(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 211 297 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
13.11.2024 Bulletin 2024/46

(21) Application number: **21763143.1**

(22) Date of filing: **31.08.2021**

(51) International Patent Classification (IPC):
D04B 9/38 *(2006.01)* ***D04B 15/06*** *(2006.01)*
D04B 1/10 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
D04B 9/38; D04B 1/104; D04B 15/06

(86) International application number:
PCT/IB2021/057950

(87) International publication number:
WO 2022/053910 (17.03.2022 Gazette 2022/11)

(54) **A SHAPED SINKER FOR KNITTING MACHINES, IN PARTICULAR FOR MANUFACTURING OPEN-WORK KNITTED FABRICS**

EINE FORMPLATINE FÜR STRICKMASCHINEN, INSBESONDERE ZUR HERSTELLUNG VON AJOURSTRICKWAREN

UNE PLATINE FAÇONNÉE POUR MACHINES À TRICOTER, EN PARTICULIER POUR LA FABRICATION DE TRICOTS AJOURÉS

(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: **10.09.2020 IT 202000021451**

(43) Date of publication of application:
19.07.2023 Bulletin 2023/29

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Description

Field of the invention

[0001] The present invention relates to a knockover sinker, known as "shaped sinker", for a knitting machine, in particular for a circular knitting machine. In further detail, the present invention relates to a particular shaped sinker configured for manufacturing open-work knitted fabrics. In the framework of the present invention, the structure of those elements which, by cooperating with the knockover sinkers and the needles, enable to manufacture said open-work knitted fabric, will be described, and in particular the individual selection of said elements enabling to create openings in the fabric by cooperating with some needles only, while the adjacent needles make traditional stitches. Preferably, the present invention falls into the field of circular knitting machines for knitted and hosiery items configured for manufacturing open-work knitted fabrics.

Background of the invention

[0002] As is known, circular knitting machines comprise a needle-holding element (needle cylinder and/or plate) on which one or more series of needles are arranged along a circular path (circular needlebeds), and devices apt to control the movement of the needles for knitted fabric formation. Knockover sinkers are arranged in radial seats obtained in a ring-shaped body (sinker crown) arranged around the needle-holding cylinder, and these sinkers cooperate with the needles so as to make knitted fabric.

[0003] While executing particular designs with circular knitting machines, it is known to manufacture open-work knitted fabrics.

[0004] Document BE781077A describes a circular knitting machine equipped with arranged in pairs one on each side of a main sinker, and the ends of auxiliary sinkers extend outwardly away from the associated main sinker so that an end of one auxiliary sinker is in line with one cylinder needle and the end of the other auxiliary sinker is in line with an adjacent cylinder needle. The auxiliary sinkers are operated in pairs to widen a stitch and place it on the two adjacent cylinder needles so that a wide variety of fancy operations e.g. open structure patterns can be carried out when knitting e.g. stockings, tights.

[0005] Document GB449404 discloses a circular knitting machine equipped with sinkers arranged between the needles and on which interstitch loops are formed. At least one of these sinkers comprises a protruding lateral portion, which is configured for moving an interstitch loop onto an adjacent needle so as to create an opening in the knitted fabric.

[0006] Document GB377794 discloses a circular knitting machine equipped with a spreader provided with a pair of blades placed on opposed sides of a sinker and configured for spreading an interstitch and arranging it on one or both adjacent needles.

[0007] Document GB410831 discloses a circular knitting machine comprising some sinkers provided with an upper hook or with a pair of hooks placed on the sides of a traditional sinker. Said hooks are configured and moved so as to displace an interstitch on adjacent needles and make an open work in the fabric. A selector moves the sinker with the hook integrated therein when said hook must work. The selector comprises an oscillating arm provided with butts interacting with a plurality of cams belonging to an actuating device.

[0008] It is further known about public document Mi2003A001995, which discloses a device for selecting sinkers comprising, for each of the radial grooves housing the sinkers, a selector oscillating in a radial plane with respect to the sinker crown so as to switch between an operating position to a non-operating position or vice versa, which is connected to the corresponding sinker arranged in the corresponding radial groove, so as to induce a given actuation of the sinker depending on whether the selector is in the non-operating position or in the operating position. Moreover, a selecting actuator is provided, laterally facing the sinker crown and to be engaged upon command with the selector so as to switch it from the non-operating position to the operating position. When the selector is in the non-operating position, the selecting actuator does not intervene, the sinker is actuated by means of actuating cams only and cooperates with the needles for making stitches. When the selector is switched to the operating position, said sinker is pushed towards the axis of the sinker crown more than the movement resulting from the actuating cams only, so as to cooperate with the needles in order to make terry stitches.

[0009] A circular knitting machine configured for manufacturing fabrics with intarsia motifs (intarsia machine) is disclosed for instance in document EP1620590 issued to the same Applicant.

[0010] Intarsia is a knitting technique enabling to obtain motifs using yarns of different colors in the same knitted course. Intarsia technique is usually used for creating multicolored motifs. As for woodworking technique, which it shares the name with, fields with different colors and materials seem to be fitted together as in a puzzle. Differently from other multicolor knitting techniques, there is only one "active" color on one or more needles and the yarn is not let float to the reverse. When a color changes on a given knitted course, the old yarn is left hanging.

Summary

[0011] In the framework of circular knitting machines as the ones disclosed above, the Applicant has identified the presence of some drawbacks.

[0012] First of all, the Applicant noticed that knockover sinkers according to known solutions can be improved

under various aspects.

[0013] For example, known knockover sinkers are not able to manage, for all knitted structures to be manufactured with the knitting machine, the correct yarn absorption during the creation of stitches. This can lead to an erroneous length of the interstitch, in particular when manufacturing open-work.

[0014] Moreover, known solutions are affected by problems related to an excessive tension of the yarns when the latter interact with the knockover sinkers, and this can lead to yarns breaking or to erroneous stitches or to inaccuracies in the knitted fabric.

[0015] A further drawback of known solutions consists in the possibility, in some textile processings, that knockover sinkers may undesirably interfere with yarns being fed (thus deviating their paths) or with elements of the knitting head such as cams or other control elements.

[0016] Under these circumstances, an aim underlying the present invention in its various aspects and/or embodiments is to provide a special knockover sinker, known as "shaped sinker", for knitting machines which can obviate one or more of the drawbacks referred to above.

[0017] A further aim of the present invention is to provide a shaped sinker for knitting machines which allows to manufacture open-work knitted fabrics with the most different features.

[0018] Moreover, an aim of the present invention is to propose a circular knitting machine which can manufacture high quality open-work knitted fabrics.

[0019] An aim of the present invention is also to propose a shaped sinker having a rational structure and specifically conceived for achieving given performance when manufacturing the knitted fabric, in particular an open-work knitted fabric.

[0020] A further aim of the present invention is to provide a low cost shaped sinker which is easy to carry out.

[0021] A further aim of the present invention is to provide a knitting machine which is able to manufacture open-work knitted fabrics enabling also to obtain further motifs and/or effects on the knitted fabric, preferably without having to reconfigure the machine itself or parts of it from a mechanical point of view.

