats, or wherein the two first seats of the pair of first seats are open on opposite lateral faces, or sides, of the support body, and the support body (2) comprises two walls (16), each wall being configured so as to laterally close the respective first seat, housing therein the respective selecting units, and to define a portion of the respective lateral face (15).
12. The device (1) according to anyone of claims 5 to 11, wherein said second seat (5) is defined on said front side (13), or wherein said second seat (5) comprises a surface portion configured so as to allow at least one knitting cam (30) to be mounted, said surface portion being suitably machined and/or comprising one or more mounting holes, or wherein said third seat (6) is defined on said front side (13), or wherein said third seat comprises a surface portion configured so as to allow at least one selector cam to be mounted, said surface portion being suitably machined and/or comprising one or more mounting holes.
13. The device (1) according to any one of claims 3 to 12, wherein the support body (2) extends longitudinally or vertically between a lower side (11) and an upper side (12), wherein the first seat (4) is placed in a proximal position to said lower side (11) of the

support body and the second seat (5) is placed in a proximal position to said upper side (12) of the support body (2), or wherein the third seat (6) is placed between said first seat and said second seat, or wherein said piezoelectric actuators comprise a ceramic element being able to bend or stretch as a result of an electric voltage, so as to place the respective lever (21) in said first position or in said second position, and wherein said selecting units comprise electric and electronic components for the operation of the piezoelectric actuators.

14. The device (1) according to any one of the preceding claims, comprising a base configured so as to house and carry thereon the support body of the device, said base being - with the device mounted to the knitting machine - vertically placed between the support body and a frame of the knitting machine and being configured so as to enable the adjustment of the position of the support and control device with respect to the needle-holding unit of the circular knitting machine, and/or wherein the base is configured so as to carry a pair of support and control devices, one beside the other, so that the devices are associated with two adjacent feeds or yarn feeding points of the knitting machine, each device supports the control units associated with a respective feed.

15. A circular knitting machine for knitted or hosiery items, comprising:
- a supporting structure;
 - at least one needle-holding unit having the structure of a needle-holding cylinder or plate, turnably mounted in said supporting structure so as to rotate around an axis of rotation;
 - a plurality of needles movably inserted into sliding compartments of the needle-holding unit and moving so as to produce a knitted fabric;
 - a plurality of selectors movably inserted into the sliding compartments of the needle-holding unit, each selector being associated with a respective needle and longitudinally arranged in phase with it inside the respective sliding compartment, the selectors being configured so as to impart certain movements to the respective needles;

the knitting machine comprising a plurality of feeds or yarn feeding points on which the yarn is supplied to the machine needles, the feeds being positioned circumferentially around the needle-holding unit and angularly spaced from each other, wherein each feed of said plurality of feeds comprises:

- at least one cam (30; 40) for controlling the needles or for controlling the selectors;

- selecting units (20) for controlling said plurality of selectors, configured so as to interact with the selectors, in particular with respective butts of the selectors, to selectively determine the switching of each selector between an activation configuration, in which the selector interacts with the respective needle, and a deactivation configuration, in which the selector does not interact with the respective needle;

the knitting machine further comprising at least one support and control device (1) according to any one of the preceding claims, wherein the mounting portion (3) of the support body (2) is mounted to said supporting structure, wherein said first seat (4) houses the selecting units (20) of a feed and said second seat (5) houses said at least one cam (30; 40) for controlling the needles or for controlling the selectors of the same feed.

Patentansprüche

1. Halterungs- und Steuerungsvorrichtung (1) für Rundstrickmaschinen, welche dafür ausgelegt ist, in einer Rundstrickmaschine montiert zu sein, welche mit einer Nadelhalteeinheit mit einer Mehrzahl von Nadeln und mit einer entsprechenden Mehrzahl von Selektoren für solche Nadeln ausgerüstet ist, wobei die Vorrichtung wenigstens einen Halterungskörper (2) umfasst, welcher ausgerüstet ist wenigstens mit:

- einem Montageabschnitt (3), welcher dazu eingerichtet ist, zu ermöglichen, dass die Vorrichtung an einer Halterungsstruktur einer Rundstrickmaschine montiert ist;
- einem ersten Sitz (4), welcher dazu eingerichtet ist, Auswahleinheiten zum Steuern der Mehrzahl von Nadelselektoren der Strickmaschine aufzunehmen;
- einem zweiten Sitz (5), welcher dazu eingerichtet ist, wenigstens einen Nocken zum Steuern der Nadeln oder der Selektoren der Strickmaschine aufzunehmen;

wobei die Vorrichtung (1) umfasst:

- Auswahleinheiten (20) zum Steuern der Mehrzahl von Nadelselektoren, welche dem ersten Sitz (4) zugeordnet sind;
- wenigstens einen Nocken (30; 40) zum Steuern der Nadeln oder zum Steuern der Selektoren, welche dem zweiten Sitz (5) zugeordnet sind,

wobei der erste Sitz (4) direkt in dem Halterungskörper (2) der Vorrichtung erhalten oder direkt daran definiert ist,

dadurch gekennzeichnet, dass

die Auswahleinheiten (20) zum Steuern der Mehrzahl von Nadelselektoren eine Mehrzahl von Hebeln (21), wobei jeder dazu eingerichtet ist, mit den Fußenden einer jeweiligen Mehrzahl von Nadelselektoren zusammenzuwirken, und eine entsprechende Mehrzahl piezoelektrischer Aktuatoren umfasst, wobei jeder piezoelektrische Aktuator dazu eingerichtet ist, den jeweiligen Hebel (21) selektiv wenigstens zwischen einer ersten Position, in welcher, in Verwendung, der Hebel mit den Fußenden der jeweiligen Mehrzahl von Selektoren zusammenwirkt, und einer zweiten Position zu bewegen, in welcher, in Verwendung, der Hebel nicht mit den Fußenden der jeweiligen Mehrzahl von Selektoren zusammenwirkt, und wobei die Mehrzahl piezoelektrischer Aktuatoren direkt einer oder mehreren Flächen des ersten Sitzes (4) des Halterungskörpers (2) der Vorrichtung zugeordnet ist oder direkt damit in Eingriff steht.

2. Vorrichtung (1) nach Anspruch 1, wobei der Halterungskörper (2) in einem Stück oder als ein einzelnes Stück hergestellt ist.

3. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der wenigstens eine Nocken, welcher dem zweiten Sitz (5) zugeordnet ist, ein Kuliernocken (30) zum Steuern der Nadeln ist, welcher dazu eingerichtet ist, als ein Ergebnis der Drehung der Nadelhalteeinheit mit den Fußenden der sich bewegenden Nadeln zusammenzuwirken, oder wobei der zweite Sitz (5) direkt in dem Halterungskörper (2) der Vorrichtung erhalten oder direkt daran definiert ist, oder wobei sich der Halterungskörper (2) longitudinal oder vertikal zwischen einer unteren Seite (11) und einer der unteren Seite entgegengesetzten oberen Seite (12) erstreckt, und wobei der vorgenannte Montageabschnitt (3) an der unteren Seite (11) des Halterungskörpers (2) definiert ist und dazu eingerichtet ist, lösbar an einer Halterungsstruktur, z. B. einem Rahmen, der Strickmaschine montiert zu sein.

4. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, ferner umfassend:

- einen dritten Sitz (6), welcher dazu eingerichtet ist, wenigstens einen weiteren Nocken zum Steuern der Nadeln oder der Selektoren der Strickmaschine aufzunehmen;
- einen weiteren Nocken (30; 40) zum Steuern der Nadeln oder der Selektoren, welche dem dritten Sitz (6) zugeordnet sind;

und wobei der wenigstens eine weitere Nocken ein Selektornocken (40) zum Steuern der Selektoren der Strickmaschine ist, welcher dazu eingerichtet ist,

als ein Ergebnis der Drehung der Nadelhalteeinheit mit den Fußenden der sich bewegenden Selektoren zusammenzuwirken, und wobei der dritte Sitz (6) direkt in dem Halterungskörper (2) der Vorrichtung erhalten oder direkt daran definiert ist.

5. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der Halterungskörper (2) eine vordere Seite (13) umfasst, welche dazu eingerichtet ist, einer Nadelhalteeinheit der Strickmaschine, vorzugsweise in einer radialen, äußeren Position in Bezug auf eine Drehachse der Nadelhalteeinheit - mit der Vorrichtung an der Strickmaschine montiert - zugewandt zu sein, und wobei der erste Sitz (4) an der vorderen Seite (13) definiert ist und einen Hohlraum umfasst, welcher sich von der vorderen Seite zu dem Inneren des Halterungskörpers nach innen dreht, und wobei der Hohlraum wenigstens an der vorderen Seite wenigstens teilweise offen ist.

6. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, wobei der erste Sitz (4) an wenigstens einer lateralen Fläche (15) des Halterungskörpers (2) lateral offen ist, oder wobei der Halterungskörper (2) eine Wand (16) umfasst, welche dazu eingerichtet ist, den ersten Sitz (4) lateral zu schließen, welcher darin die Auswahleinheiten (20) aufnimmt, und einen Abschnitt der lateralen Fläche (15) zu definieren.

7. Vorrichtung (1) nach dem vorhergehenden Anspruch, wobei die Wand (16) ein strukturelles Element ist, welches dazu eingerichtet ist, den Halterungskörper zu verstärken und zu verhindern, dass sich der Halterungskörper aufgrund des Fehlens von Material von dem ersten Sitz (4) an der lateralen Fläche (15) biegt, wobei die Wand (16) starr an dem Halterungskörper gesichert ist, um unter Kompression und unter Traktion Verformungen zu vermeiden und die Größe des Halterungskörpers konstant zu halten.

8. Vorrichtung (1) nach Anspruch 6 oder 7, wobei die Wand (16) an einer jeweiligen lateralen Fläche (15) des Körpers platziert ist und einen oberen Zahn, welcher dazu eingerichtet ist, an einem in Bezug auf die obere Seite (12) des Halterungskörpers proximalen Abschnitt des Halterungskörpers gesichert zu sein, und einen unteren Zahn aufweist, welcher dazu eingerichtet ist, an einem in Bezug auf die untere Seite (11) des Halterungskörpers proximalen Abschnitt des Halterungskörpers gesichert zu sein, oder wobei die Wand (16) oberhalb des Halterungskörpers mittels einer oder mehrerer Schrauben gesichert ist, welche in zugehörige Aussparungen des Halterungskörpers eingefügt sind, und unterhalb des Halterungskörpers mittels weiterer einer oder mehrerer Schrauben gesichert ist, welche in zugehörige Aussparungen des Halterungskörpers eingefügt sind,

oder wobei die Wand (16) an dem Halterungskörper, sowohl oberhalb als auch unterhalb, mittels eines oder mehrerer Anschlagstifte gesichert ist, welche in geeignete Sitze des Halterungskörpers eingefügt oder gezwängt sind.