[0022] A further aim of the present invention is to provide a circular knitting machine configured for manufacturing fabrics with intarsia motifs (intarsia machine or argyle machine), which is also able to manufacture open-work knitted fabrics according to the aims listed above.

[0023] A further aim of the present invention is to create alternative solutions to the state of the art for carrying out shaped knockover sinkers and for manufacturing open-work knitted fabrics, and/or to open new design possibilities.

[0024] These and other possible aims, which shall appear better from the following description, are basically achieved by a knockover sinker, known as "shaped sinker", and by a circular knitting machine including this sinker, according to one or more of the appended claims and according to the following aspects and/or embodiments, variously combined, possibly also with the aforesaid claims.

[0025] In the present description and in the appended claims, the words "upper", "lower", "above", "below", "horizontal", "vertical" relate to the positioning of the machine during normal operation with the central axis of rotation in vertical position and the cylinder needles with their heads pointing upwards.

[0026] In the present description and in the appended claims, the words "axial", "circumferential", "radial" relate to said central axis.

[0027] Some aspects of the invention are listed below.

[0028] In a first aspect thereof, the present invention relates to a shaped knockover sinker for knitting machines according to claim 1.

[0029] The shaped sinker is configured in particular for manufacturing open-work knitted fabrics.

[0030] The shaped sinker comprises a main body shaped like a horizontal flat bar and designed to be slidingly housed inside a radial groove of a sinker-holding crown of a knitting machine so as to move radially in a controlled manner inside the groove, the main body having a main longitudinal development and extending between a rear portion and a front portion.

[0031] The shaped sinker comprises an upright shaped like a vertical flat element and developing vertically, i.e. rising, from said main body near or on said front portion or in an intermediate position between the rear portion and the front portion.

[0032] Said upright ends on top with an upper portion defining an upper resting plane designed to receive one or more yarns resting thereupon during stitch formation.

[0033] The main body and the upright lie on one lying plane of the shaped sinker.

[0034] The shaped sinker comprises a protrusion rising from said upper portion of the upright and developing on the upright side facing the front portion of the main body.

[0035] The protrusion has on top a sliding plane.

[0036] The protrusion protrudes from the upper portion of the upright so that the sliding plane of the protrusion is placed forward with respect to the upper resting plane of the upright, according to a direction pointing to the front end of the main body.

[0037] The protrusion is offset or inclined laterally with respect to the lying plane of the upright of the shaped sinker, from which it rises.

[0038] The protrusion is configured for loading and stretching an interstitch and arrange it on an adjacent needle of the knitting machine so as to form an open work.

[0039] The sliding plane of the protrusion is at least partially lowered downwards, i.e. towards the main body, with respect to the upper resting plane of the upright.

[0040] The sliding plane of the protrusion is configured for receiving thereon one or more yarns when loading and stretching the interstitch during open work formation.

[0041] In one aspect, the terms "offset laterally" or "in-

clined" means that the protrusion is bent or curved laterally with respect to the upright, in particular with respect to the upper portion of the upright.

[0042] In one aspect, the protrusion is inclined or angled with respect to the upright.

[0043] In one aspect, the protrusion is offset or inclined laterally with respect to the upright so as not to lie on said lying plane of the shaped sinker.

[0044] In one aspect, the sliding plane, lowered with respect to the upper resting plane of the upright, develops in a continuous manner with respect to the upper resting plane, a connecting step being present, downwards, in the transition from the upper resting plane to the sliding plane.

[0045] In one aspect, said step is rounded off or connected so that the transition from the upper resting plane to the sliding plane takes place without discontinuity between the surface of the upper resting plane and the surface of the sliding plane.

[0046] In one aspect, the resting plane is a planar surface, i.e. lying on one, preferably horizontal plane, and the sliding plane is a respective surface at least partially lowered downwards, i.e. towards the main body of the shaped sinker.

[0047] In one aspect, the resting plane is a planar surface parallel to the development of the main body of the shaped sinker.

[0048] The term "lowered" means that the sliding plane of the protrusion is vertically lower than the upper resting plane of the upper portion of the upright, i.e. closer to the main body of the shaped sinker. In one aspect, the protrusion is configured so that, in use, the backward movement of the shaped sinker, carrying a yarn on the resting surface of the upright, causes the passage of the yarn on the protrusion which, being offset laterally, loads and stretches the interstitch so as to arrange it on an adjacent needle, wherein the sliding plane, lowered with respect to the upper resting plane, is configured for counterbalancing or containing the increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion, so as to maintain a correct and/or constant tension of the interstitch when forming the open work.

[0049] In one aspect, the structure, e.g. the respective shape or vertical height, of the resting plane and the sliding plane is configured for counterbalancing the stretching caused by the lateral offset of the protrusion, so as to maintain a correct length of the interstitch when forming the open work.

[0050] In one aspect, the sliding plane lowered with respect to the upper resting plane is configured for reducing the tension and/or pressure exerted by the interstitch, during loading, on the protrusion.

[0051] In one aspect, the sliding plane is lowered with respect of the upper resting plane of an amount of at least 0.1 mm or at least 0.3 mm or at least 0.5 mm or at least 1 mm or at least 2 mm.

[0052] In one aspect, the protrusion has a base, connected to the front side of the upper portion of the upright, from which the protrusion itself develops and protrudes as far as an end tip of the protrusion, opposed to said base. In one aspect, the end tip of the protrusion is free and points to the front part of the shaped sinker.

[0053] In one aspect, the sliding plane of the protrusion, lowered with respect to the upper resting plane of the upright, is made like an inclined plane downwards, developing in a continuous manner from the base of the protrusion to the end tip.

[0054] In one aspect, the inclination of the sliding plane of the protrusion increases from the base to the end tip, so that the lowering of the sliding plane, with respect to the resting plane, is greater towards the end tip.

[0055] In one aspect, said inclination of the sliding plane can be constant or variable along the development of the sliding plane.

[0056] In one aspect, in the sliding plane of the protrusion, made like an inclined plane downwards, the inclination points to the main body, looking at the shaped sinker from a lateral position.

[0057] In one aspect, the lateral offset of the protrusion with respect to the lying plane of the shaped sinker increases from the base to the end tip of the protrusion, i.e. the protrusion gets progressively away along the protrusion itself, from the base to the end tip.

[0058] In one aspect, the protrusion being bent with respect to the lying plane so as to get progressively away from the lying plane itself towards the end tip, the stretching of the interstitch placed on the sliding plane increases progressively as the shaped sinker moves backward, the tension on the yarn increasing at the same time when loading it onto the protrusion, and the downward inclination of the sliding plane is configured for retrieving and counterbalancing gradually the progressive increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion, so as to maintain a correct and/or constant tension of the interstitch while forming the open work.

[0059] In one aspect, the end tip comprises a stopping portion, raised with respect to a lower end of the sliding plane. In one aspect, the stopping portion represents an abutment at the end of the sliding plane, configured for stopping the sliding of the yarn at the end of the protrusion and retaining the yarn and preventing it from detaching from the sliding plane and separating from the protrusion.

[0060] In one aspect, the stopping portion is made like a projection on the end tip of the protrusion, raised with respect to the sliding plane.