9. Vorrichtung (1) nach einem der Ansprüche 6 bis 8, wobei der Halterungskörper (2) nur einen ersten Sitz (4) umfasst, welcher lateral an beiden lateralen Flächen (15), oder Seiten, des Halterungskörpers offen ist, und wobei der Halterungskörper (2) lateral an wenigstens einer lateralen Fläche (15) des Halterungskörpers (2) offen ist, und wobei der Halterungskörper (2) zwei Wände (16) umfasst, welche dazu eingerichtet sind, den ersten Sitz (4) lateral zu schließen, welcher darin die Auswahlseinheiten (20) aufnimmt, wobei jede Wand (16) einen Abschnitt der jeweiligen lateralen Fläche (15) definiert.
10. Vorrichtung (1) nach einem der Ansprüche 1 bis 8, wobei der Halterungskörper (2) ein Paar erster Sitze (4a, 4b) umfasst, welche dazu eingerichtet sind, erste Auswahlseinheiten (20a) bzw. zweite Auswahlseinheiten (20b) zum Steuern der Mehrzahl von Selektoren der Nadeln der Strickmaschine aufzunehmen, wobei die ersten Sitze (4a, 4b) des Paares erster Sitze sowohl an der vorderen Seite (13) definiert sind als auch lateral nebeneinander platziert sind, wobei jeder erste Sitz des Paares erster Sitze einen jeweiligen Hohlraum umfasst, welcher sich von der vorderen Seite zu dem Inneren des Halterungskörpers nach innen dreht, wobei der jeweilige Hohlraum jedes ersten Sitzes des Paares erster Sitze wenigstens an der vorderen Seite wenigstens teilweise offen ist, und wobei der Halterungskörper eine innere Abtrennung aufweist, welche zwischen den zwei ersten Sitzen des Paares erster Sitze platziert ist und dazu eingerichtet ist, die Hohlräume der zwei ersten Sitze zu definieren und voneinander zu separieren.
11. Vorrichtung (1) nach dem vorhergehenden Anspruch, umfassend die vorgenannten ersten Auswahlseinheiten (20a) und die vorgenannten zweiten Auswahlseinheiten (20b) zum Steuern der Mehrzahl von Selektoren der Nadeln der Strickmaschine, wobei die ersten Auswahlseinheiten (20a) in einem ersten Sitz (4a) des Paares erster Sitze aufgenommen oder diesem zugeordnet sind und die zweiten Auswahlseinheiten (20b) in einem zweiten Sitz (4b) des Paares erster Sitze aufgenommen oder diesem zugeordnet sind, oder wobei die zwei ersten Sitze des Paares erster Sitze an entgegengesetzten lateralen Flächen, oder Seiten, des Halterungskörpers offen sind und der Halterungskörper (2) zwei Wände (16) umfasst, wobei jede Wand dazu eingerichtet ist, den jeweiligen ersten Sitz lateral zu schließen, welcher darin die jeweiligen Auswahlseinheiten aufnimmt, und einen Abschnitt der jeweiligen lateralen Fläche (15)

zu definieren.

12. Vorrichtung (1) nach einem der Ansprüche 5 bis 11, wobei der zweite Sitz (5) an der vorderen Seite (13) definiert ist, oder wobei der zweite Sitz (5) einen Flächenabschnitt umfasst, welcher dazu eingerichtet ist, zu ermöglichen, dass wenigstens ein Stricknocken (30) montiert ist, wobei der Flächenabschnitt geeignet bearbeitet ist und/oder ein oder mehrere Montagelöcher umfasst, oder wobei der dritte Sitz (6) an der vorderen Seite (13) definiert ist, oder wobei der dritte Sitz einen Flächenabschnitt umfasst, welcher dazu eingerichtet ist, zu ermöglichen, dass wenigstens ein Selektornocken montiert ist, wobei der Flächenabschnitt geeignet bearbeitet ist und/oder ein oder mehrere Montagelöcher umfasst.
13. Vorrichtung (1) nach einem der Ansprüche 3 bis 12, wobei sich der Halterungskörper (2) longitudinal oder vertikal zwischen einer unteren Seite (11) und einer oberen Seite (12) erstreckt, wobei der erste Sitz (4) in einer zu der unteren Seite (11) des Halterungskörpers proximalen Position platziert ist und der zweite Sitz (5) in einer zu der oberen Seite (12) des Halterungskörpers (2) proximalen Position platziert ist, oder wobei der dritte Sitz (6) zwischen dem ersten Sitz und dem zweiten Sitz platziert ist, oder wobei die piezoelektrischen Aktuatoren ein keramisches Element umfassen, welches dazu in der Lage ist, sich als ein Ergebnis einer elektrischen Spannung zu biegen oder zu strecken, um den jeweiligen Hebel (21) in der ersten Position oder in der zweiten Position zu platzieren, und wobei die Auswahlseinheiten elektrische und elektronische Komponenten für die Betätigung der piezoelektrischen Aktuatoren umfassen.
14. Vorrichtung (1) nach einem der vorhergehenden Ansprüche, umfassend eine Basis, welche dazu eingerichtet ist, den Halterungskörper der Vorrichtung aufzunehmen und daran zu tragen, wobei die Basis - mit der Vorrichtung an der Strickmaschine montiert - vertikal zwischen dem Halterungskörper und einem Rahmen der Strickmaschine platziert ist und dazu eingerichtet ist, die Einstellung der Position der Halterungs- und Steuerungsvorrichtung in Bezug auf die Nadelhalteeinheit der Ringstrickmaschine zu ermöglichen, und/oder wobei die Basis dazu eingerichtet ist, ein Paar von Halterungs- und Steuerungsvorrichtungen, eine neben der anderen, derart zu tragen, dass die Vorrichtungen zwei benachbarten Zuführungen oder Garnzufuhrstellen der Strickmaschine zugeordnet sind, wobei jede Vorrichtung die einer jeweiligen Zuführung zugeordneten Steuerungseinheiten haltet.
15. Rundstrickmaschine für Strick- oder Wirkwaren, umfassend:

- eine Halterungsstruktur;
- wenigstens eine Nadelhalteeinheit mit der Struktur eines Nadelhaltezyinders oder einer Nadelhalteplatte, welche drehbar in der Halterungsstruktur montiert ist, so dass sie sich um eine Drehachse dreht;
- eine Mehrzahl von Nadeln, welche beweglich in Gleiteinsätze der Nadelhalteeinheit eingefügt sind und sich bewegen, so dass sie ein Gestrick erzeugen;
- eine Mehrzahl von Selektoren, welche beweglich in die Gleiteinsätze der Nadelhalteeinheit eingefügt sind, wobei jeder Selektor einer jeweiligen Nadel zugeordnet ist und phasengleich damit longitudinal innerhalb des jeweiligen Gleiteinsatzes angeordnet ist, wobei die Selektoren dazu eingerichtet sind, bestimmte Bewegungen an die jeweiligen Nadeln weiterzugeben;

wobei die Strickmaschine eine Mehrzahl von Zuführungen oder Garnzufuhrstellen umfasst, an welchen das Garn den Maschinennadeln zugeführt wird, wobei die Zuführungen umfangsmäßig um die Nadelhalteeinheit herum positioniert sind und winkelmäßig voneinander beabstandet sind, wobei jede Zuführung der Mehrzahl von Zuführungen umfasst:

- wenigstens einen Nocken (30; 40) zum Steuern der Nadeln oder zum Steuern der Selektoren;
- Auswahleinheiten (20) zum Steuern der Mehrzahl von Selektoren, welche dazu eingerichtet sind, mit den Selektoren, insbesondere mit jeweiligen Fußenden der Selektoren, zusammenzuwirken, um selektiv das Umschalten jedes Selektors zwischen einer Aktivierungskonfiguration, in welcher der Selektor mit der jeweiligen Nadel zusammenwirkt, und einer Deaktivierungskonfiguration zu bestimmen, in welcher der Selektor nicht mit der jeweiligen Nadel zusammenwirkt;

wobei die Strickmaschine ferner wenigstens eine Halterungs- und Steuerungsvorrichtung (1) nach einem der vorhergehenden Ansprüche umfasst, wobei der Montageabschnitt (3) des Halterungskörpers (2) an der Halterungsstruktur montiert ist, wobei der erste Sitz (4) die Auswahleinheiten (20) einer Zuführung aufnimmt und der zweite Sitz (5) den wenigstens einen Nocken (30; 40) zum Steuern der Nadeln oder zum Steuern der Selektoren der gleichen Zuführung aufnimmt.

Revendications

1. Dispositif de support et de commande (1) pour ma-

chines à tricoter circulaires, conçu pour être monté dans des machines à tricoter circulaires équipées d'une unité de maintien d'aiguilles, avec une pluralité d'aiguilles ainsi qu'une pluralité correspondante de sélecteurs pour de telles aiguilles, le dispositif comprenant au moins un corps de support (2) équipé au moins de :

- une portion de montage (3) configurée pour permettre au dispositif d'être monté à une structure de support d'une machine à tricoter circulaire ;
- un premier siège (4) configuré pour loger des unités de sélection pour commander la pluralité de sélecteurs d'aiguilles de la machine à tricoter ;
- un second siège (5) configuré pour loger au moins une came pour commander les aiguilles ou les sélecteurs de la machine à tricoter ;

le dispositif (1) comprenant :

- des unités de sélection (20) pour commander la pluralité de sélecteurs d'aiguilles associées, audit premier siège (4) ;
- au moins une came (30 ; 40) pour commander les aiguilles ou pour commander les sélecteurs, associée audit second siège (5),

ledit premier siège (4) étant directement obtenu dans, ou directement défini sur, ledit corps de support (2) du dispositif, **caractérisé en ce que** lesdites unités de sélection (20) pour commander la pluralité de sélecteurs d'aiguilles comprennent une pluralité de leviers (21), chacun étant configuré pour entrer en interaction avec les bouts d'une pluralité respective de sélecteurs d'aiguilles, et une pluralité correspondante d'actionneurs piézoélectriques, chaque actionneur piézoélectrique étant configuré pour déplacer sélectivement le levier respectif (21) au moins entre une première position, dans laquelle, durant l'utilisation, le levier entre en interaction avec les bouts de la pluralité respective de sélecteurs, et une seconde position, dans laquelle, durant l'utilisation, le levier n'entre pas en interaction avec les bouts de la pluralité respective des sélecteurs, et ladite pluralité d'actionneurs piézoélectriques étant directement associée à, ou directement en prise avec, une ou plusieurs surfaces dudit premier siège (4) du corps de support (2) du dispositif.

2. Dispositif (1) selon la revendication 1, ledit corps de support (2) étant fait d'une pièce ou d'une pièce unique.

3. Dispositif (1) selon l'une quelconque des revendications précédentes, ladite au moins une came, associée audit second siège (5), étant une came de points