[0061] In one aspect, the protrusion may be offset or inclined laterally, with respect to the upright, to the right or to the left with respect to the lying plane of the shaped sinker.

[0062] In one aspect, the protrusion develops, from its base to its end tip, starting from the upright and advancing (though offset laterally) towards the front end of the shaped sinker.

[0063] In one aspect, the shaped sinker comprises a

fin placed behind the upper portion of the upright, i.e. on the upright side opposed to the side from which the protrusion develops.

[0064] In one aspect, the protrusion has on top a supporting plane.

[0065] In one aspect, the fin can be positioned so that the supporting plane of the fin is placed backward with respect to the upper resting plane of the upright, according to a direction towards the rear end of the main body.

[0066] In one aspect, the fin rises from the upper portion of the upright and develops from the upright side facing the rear portion of the main body.

[0067] In one aspect, the fin develops from the upright side opposed to the side from which the protrusion develops (i.e. the fin develops from the rear side of the upright).

[0068] In one aspect, the fin protrudes on the back from the upper portion of the upright so that said supporting plane is placed backward with respect to the upper resting plane of the upright, according to a direction towards the rear end of the main body.

[0069] In one aspect, the fin protrudes on the back from the upright so that the supporting plane of the fin develops in a continuous manner from the resting plane of the upright.

[0070] In one aspect, the supporting plane of the fin and the resting plane of the upright are coplanar and have the same vertical height.

[0071] In one aspect, the supporting plane of the fin and the resting plane of the upright are aligned along a longitudinal direction.

[0072] In one aspect, the supporting plane of the fin and the resting plane of the upright are both horizontal surfaces, preferably parallel to the underlying main body of the shaped sinker.

[0073] In one aspect, the supporting plane of the fin is not lowered with respect to the resting plane of the upright.

[0074] In one aspect, the supporting plane of the fin and the resting plane of the upright globally form a summit surface, preferably horizontal, of the upright and of the whole shaped sinker.

[0075] In one aspect:

- during a knitting operation combining an open work with the use of at least one yarn having at least one low trajectory portion, i.e. passing at a lower height that the height of the resting plane of the upright;
- for making the open work the shaped sinker, in order to transfer the interstitch to one of the adjacent needles, has to perform a backward motion during which the rear side of the upright might push, deviate or interfere with the yarn having said at least one low trajectory portion;
- the fin is configured for supporting, by means of said supporting plane, said at least one yarn having said at least one low trajectory portion, by letting said trajectory pass above the supporting plane of the fin and preventing the rear side of the upright from pushing or interfering with said at least one yarn during the backward shifting movement of the shaped sinker.

[0076] In one aspect, "yarn having a low trajectory" means a yarn, or at least a portion thereof, fed below a yarn guiding element (typically known as a "box" or "throat plate").

[0077] In one aspect, the yarn having at least one low trajectory portion is a yarn destined to take part in a plated operation.

[0078] In one aspect, the yarn having at least one low trajectory portion can be one of the two yarns taking part in a two-yarn plated operation.

[0079] In one aspect, the fin is configured for working, supporting a yarn by means of said supporting plane, when the shaped sinker makes an open work and at the same time adjacent needles make plain or terrycloth knitted structures.

[0080] In one aspect, the fin is offset or inclined laterally with respect to the upright of the shaped sinker, from which it rises.

[0081] In one aspect, the fin is inclined or angled with respect to the upright.

[0082] In one aspect, the fin is offset or inclined laterally with respect to the upright so as not to lie on said lying plane of the shaped sinker.

[0083] In one aspect, the lateral offset of the fin with respect to the lying plane of the shaped sinker increases from the base of the fin to an end tip of the fin, i.e. the fin gets progressively away from the lying plane along the fin itself. In one aspect, the lateral offset of the fin is configured for avoiding interferences with a further sinker placed laterally.

[0084] In one aspect, the fin is offset or inclined laterally, with respect to the upright, in the same offset direction of the protrusion.

[0085] In one aspect, the lateral inclination of the fin has a smaller angle with respect to the respective angle of lateral inclination of the protrusion.

[0086] In an alternative aspect, the fin is coplanar with the upright and lies on said lying plane of the shaped sinker.

[0087] In one aspect, the main body, the upright and the protrusion are made as one piece, thus forming a single-piece shaped sinker.

[0088] In one aspect, the fin is made as one piece with said upright.

[0089] In an alternative embodiment, the fin is a distinct element from the upright, placed behind the upper portion of the upright, so that the supporting plane of the fin is placed backward and aligned with respect to the upper plane of the upright.

[0090] In a possible embodiment, the shaped sinker is completely made as one piece.

[0091] In one aspect, the shaped sinker has in all its parts a basically constant thickness.

[0092] In one aspect, the shaped sinker is wholly made as a flat, thin plate, its length and height being greater than its thickness.

[0093] In one aspect, the sinker comprises a pin shaped as a horizontal flat element developing horizontally, i.e. rising, from an intermediate position of said upright between the upper portion of the upright and a lower coupling point of the upright to the main body, said pin rising from a front side of the upright pointing towards the end of the front portion of the main body.

[0094] In one aspect, the pin lies on said lying plane of the shaped sinker.

[0095] In one aspect, the pin can be configured for cooperating with needles of the knitting machine.

[0096] In one aspect, the protrusion is vertically superimposed above said pin.

[0097] In one aspect, the pin develops parallel to the front portion of the main body, vertically above it.

[0098] In one aspect, the main body, the upright and the pin lie on one lying plane of the shaped sinker.

[0099] The invention relates to a circular knitting machine for manufacturing open-work knitted fabric with at least one shaped sinker according to claim 1.

[0100] The knitting machine comprises:

- a needle-holding cylinder having a plurality of longitudinal grooves arranged around a central axis of the needle-holding cylinder;
- a plurality of needles, each being housed in a respective longitudinal groove;
- at least one yarn feed operatively associated to the needles;
- a crown arranged around the needle-holding cylinder and having a plurality of radial grooves;
- at least one guiding ring operatively associated to the crown, wherein the crown is rotatable with respect to the guiding ring and around the central axis;
- a plurality of knockover sinkers, each housed in one of the radial grooves and radially movable in the respective radial groove, each knockover sinker having a pin configured for cooperating with the needles and a butt engaged with a first guide obtained in the guiding ring and developing around the central axis; wherein the first guide is configured for moving the knockover sinker radially along the respective radial groove when the crown rotates with respect to the guiding ring and around the central axis.

[0101] The machine comprises at least one shaped sinker, according to one or more of the above aspects, placed beside each of the knockover sinkers, wherein the shaped sinker is movable with respect to the respective knockover sinker.

[0102] In one aspect, the shaped sinker has a butt that is or can be engaged with a second guide obtained in the guiding ring and developing around the central axis, wherein the second guide defines a plurality of trajectories for the open-work sinker, wherein the second guide is configured for moving the shaped sinker radially when the crown rotates with respect to the guiding ring and around the central axis.

[0103] In one aspect, the machine comprises at least one selector operatively coupled with said at least one shaped sinker, wherein the selector is movable, preferably oscillating, in a radial plane between a rest position and an operating position, wherein in the operating position the selector acts directly or indirectly upon said at least one shaped sinker so as to deviate the butt of the shaped sinker along a trajectory of the second guide.

[0104] In one aspect, the machine comprises at least one selecting actuator laterally facing the crown, fixed with respect to the guiding ring, that can be engaged under control with the selectors and is configured for causing the selectors to switch from the rest position to the operating position.

[0105] In one aspect, the circular knitting machine is an intarsia machine, i.e. a machine configured for manufacturing fabrics with intarsia motifs (intarsia machine or argyle machine).

[0106] In one aspect, the circular intarsia knitting machine comprises at least two yarn feeds, each one configured for working with a respective group of needles arranged along an arc of circle by means of an alternating rotary motion of the needles around the central axis.

[0107] In one aspect, said at least two feeds cooperate to form every knitted course by rotating in both directions. In one aspect, at least one more is operatively connected to the needle-holding cylinder and to the crown so as to make them rotate around the central axis.

[0108] In one aspect, cams and/or other types of devices are arranged around the needle-holding cylinder so as to turn the rotational motion of the needle-holding cylinder into an axial motion of the needles.

[0109] In one aspect, the machine comprises a plurality of yarn feeds, preferably one, more preferably two or four thereof.

[0110] In one aspect, the machine comprises a plurality of selecting actuators, preferably each one placed on a yarn feed.

[0111] In one aspect, said at least one shaped sinker, according to one or more of the above aspects, comprises a right shaped sinker and a left shaped sinker, arranged on opposed sides of the respective knockover sinker. In one aspect:

- the right shaped sinker has its protrusion offset laterally to the right with respect to the upright;
- the left shaped sinker has its protrusion offset laterally to left the with respect to the upright.

[0112] In one aspect, the right shaped sinker and the left shaped sinker exhibit respective protrusions that are laterally offset towards opposed sides of said knockover sinker and preferably placed above the respective knockover sinker.

[0113] In one aspect, the protrusions are configured

for loading and stretching the interstitch and arrange it on two adjacent needles placed on opposed sides of the respective knockover sinker and form the open work. The use of two shaped sinkers for every knockover sinker allows to make wider, better defined open works, thus obtaining a balanced knitted fabric without twists or folds.

[0114] In one aspect, said at least one shaped sinker is housed in one of the radial grooves together with the respective knockover sinker.

[0115] In one aspect, a first assembly made up of the knockover sinker and by the shaped sinker, according to one or more of the above aspects, or by the right shaped sinker and by the left shaped sinker, is housed in one of the radial grooves. The radial groove houses the whole assembly so as to reduce the overall size.

[0116] In one aspect, the shaped sinker is preferably made of metal.

[0117] In one aspect, the right shaped sinker and the left shaped sinker exhibit respective protrusions that are laterally offset in opposed directions with respect to their upright and to their main body.

[0118] In one aspect, the butt of the shaped sinker is flat and extends vertically from the main body.

[0119] In one aspect, the butt of the shaped sinker is positioned on a radially outer end of the main body.

[0120] In one aspect, the butt of the shaped sinker points upwards.

[0121] In one aspect, the selector acts indirectly upon an end of said at least one shaped sinker that is radially opposed to the protrusion.

[0122] In one aspect, each selector acts indirectly upon the right shaped sinker and/or on the left shaped sinker.

[0123] In one aspect, the selector is a flat element, preferably made of metal.

[0124] In one aspect, the selector exhibits a base portion configured for oscillating around an axis tangent to a horizontal circumference with its center in the central axis.

[0125] In one aspect, the selector exhibits an abutment portion at a distance from the base portion, pointing towards the central axis and configured for directly or indirectly acting upon the shaped sinker.

[0126] In one aspect, the selector has at least one tooth radially pointing outwards, i.e. on the side opposed to the central axis, and configured for interacting with the selecting actuator.

[0127] In one aspect, the guiding ring comprises a circular track extending around the central axis.

[0128] In one aspect, each selector, preferably the base portion of each selector, is slidingly engaged into the circular track so as to rotate together with said at least one shaped sinker.

[0129] In one aspect, the knockover sinker is a flat element, preferably made of metal.

[0130] In one aspect, the knockover sinker comprises a main body and the respective pin is arranged above the main body.

[0131] In one aspect, the main body lies basically in a plane.

[0132] In one aspect, the main body comprises a horizontal flat bar and a vertical flat upright developing from the horizontal flat bar, wherein the pin is arranged on an upper end of the flat upright.

[0133] In one aspect, the butt of the knockover sinker is flat and extends vertically from the flat bar.

[0134] In one aspect, the butt of the knockover sinker is placed at a distance from a radially outer end of the main body of the knockover sinker.

[0135] In one aspect, the butt of the knockover sinker points upwards.

[0136] In one aspect, when the knockover sinker is associated to the shaped sinker, or to the right shaped sinker and to the left shaped sinker, in the respective groove, the butt of the knockover sinker is radially placed between the butt and the protrusion of the shaped sinker.

[0137] In one aspect, each knockover sinker is operatively associated to a respective selector.

[0138] In one aspect, the selector of the knockover sinker is movable, preferably oscillating, in a radial plane between a rest position and an operating position.

[0139] In one aspect, in the operating position the selector of the knockover sinker acts directly or indirectly upon the knockover sinker so as to deviate the butt of the knockover sinker along a trajectory of the first guide.

[0140] In one aspect, the knockover sinker further comprises a spring arranged above the pin and configured with making different stitches, preferably terry stitches.

[0141] In one aspect, the machine comprises a plurality of pushing units, each associated to a selector and to said at least one shaped sinker.

[0142] In one aspect, in the operating position the selector rests against the pushing unit and the pushing unit is configured for pushing against said at least one shaped sinker. The use of the pushing units, which are operatively placed between the selectors and the shaped sinkers, allows the selectors to indirectly act upon the shaped sinkers.

[0143] In one aspect, the machine comprises a plurality of pushing units, each associated to a selector of a knockover sinker.

[0144] In one aspect, the pushing unit is a flat element, preferably made of metal.

[0145] In one aspect, the guiding ring comprises a third guide extending around the central axis and defining a plurality of trajectories.

[0146] In one aspect, each pushing unit exhibits a butt that is or can be engaged with the third guide.

[0147] In one aspect, the pushing unit comprises a horizontal flat bar, wherein the butt is positioned on a radially outer end of the horizontal flat bar.

[0148] In one aspect, the butt of the pushing unit is flat and extends vertically from the horizontal flat bar.

[0149] In one aspect, the butt of the pushing unit points upwards.

[0150] In one aspect, the pushing unit has an abutment surface facing the central axis and configured for resting

against the respective shaped sinker or knockover sinker.

[0151] In one aspect, the pushing unit is housed in the radial groove together with the respective knockover sinker and with said at least one shaped sinker.

[0152] In one aspect, a first assembly made up of the knockover sinker, of the right shaped sinker, of the left shaped sinker and of the respective pushing units (one for the right shaped sinker and one for the left shaped sinker or only one acting both against the right shaped sinker and against the left shaped sinker) is housed in one of the radial grooves.

[0153] In one aspect, the abutment surface of the pushing unit is placed near the butt of said pushing unit.