- (30) pour commander les aiguilles, configurée pour entrer en interaction avec les bouts des aiguilles en mouvement en résultat de la rotation de l'unité de maintien d'aiguille, ou ledit second siège (5) étant directement obtenu dans, ou directement défini sur, ledit corps de support (2) du dispositif, ou le corps de support (2) s'étendant longitudinalement ou verticalement entre un côté inférieur (11) et un côté supérieur (12), opposé audit côté inférieur, et la portion de montage susmentionnée (3) étant définie sur ledit côté inférieur (11) du corps de support (2) et étant configurée pour être montée de manière amovible à une structure de support, par exemple un châssis, de la machine à tricoter.
4. Dispositif (1) selon l'une quelconque des revendications précédentes, comprenant en outre :
- un troisième siège (6) configuré pour loger au moins une came supplémentaire pour commander les aiguilles ou les sélecteurs de la machine à tricoter ;
 - une came supplémentaire (30 ; 40) pour commander les aiguilles ou les sélecteurs, associée audit troisième siège (6) ;
- et ladite au moins une came supplémentaire étant une came de sélecteur (40) pour commander les sélecteurs de la machine à tricoter, configurée pour entrer en interaction avec les bouts des sélecteurs en mouvement en résultat de la rotation de l'unité de maintien d'aiguilles, et ledit troisième siège (6) étant directement obtenu dans, ou directement défini sur, ledit corps de support (2) du dispositif.
5. Dispositif (1) selon l'une quelconque des revendications précédentes, le corps de support (2) comprenant un côté avant (13), configuré pour faire face - avec le dispositif étant monté à la machine à tricoter - à une unité de maintien d'aiguilles de la machine à tricoter, préférablement dans une position radiale, extérieure par rapport à un axe de rotation de l'unité de maintien d'aiguilles, et ledit premier siège (4) étant défini sur ledit côté avant (13) et comprenant une cavité tournée vers l'intérieur depuis ledit côté avant vers l'intérieur du corps de support, et ladite cavité étant au moins partiellement ouverte au moins sur ledit côté avant.
6. Dispositif (1) selon l'une quelconque des revendications précédentes, le premier siège (4) étant latéralement ouvert au moins sur la face latérale (15) du corps de support (2), ou le corps de support (2) comprenant une cloison (16) configurée pour fermer latéralement le premier siège (4), logeant en son sein les unités de sélection (20), et définissant une portion de la face latérale (15).
7. Dispositif (1) selon la revendication précédente, ladite cloison (16) étant un élément de structure configuré pour renforcer le corps de support et empêcher le corps de support de fléchir du fait de l'absence de matériau du premier siège (4) sur la face latérale (15), ladite cloison (16) étant solidement fixée de manière rigide au corps de support pour empêcher des déformations sous compression et sous traction, et pour maintenir constante la taille du corps de support.
8. Dispositif (1) selon la revendication 6 ou 7, la cloison (16) étant placée sur une face latérale respective (15) du corps et ayant une dent supérieure, configurée pour être solidement fixée à une portion proximale du corps de support par rapport au côté supérieur (12) du corps de support, et une dent inférieure, configurée solidement fixée à une portion proximale du corps de support par rapport au côté inférieur (11) du corps de support, ou la cloison (16) étant solidement fixée au-dessus du corps de support au moyen d'une ou plusieurs vis, insérées dans des fentes dédiées du corps de support, et étant solidement fixée au-dessous du corps de support au moyen d'une ou plusieurs vis supplémentaires, insérées dans des fentes dédiées du corps de support, ou la cloison (16) étant solidement fixée au corps de support, à la fois au-dessus et en-dessous, au moyen d'une ou plusieurs goupilles d'arrêt insérées ou forcées dans des sièges adaptés du corps de support.
9. Dispositif (1) selon l'une quelconque des revendications 6 à 8, le corps de support (2) comprenant un premier siège (4) uniquement, lequel étant latéralement ouvert sur les deux faces latérales (15), ou côtés, du corps de support, et le corps de support (2) étant latéralement ouvert au moins sur une face latérale (15) du corps de support (2), et le corps de support (2) comprenant deux cloisons (16) configurées pour fermer latéralement le premier siège (4), logeant en son sein les unités de sélection (20), chaque cloison (16) définissant une portion de la face latérale respective (15) .
10. Dispositif (1) selon l'une quelconque des revendications 1 à 8, le corps de support (2) comprenant une paire de premiers sièges (4a, 4b), configurée pour loger respectivement de premières unités de sélection (20a) et de secondes unités de sélection (20b) pour commander la pluralité de sélecteurs des aiguilles de la machine à tricoter, lesdits premiers sièges (4a, 4b) de ladite paire de premiers sièges étant tous deux définis sur le côté avant (13) et latéralement placés l'un à côté de l'autre, chaque premier siège de la paire de premiers sièges comprenant une cavité respective tournée vers l'intérieur à partir du côté avant vers l'intérieur du corps de support, la cavité respective de chaque premier siège

de la paire de premiers sièges étant au moins partiellement ouverte au moins sur le côté avant, et le corps de support ayant une partition intérieure placée entre les deux premiers sièges de la paire de premiers sièges et configurée pour définir et séparer les cavités des deux premiers sièges l'un de l'autre.

11. Dispositif (1) selon la revendication précédente, comprenant les premières unités de sélection susmentionnées (20a) et les secondes unités de sélection susmentionnées (20b) pour commander la pluralité de sélecteurs des aiguilles de la machine à tricoter, les premières unités de sélection (20a) étant logées dans, ou associées à, un premier siège (4a) de la paire de premiers sièges, et les secondes unités de sélection (20b) étant logées dans, ou associées à, un second siège (4b) de la paire de premiers sièges, ou les deux premiers sièges de la paire de premiers sièges étant ouverts sur les faces latérales opposées, ou côtés, du corps de support, et le corps de support (2) comprenant deux cloisons (16), chaque cloison étant configurée pour fermer latéralement le premier siège respectif, logeant en son sein les unités de sélection respectives, et pour définir une portion de la face latérale (15) respective.
12. Dispositif (1) selon l'une quelconque des revendications 5 à 11, ledit second siège (5) étant défini sur ledit côté avant (13), ou ledit second siège (5) comprenant une portion de surface configurée pour permettre à au moins une came de tricotage (30) d'être montée, ladite portion de surface étant correctement usinée et/ou comprenant un ou plusieurs trous de montage, ou ledit troisième siège (6) étant défini sur ledit côté avant (13), ou ledit troisième siège comprenant une portion de surface configurée pour permettre à au moins une came de sélection d'être montée, ladite portion de surface étant correctement usinée et/ou comprenant un ou plusieurs trous de montage.
13. Dispositif (1) selon l'une quelconque des revendications 3 à 12, le corps de support (2) se prolongeant longitudinalement ou verticalement entre un côté inférieur (11) et un côté supérieur (12), le premier siège (4) étant placé dans une position proximale audit côté inférieur (11) du corps de support et le second siège (5) étant placé dans une position proximale audit côté supérieur (12) du corps de support (2), ou le troisième siège (6) étant placé entre ledit premier siège et ledit second siège, ou lesdits actionneurs piézoélectriques comprenant un élément en céramique étant capable de se plier ou de s'étirer en résultat d'une tension électrique, pour placer le levier respectif (21) dans ladite première position ou dans ladite seconde position, et lesdites unités de sélection comprenant des composants électriques et électroniques pour le fonctionnement

des actionneurs piézoélectriques.

14. Dispositif (1) selon l'une quelconque des revendications précédentes, comprenant une base configurée pour loger et porter dessus le corps de support du dispositif, ladite base étant - avec le dispositif monté à la machine à tricoter - verticalement placée entre le corps de support et un châssis de la machine à tricoter et étant configurée pour permettre l'ajustement de la position du dispositif de support et de commande par rapport à l'unité de maintien d'aiguilles de la machine à tricoter circulaire, et/ou la base étant configurée pour porter une paire de dispositifs de support et de commande, l'un à côté de l'autre, de sorte que les dispositifs soient associés aux deux alimentations ou points d'alimentation de fil adjacent-e-s de la machine à tricoter, chaque dispositif supportant les unités de commande associées à l'alimentation respective.

15. Machine à tricoter circulaire pour articles tricotés ou articles chaussants, comprenant :

- une structure de support ;
- au moins une unité de maintien d'aiguilles ayant la structure d'un cylindre ou d'une plaque de maintien d'aiguilles, montée de manière à pouvoir tourner dans ladite structure de support pour tourner autour d'un axe de rotation ;
- une pluralité d'aiguilles insérées de manière mobile dans des compartiments coulissants de l'unité de maintien d'aiguilles et se déplaçant pour produire un tissu tricoté ;
- une pluralité de sélecteurs insérés de manière mobile dans des compartiments coulissants de l'unité de maintien d'aiguilles, chaque sélecteur étant associé à une aiguille respective et longitudinalement agencé en phase avec lui à l'intérieur du compartiment coulissant respectif, les sélecteurs étant configurés pour transmettre certains mouvements aux aiguilles respectives;

la machine à tricoter comprenant une pluralité d'alimentations ou de points d'alimentation de fil sur lesquels le fil est fourni aux aiguilles de la machine, les alimentations étant positionnées dans la circonférence autour de l'unité de maintien d'aiguilles et espacées de manière angulaire les unes par rapport aux autres, chaque alimentation de ladite pluralité d'alimentations comprenant :

- au moins une came (30 ; 40) pour commander les aiguilles ou pour commander les sélecteurs ;
- des unités de sélection (20) pour commander ladite pluralité de sélecteurs, configurées pour entrer en interaction avec les sélecteurs, en particulier avec les bouts correspondants des sé-

lecteurs, pour déterminer sélectivement la commutation de chaque sélecteur entre une configuration d'activation, dans laquelle le sélecteur entre en interaction avec l'aiguille respective, et une configuration de désactivation, dans laquelle le sélecteur n'entre pas en interaction avec l'aiguille respective;

la machine à tricoter comprenant en outre au moins un dispositif de support et de commande (1) selon l'une quelconque des revendications précédentes, la portion de montage (3) du corps de support (2) étant montée à ladite structure de support, ledit premier siège (4) logeant les unités de sélection (20) de l'alimentation et ledit second siège (5) logeant ladite au moins une came (30 ; 40) pour commander les aiguilles ou pour commander les sélecteurs de la même alimentation.

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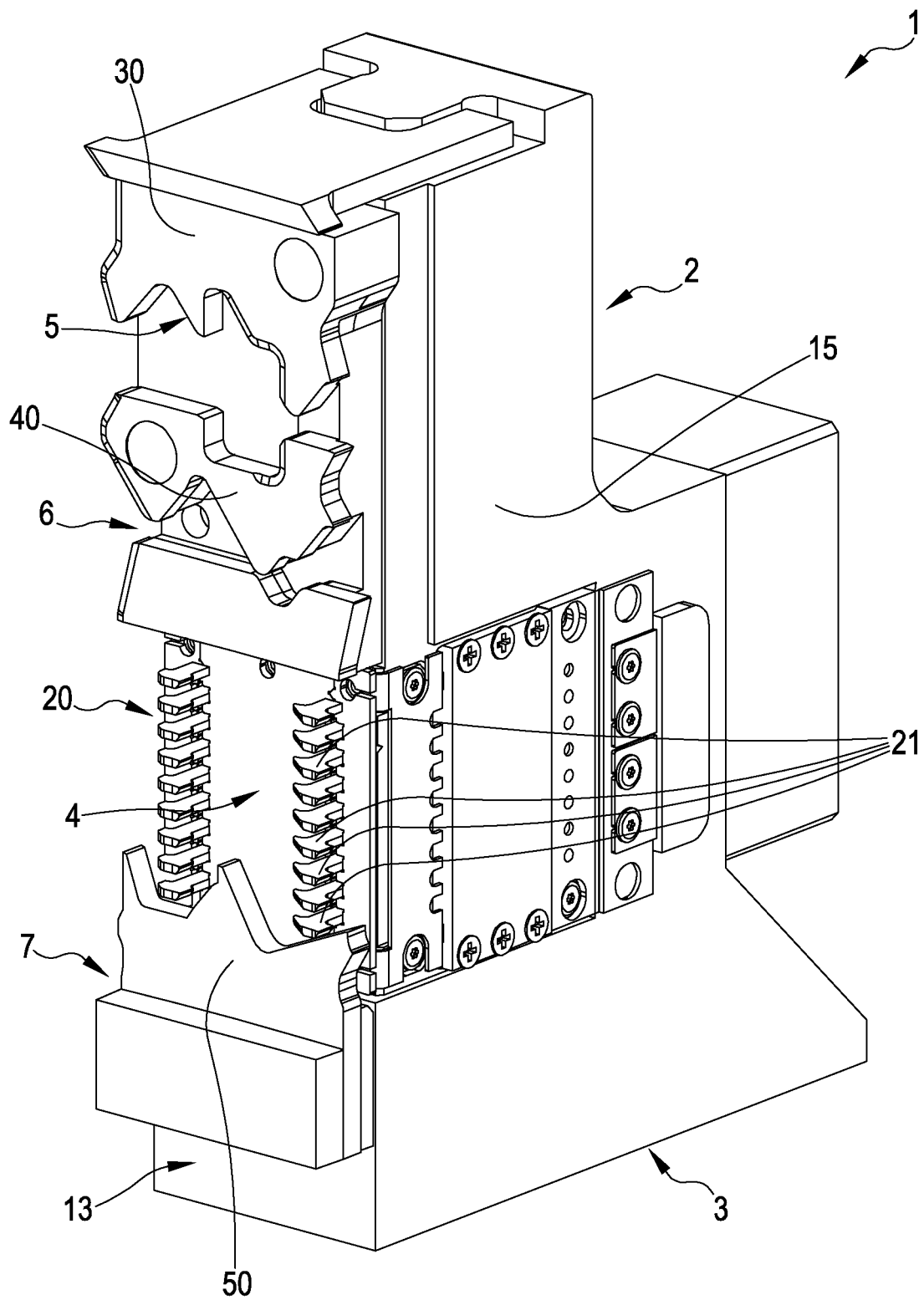