[0154] In one aspect, said abutment portion of the respective selector faces a radially outer end of the pushing unit, preferably of the horizontal flat bar of said pushing unit.

[0155] In one aspect, the abutment portion of the selector is sized so as to rest both against the pushing unit associated to the right shaped sinker and against the pushing unit associated to the left shapes sinker, preferably simultaneously or almost simultaneously.

[0156] In one aspect, a part of the pushing unit, preferably the horizontal flat bar of the pushing unit, is placed below the respective shaped sinker and/or knockover sinker, preferably of the horizontal flat bar of said shaped sinker and/or knockover sinker.

[0157] In one aspect, said at least one selecting actuator comprises at least one selecting lever movable between a first position, in which it lies at a distance from the selectors, and a second position, in which it interferes with the selectors moving in front of the selecting actuator when the crown rotates with respect to the guiding ring and around the central axis, so as to move the selectors from the rest position to the operating position.

[0158] In one aspect, the selecting actuator is of magnetic or piezoelectric type.

[0159] In a further aspect thereof, the present invention relates to a second assembly comprising a group of metal flat parts which can slide radially in a respective radial groove as well as one with respect to the other with at least one shaped sinker according to claim 1.

[0160] In one aspect, the second assembly comprises an interstitch-knockover sinker, a right shaped sinker, a left shaped sinker, two pushing units, one associated to the right shaped sinker and the other one to the left shaped sinker, and a selector for each of the pushing units.

[0161] In one aspect, one out of two grooves of the plurality of radial grooves houses a respective second assembly. In one aspect, said plurality of radial grooves includes a continuous alternation of a first and a second assembly, along the whole circumferential development of the crown.

[0162] In one aspect, the interstitch-knockover sinker comprises a respective main body shaped as a horizontal flat bar oriented as the radial groove, i.e. along a radial direction, and a vertical flat upright developing from the horizontal flat bar.

[0163] In one aspect, a pin develops from a front side of the vertical flat upright towards the central axis when the second assembly is properly mounted to the machine.

[0164] In one aspect, the interstitch-knockover sinker further comprises a vertical tooth developing above said upright. In one aspect, the tooth develops rising from the top of the upright.

[0165] In one aspect, the tooth has a front surface configured for retaining, or "knocking over" technically speaking, the interstitch loaded and stretched by the protrusions of the right shaped sinker and of the left shaped sinker.

[0166] In one aspect, the tooth is configured for retaining, by means of the front surface, the interstitch carried by the protrusions of the right shaped sinker and of the left shaped sinker during their backward motion made so as to place the interstitch one or more adjacent needles so as to form an open work.

[0167] In one aspect, the front surface of the tooth is configured from preventing, during the backward motion of the right and left shaped sinkers so as to form an open work, the interstitch from being drawn radially backwards, towards the outside of the crown of the sinkers.

[0168] In one aspect, the front surface of the tooth is configured for pushing forward the interstitch on the protrusions, during the backward motion of the right and left shaped sinkers so as to form an open work, so that the interstitch is spread at its maximum on the protrusions themselves.

[0169] In one aspect, the front surface of the tooth is configured for pushing forward the interstitch on the protrusions, during a forward motion of the interstitch-knockover sinker (towards the central axis).

[0170] In one aspect, the front surface points towards the central axis.

[0171] In one aspect, the front surface is basically vertical, i.e. it develops parallel to the central axis.

[0172] In one aspect, the tooth has a rear surface, opposed to the front surface.

[0173] In one aspect, the rear surface points towards the outside to the crown of the sinkers.

[0174] In one aspect, the tooth develops starting (below) from a base integral with the top of the upright, and ends above with a free end (or tip).

[0175] In one aspect, the tooth is shaped so that, with the second assembly positioned in the respective groove, it rises above from the upper resting plane of the upright of each of the two right and left shaped sinkers belonging to the same assembly and placed on the sides of the interstitch-knockover sinker.

[0176] In one aspect, the rear surface is rounded off or inclined so as to reduce the overall rear size of the tooth, preferably to avoid contacts with further elements of the crown of the sinkers, e.g. control cams.

[0177] In one aspect, the tooth develops above the up-

right so as to be higher than the pin.

[0178] In one aspect, the interstitch-knockover sinker comprises a flat butt extending vertically upwards from the horizontal flat bar and at a distance from a radially outer end (with respect to the central axis) of the horizontal flat bar.

[0179] In one aspect, the interstitch-knockover sinker is made up of a single flat metal part, e.g. a cut part.

[0180] In one aspect, the first assembly and the second assembly share the same right shaped sinker and the same left shaped sinker, and differ in the central element of the assembly, which is the knockover sinker in the first assembly and the interstitch-knockover sinker in the second assembly.

[0181] In one aspect, in the second assembly the right shaped sinker and the left shaped sinker have their respective protrusions laterally displaced in opposed directions with respect to their main body and with respect to the interstitch-knockover sinker placed between them.

[0182] In an aspect thereof, the present invention relates to an assembly of flat parts for a circular knitting machine, the assembly comprising:

- a knockover sinker or an interstitch-knockover sinker, provided with a pin configured for cooperating with the needles of a knitting machine and with a butt designed to cooperated with suitable driving means of the knitting machine so as to cause a shifting movement of the knockover sinker or interstitch-knockover sinker, in a radial direction with respect to a central axis of the knitting machine;
- at least one shaped sinker according to one or more of the above aspects, the shaped sinker being movable with respect to the knockover sinker or interstitch-knockover sinker;

  wherein the assembly is configured for being housed in a respective radial groove of a crown arranged around a needle-holding cylinder of the knitting machine, so that said at least one shaped sinker lies beside said knockover sinker or interstitch-knockover sinker,
  said at least one shaped sinker and said knockover sinker or interstitch-knockover sinker being movable radially, in an independent manner, in the respective radial groove.

[0183] In one aspect, the assembly comprises a group of flat metal parts designed to slide radially in a respective radial groove and one with respect to the other, too, the assembly comprising an interstitch-knockover sinker, a right shaped sinker and a left shaped sinker.

[0184] In an independent aspect thereof, the present invention also relates to a method for manufacturing knitted fabric using a machine according to one or more of the preceding aspects.

[0185] In an independent aspect thereof, the present invention also relates to a use, in a knitting machine, of a shaped sinker according to one or more of the preceding aspects, for manufacturing open words in a knitted fabric. Further characteristics and advantages shall be more evident from the detailed description of a preferred embodiment of a knockover sinker, known as "shaped sinker", and of a circular knitting machine, in particular for manufacturing open-work knitted fabric, comprising such a sinker, according to the present invention.

Description of the drawings

[0186] 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 view of a possible embodiment of a shaped sinker, for knitting machines, according to the present invention;
- Figure 2 shows a side view of the shaped sinker of Figure 1;
- Figure 3 shows a plan view, from above, of the shaped sinker of Figure 1;
- Figure 4 shows a magnified view of a portion of the shaped sinker of Figure 1;
- Figure 5 is a magnified view of a portion of the side view of Figure 2;
- Figure 6 shows an exemplary, perspective view of a right shaped sinker and of a left shaped sinker, according to the present invention, placed one beside the other;
- Figure 7 shows a plan view, from above, of the shaped sinkers of Figure 6;
- Figure 8 shows a portion of a circular knitting machine according to the present invention with some parts removed for better showing others;
- Figure 9 shows a different, partially sectioned view of the portion of Figure 8;
- Figure 10 shows an exploded view of a first assembly of elements belonging to the machine as in the preceding figures;
- Figure 11 shows the assembly of Figure 10 with the elements associated to one another;
- Figure 12 shows an exploded view of a second assembly of elements belonging to the machine as in the preceding figures, which can be seen in Figure 9;
- Figure 13 shows the assembly of Figure 12 with the elements associated to one another.

Detailed description

[0187] With reference to the figures mentioned, and in particular to Figures 8 and 9, the numeral 100 globally designates a portion of a knitting head of a circular knitting machine according to the present invention. The circular knitting machine shown is a machine configured for manufacturing fabrics with intarsia motifs (intarsia machine or argyle machine). The circular knitting machine com-

prises a basement, not shown since it is of known type, constituting the supporting structure of the machine, and said knitting head 100 is mounted onto the basement.

[0188] The knitting head 100 is equipped with a needle-holding cylinder 101, with a plurality of needles N mounted onto the needle-holding cylinder 101, and with control means, not shown, apt to selectively actuate the needles N so as to enable the production of a knitted fabric. The needle-holding cylinder 101 is usually mounted in vertical position onto the basement, with the needles N arranged vertically and protruding beyond an upper edge of the needle-holding cylinder 101.

[0189] As is known, the needle-holding cylinder 101 has a plurality of longitudinal grooves obtained on a radially outer surface of the needle-holding cylinder 101. The longitudinal grooves are arranged around a central axis X (vertical) of the needle-holding cylinder 101 and develop parallel to said central axis X. Each longitudinal groove houses a respective needle N and a respective drive chain (comprising a group of flat parts). Actuating cams are arranged as a casing around the needle-holding cylinder 101 and lie facing the radially outer surface of the cylinder 101 and thus the longitudinal grooves and the drive chains. These actuating cams are defined e.g. by plates and/or grooves arranged on an inner surface of the casing.

[0190] In one embodiment, the casing of the actuating cams is basically stationary, whereas the needle-holding cylinder 101 rotates (with a continuous or alternating motion in both directions) around the central axis X by means of a suitable motor, so as to generate a relative rotational motion between the drive chains and the actuating cams and turn the rotational motion of the needle-holding cylinder 101 into an axial motion of the needles N in order to manufacture knitted fabric by means of the said needles N.

[0191] The machine further comprises a crown 102 arranged around the needle-holding cylinder 101 and having a plurality of radial grooves 103 that are open on a radially inner edge of the crown 102, i.e. towards the central axis X. The crown 102 is moved in rotation around the central axis X together with the needle-holding cylinder 101 (since it is integral therewith), e.g. by means of the same motor.

[0192] Suitable devices, not shown, feed the yarns to be knitted on one or more yarn feeding points (known as feeds) usually arranged above the needle-holding cylinder 101. The circular intarsia knitting machine shown comprises four yarn feeds, each one configured for working with a respective group of needles N arranged along an arc of circle (e.g. a 90° arc) by means of an alternating rotary motion of the needles N around the central axis X. The four feeds cooperate to form every knitted course by rotating in both directions.

[0193] The circular knitting machine will be described further on; a shaped sinker according to the present invention is now described in detail.

[0194] With reference to the figures mentioned, and in particular to Figures 1-7, the numeral 1 globally designates a shaped sinker for knitting machines, according to the present invention.

[0195] First of all, the shaped sinker 1 is configured in particular for manufacturing open-work knitted fabrics.

[0196] As shown by way of example in the figures, the shaped sinker 1 comprises a main body 2 shaped like a horizontal flat bar and designed to be slidingly housed inside a radial groove 103 of the sinker-holding crown 102 of the knitting machine so as to move radially in a controlled manner inside the groove.

[0197] The main body 2 has a main longitudinal development and extends between a rear portion (or end) 2A and a front portion (or end) 2B.

[0198] The shaped sinker comprises an upright 3 shaped like a vertical flat element and developing vertically, i.e. rising, from the main body 2 near or on the front portion 2B. As an alternative, the upright may develop vertically in an intermediate position between the rear portion 2A and the front portion 2B.

[0199] The upright 3 ends on top with an upper portion 4 defining an upper resting plane 30 designed to receive one or more yarns resting thereupon during stitch formation.

[0200] The main body 2 and the upright 3 preferably lie on one lying plane G of the shaped sinker. The shaped sinker 1 further comprises a protrusion 6 rising from the upper portion 4 of the upright 3 and developing on the upright 3 side facing the front portion 2B of the main body 2 (i.e. on a front side 3A of the upright).

[0201] The protrusion 6 has on top a sliding plane 60.

[0202] The protrusion 6 protrudes from the upper portion 4 of the upright 3 so that the sliding plane 60 of the protrusion 6 is placed forward with respect to the upper resting plane 30 of the upright 3, according to a direction pointing to the front end 2B of the main body 2.

[0203] The protrusion 6 is offset or inclined laterally with respect to the upright 3 of the shaped sinker 1, from which it rises.

[0204] The protrusion 6 is configured for loading and stretching an interstitch and arrange it on an adjacent needle of the knitting machine so as to form an open work.

[0205] In one aspect, a needle is present between each pair of adjacent grooves: in each groove the shaped sinker are configured, thanks to their protrusion, for stretching and expanding the interstitch so as to move it to the needles close to the groove, i.e. the needles placed on the sides of the groove (one on the right and one on the left). Thus the adjacent needle picks up the interstitch transferred from the shaped sinker and an open work in the fabric can be manufactured.

[0206] The sliding plane 60 of the protrusion 6 is at least partially lowerec downwards, i.e. towards the main body 2, with respect to the upper resting plane 30 of the upright 3.

[0207] The sliding plane 60 of the protrusion 6 is configured for receiving thereon one or more yarns when loading and stretching the interstitch during open work

formation.

[0208] In the framework of the present invention, the terms "offset laterally" or "inclined" means that the protrusion 6 is bent or curved laterally with respect to the upright 3, in particular with respect to the upper portion 4 of the upright 3.

[0209] In one aspect, the protrusion is inclined or angled with respect to the upright.

[0210] The protrusion 6 is offset or inclined laterally with respect to the upright 3 so as not to lie on the aforesaid lying plane G of the shaped sinker.

[0211] Preferably, the sliding plane 60, lowered with respect to the upper resting plane 30 of the upright 3, develops in a continuous manner with respect to the upper resting plane 30, a connecting step 61 being present, downwards, in the transition from the upper resting plane 30 to the sliding plane 60.

[0212] Preferably, the step 61 is rounded off or connected so that the transition from the upper resting plane 30 to the sliding plane 60 takes place without discontinuity between the surface of the upper resting plane and the surface of the sliding plane.

[0213] Thus the yarn, during the radial translation of the shaped sinker 1 in the respective groove 103, may move from the upper resting plane 30 to the sliding plane 60 of the protrusion 6 sliding on these planes, maintaining a continuous contact with the surface of the upper resting plane and the surface of the sliding plane.