FIG.1

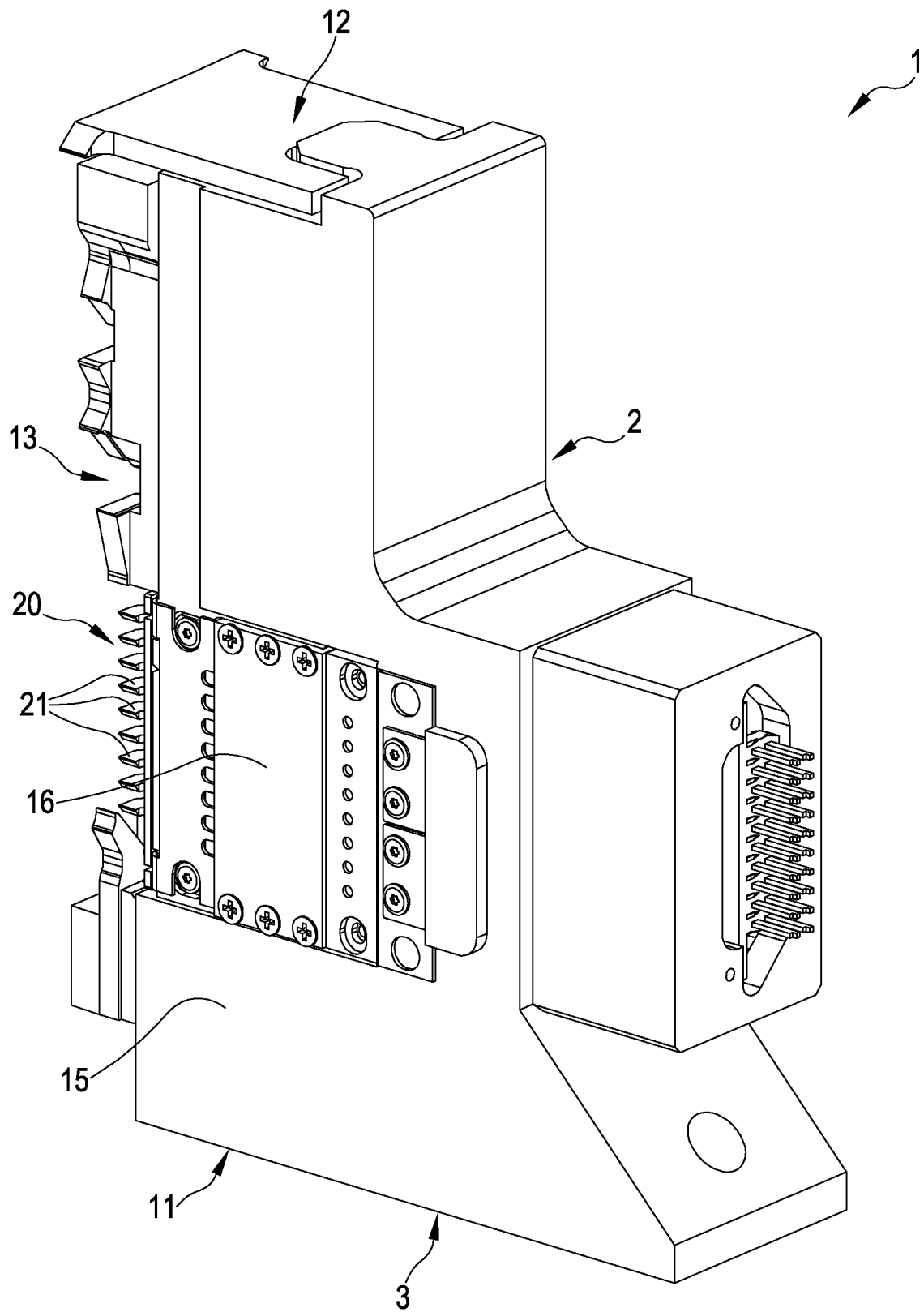


FIG.2

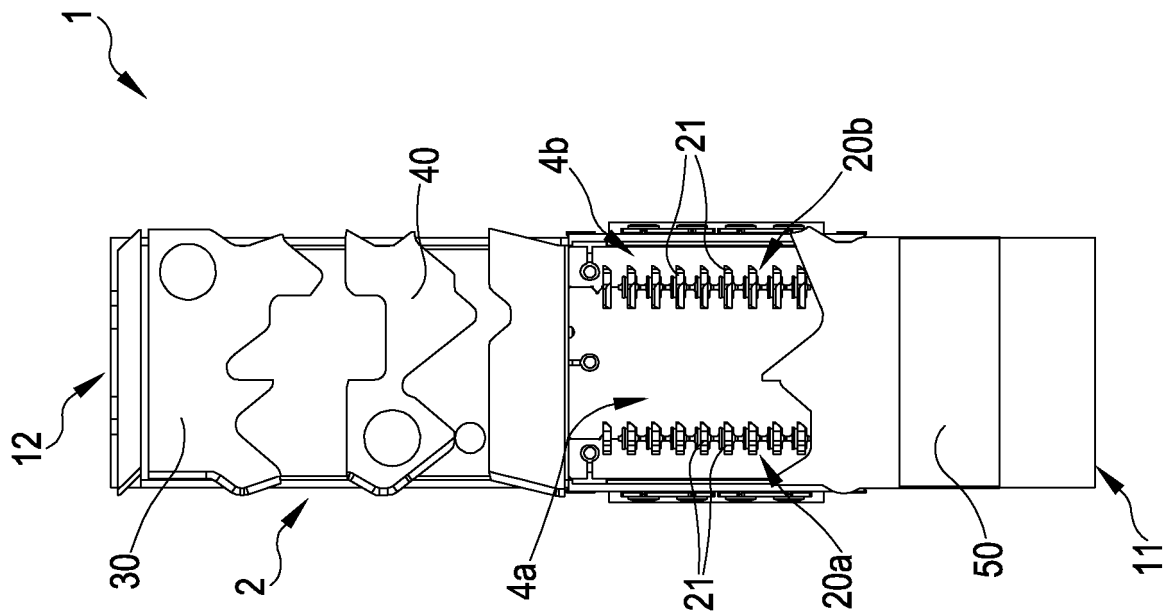


FIG.4