[0214] Preferably, the upper resting plane 30 is a planar surface, i.e. lying on one, preferably horizontal plane, and the sliding plane 60 is a respective surface at least partially lowered downwards, i.e. towards the main body 2 of the shaped sinker 1.

[0215] Preferably, the resting plane 30 is a planar surface parallel to the development of the main body 2 of the shaped sinker 1.

[0216] The term "lowered" means that the sliding plane 60 of the protrusion 6 is vertically lower than the upper resting plane 30 of the upper portion 4 of the upright 3, i.e. closer to the main body 2 of the shaped sinker 1.

[0217] Preferably, the protrusion 6 is configured so that, in use, the backward movement of the shaped sinker 1, carrying a yarn on the resting surface 30 of the upright 3, causes the passage of the yarn on the protrusion 6 which, being offset laterally, loads and stretches the interstitch so as to arrange it on an adjacent needle. The sliding plane 60, lowered with respect to the upper resting plane 30, is configured for counterbalancing/containing the increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion 6, so as to maintain a correct and/or constant tension of the interstitch when forming the open work.

[0218] Preferably, the structure, e.g. the respective shape or vertical height, of the resting plane 30 and the sliding plane 60 is configured for counterbalancing the stretching caused by the lateral offset of the protrusion 6, so as to maintain a correct length of the interstitch when forming the open work.

[0219] Preferably, the sliding plane 60 lowered with respect to the upper resting plane 30 is configured for reducing the tension and/or pressure exerted by the interstitch, during loading, on the protrusion 6.

[0220] Preferably, the sliding plane 60 is lowered with respect of the upper resting plane 30 of an amount of at least 0.1 mm or at least 0.3 mm or at least 0.5 mm or at least 1 mm or at least 2 mm.

[0221] Preferably, the protrusion 6 has a base 62, connected to the front side 3A of the upper portion of the upright 3, from which the protrusion 6 itself develops and protrudes as far as an end tip 63 of the protrusion, opposed to said base 62.

[0222] Preferably, the end tip 63 of the protrusion is free and points to the front part 2B of the shaped sinker 1.

[0223] Preferably, the offset or inclination of the protrusion 6 with respect to the upright 3 (i.e. with respect to the lying plane G) is obtained by bending the protrusion itself on its base 62 so that the protrusion forms an angle with the upright. The bend at the base of the protrusion makes the whole protrusion advancing outside with respect to the upright, i.e. with an angle with respect to the lying plane G (see e.g. Figure 3).

[0224] Preferably, the sliding plane 60 of the protrusion 6, lowered with respect to the upper resting plane 30 of the upright 3, is made like an inclined plane 64 downwards, developing in a continuous manner from the base 62 of the protrusion to the end tip 63.

[0225] Preferably, the inclination of the sliding plane 60 of the protrusion 6 increases from the base 62 to the end tip 63, so that the lowering of the sliding plane, with respect to the resting plane 30, is greater towards the end tip 63.

[0226] Preferably, the aforesaid inclination of the sliding plane 60 can be constant or variable along the development of the sliding plane itself.

[0227] Preferably, in the sliding plane 60 of the protrusion 6, made like an inclined plane 64 downwards, the inclination points to the main body 2, looking at the shaped sinker from a lateral position (like e.g. in Figures 2 and 5). Preferably, the lateral offset of the protrusion 6 with respect to the lying plane G of the shaped sinker 1 increases from the base 62 to the end tip 63 of the protrusion, i.e. the protrusion 6 gets progressively away along the protrusion 6 itself, from the base to the end tip.

[0228] Preferably, the protrusion 6 being bent with respect to the lying plane G so as to get progressively away from the lying plane itself towards the end tip 63, the stretching of the interstitch placed on the sliding plane 60 increases progressively as the shaped sinker moves backward, the tension on the yarn increasing at the same time when loading it onto the protrusion, and the downward inclination of the sliding plane 60 is configured for retrieving and counterbalancing gradually the progressive increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion 6, so as to maintain a correct and/or constant tension of the interstitch while forming the open work.

[0229] In other words, as the protrusion 6, during the backward motion of the shaped sinker 1, expands the interstitch and progressively increases the tension on the yarn, the inclined plane 64 of the protrusion 6 counterbalances the increase in tension that would be introduced without a lowering or inclination of the sliding plane 60 of the protrusion.

[0230] Preferably, the end tip 63 comprises a stopping portion 65, raised with respect to a lower end of the sliding plane 60.

[0231] Preferably, the stopping portion 65 represents a mechanical abutment at the end of the sliding plane 60, configured for stopping the sliding of the yarn at the end of the protrusion 6 and retaining the yarn and preventing it from detaching from the sliding plane and separating from the protrusion.

[0232] Preferably, the stopping portion 65 is made like a projection on the end tip 63 of the protrusion, raised with respect to the sliding plane 60.

[0233] Preferably, the protrusion 6 may be offset or inclined laterally, with respect to the upright, to the right or to the left with respect to the lying plane G of the shaped sinker 1.

[0234] Traditionally, looking at the lying plane G in a direction pointing towards the front end 2B of the shaped sinker 1, a left and a right side of the horizontal main boy and of the vertical upright can be defined, the protrusion being offset or inclined laterally to the right when it develops advancing from the right side, or vice versa being offset or inclined laterally to the left when it develops advancing from the left side.

[0235] The shaped sinker shown by way of example in Figures 1-5 has its protrusion 6 offset or inclined to the right. Conversely, Figures 6 and 7 show a pair of shaped sinkers 1: in each figure, the highest sinker has its protrusion offset or inclined to the right, whereas the lowest sinker has its protrusion offset or inclined to the left.

[0236] "Right" and "left" shaped sinkers will be disclosed later in the present description.

[0237] Preferably, the protrusion 6 develops, from its base 62 to its end tip 63, starting from the upright 3 and advancing (though offset laterally) towards the front end 2B of the shaped sinker 1.

[0238] Preferably, the end tip 63 of the protrusion 6 or the stopping portion 65 is bent with respect to the sliding plane 60 in a direction approaching the lying plane G of the shaped sinker. In other words, the end tip may be inclined in an opposed direction with respect to the inclination of the protrusion at the base. In this case the protrusion 6 has a first bend, towards the outside of the sinker, at the base 62, and a second bend, towards the lying plane, at or short before the end tip 63. In this embodiment, as shown by way of example in the figures (see in particular Figure 3), the protrusion 6 globally takes a plan shape slightly similar to a Z", i.e. with a double bend.

[0239] According to the preferred embodiment shown in the figures, the shaped sinker 1 comprises a fin 70 placed behind the upper portion 4 of the upright 3, i.e. on the upright 3 side opposed to the side from which the protrusion develops. The fin 70 has on top a supporting plane 71.

[0240] Preferably, the fin 70 can be positioned so that the supporting plane 71 of the fin is placed backward with respect to the upper resting plane 30 of the upright 3, according to a direction towards the rear end 2A of the main body 2.

[0241] Preferably, the fin 70 of the shaped sinker 1 rises from the upper portion 4 of the upright 3 and develops from the upright side facing the rear portion 2A of the main body 2.