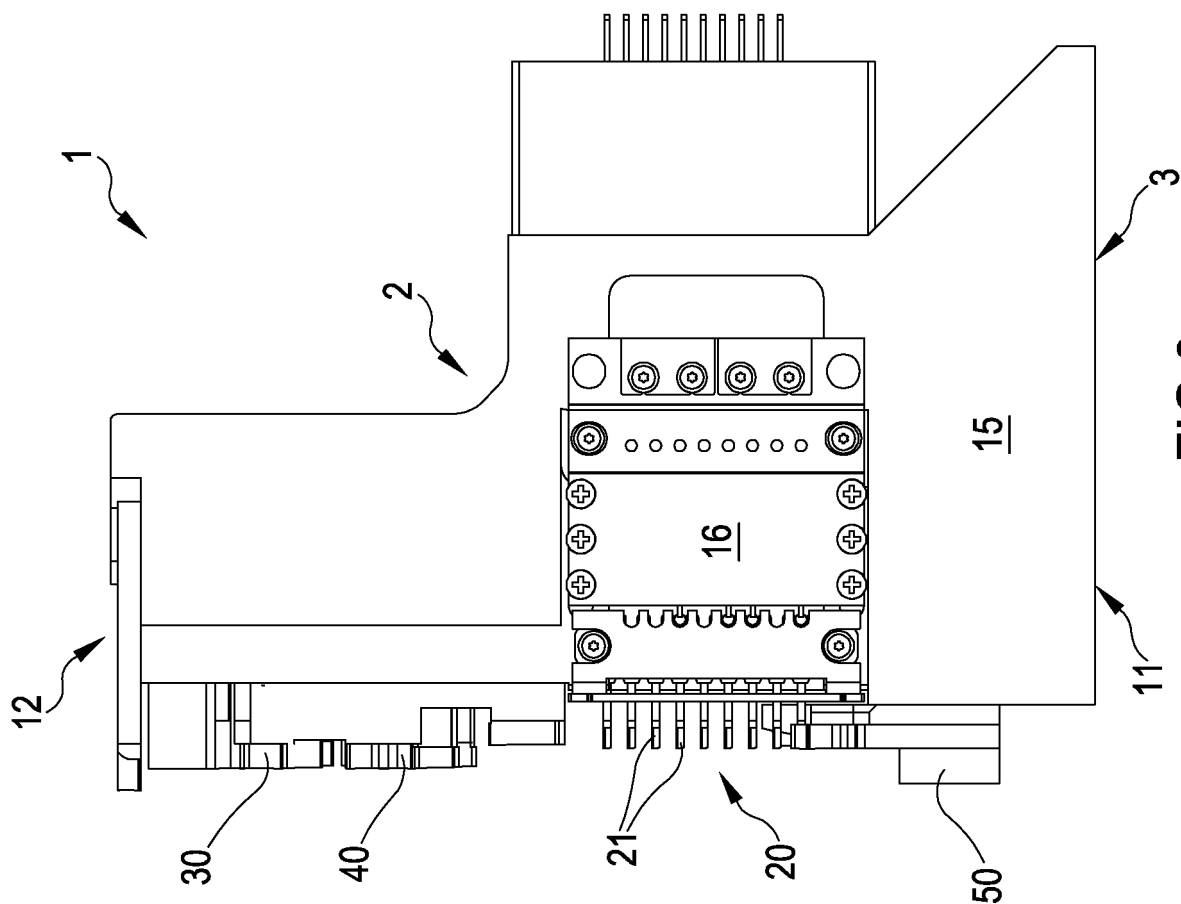


FIG.3

REFERENCES CITED IN THE DESCRIPTION

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