[0242] Preferably, the fin 70 develops from the upright 3 side opposed to the side from which the protrusion develops, i.e. the fin develops from a rear side 3B of the upright 3, opposed to the front side 3A.

[0243] Preferably, the fin 70 protrudes on the back from the upper portion 4 of the upright 3 so that the supporting plane 71 is placed backward with respect to the upper resting plane 30 of the upright 3, according to a direction towards the rear end 2A of the main body 2.

[0244] Preferably, the fin 70 protrudes on the back from the upright 3 so that the supporting plane 71 of the fin develops in a continuous manner from the resting plane 30 of the upright 3.

[0245] Preferably, the supporting plane 71 of the fin 70 and the resting plane 30 of the upright 3 are coplanar and have the same vertical height.

[0246] Preferably, the supporting plane 71 of the fin 70 and the resting plane 30 of the upright 3 are aligned along a longitudinal direction.

[0247] Preferably, the supporting plane 71 of the fin 70 and the resting plane 30 of the upright 3 are both horizontal surfaces, preferably parallel to the underlying main body 2 of the shaped sinker 1.

[0248] Preferably, the sliding plane 71 of the fin 70 is not lowered with respect to the resting plane 30 of the upright 3. Preferably, the supporting plane 71 of the fin and the resting plane 30 of the upright globally form a summit surface, preferably horizontal, of the upright and of the whole shaped sinker.

[0249] According to the present invention, a shaped sinker 1 in use:

- during a knitting operation combining an open work with the use of at least one yarn having at least one of its portions with a low trajectory, i.e. passing at a lower height that the height of the resting plane 30 of the upright;
- for making the open work the shaped sinker 1, in order to transfer the interstitch to one of the adjacent needles, has to perform a backward motion during which the rear side 3B of the upright 3 might push, deviate or interfere with the yarn portion having a low trajectory;
- the fin 70 is configured for supporting, by means of the supporting plane 71, the aforesaid at least one yarn portion having a low trajectory, by letting said

trajectory pass above the supporting plane 71 of the fin and preventing the rear side 3B of the upright 3 from pushing or interfering with said at least one yarn portion during the backward shifting movement of the shaped sinker 1.

[0250] In the framework of the present invention, "yarn having a low trajectory" means a yarn, or at least a portion thereof, fed below a yarn guiding element (typically known as a "box" or "*throat plate*").

[0251] It should be noticed that a yarn fed below the guiding element is a yarn with at least one of its portions having a trajectory passing below said element, although the thread guide feeding it may also be placed above said element.

[0252] Preferably, the yarn having at least one portion with a low trajectory is a yarn destined to take part in a plated operation.

[0253] The yarn having at least one portion with a low trajectory can be one of the two yarns taking part in a two-yarn plated operation.

[0254] Preferably, the fin 70 is configured for working, supporting a yarn by means of the supporting plane 71, when the shaped sinker 1 makes an open work and at the same time adjacent needles make plain or terrycloth knitted structures.

[0255] It should be noticed that "fin" means a portion of the shaped sinker 1 protruding on the back from the upper portion 4 of the upright 3 or positioned behind the upper portion of the upright.

[0256] In a possible embodiment, as shown in the figures, the fin 70 can be offset or inclined laterally with respect to the upright 3 of the shaped sinker, from which it rises.

[0257] Preferably, the fin 70 is inclined or angled with respect to the upright.

[0258] Preferably, the fin 70 is offset or inclined laterally with respect to the upright 3 so as not to lie on the lying plane G of the shaped sinker 1.

[0259] Preferably, the lateral offset of the fin 70 with respect to the lying plane G of the shaped sinker increases from the base of the fin to an end tip of the fin, i.e. the fin gets progressively away from the lying plane G along the fin itself.

[0260] Preferably, the lateral offset of the fin 70 is configured for avoiding interferences with a further sinker placed laterally.

[0261] Preferably, the fin 70 is offset or inclined laterally, with respect to the upright 3, in the same offset direction of the protrusion 6 of the same shaped sinker.

[0262] In other words, the lateral offsets of the protrusion 6 and of the fin 70 with respect to upright 3 correspond; if the protrusion is inclined to the right, the fin is inclined to the right, too, and vice versa if the protrusion is inclined to the left, the fin is inclined to the left, too.

[0263] Preferably, the lateral inclination of the fin 70 has a smaller angle with respect to the respective angle of lateral inclination of the protrusion 6. In other words, the protrusion 6 is preferably more inclined laterally, with respect to the upright 3, than the fin 70.

[0264] As an alternative, the fin can be coplanar with the upright as well as lie on the lying plane of the shaped sinker. Preferably, the main body 2, the upright 3 and the protrusion 6 are made as one piece, thus forming a single-piece shaped sinker.

[0265] Preferably, as shown in the figures, the fin 70 is made as one piece with the upright 3.

[0266] Preferably, the shaped plate 1 is made completely as one piece.

[0267] In a possible alternative embodiment (not shown), the fin can be a distinct element from the upright, placed behind the upper portion of the upright, so that the supporting plane of the fin is placed backward and aligned with respect to the upper plane of the upright.

[0268] Should the fin be a distinct element from the upright (and in general from the body of the shaped sinker), it can be moved through suitable means independently from the main body and the upright of the sinker, e.g. so as to be positioned behind the upright when the supporting plane has to be arranged behind the upper resting plane.

[0269] Preferably, the shaped sinker 1 has in all its parts a basically constant thickness.

[0270] Preferably, the shaped sinker 1 is wholly made as a flat, thin plate, its length and height being greater than its thickness.

[0271] The shaped sinker 1 can be made up of a single flat metal part, e.g. a cut, stamped and/or bent part. Preferably, the sinker comprises a pin 80 shaped as a horizontal flat element developing horizontally, i.e. rising, from an intermediate position of the upright 3 between the upper portion 4 of the upright 3 and a lower coupling point of the upright to the main body 2.

[0272] The pin rises from the front side 3A of the upright 3 pointing towards the end of the front portion 2B of the main body 2.

[0273] Preferably, the pin 80 lies on said lying plane G of the shaped sinker.

[0274] Preferably, the protrusion 6 is vertically superimposed above the pin 80.

[0275] Preferably, the pin 80 develops parallel to the front portion 2B of the main body 2, vertically above it. Preferably, the main body, the upright and the pin lie on one lying plane G of the shaped sinker.

[0276] The use of the shaped sinkers 1 according to the present invention in a circular knitting machine will now be described. Let us observe Figures 8-11.

[0277] As stated above, the knitting machine comprises a knitting head 100, a needle-holding cylinder 101, a plurality of needles N and a crown 102 provided with a plurality of radial grooved 103.

[0278] According to a possible embodiment of the present invention, one or more of the radial grooves 103 houses a first assembly A made up of a plurality of metal flat parts that can slide radially in the respective radial groove 103 and also one with respect to the other. This

first assembly A, better shown in Figures 10 and 11, comprises a knockover sinker 7, a right shaped sinker 8, a left shaped sinker 9, two pushing units 10, one associated to the right shaped sinker 8 and the other one to the left shaped sinker 9, and a selector 11 for each of the pushing units 10.

[0279] The knockover sinker 7 comprises a main body shaped as a horizontal flat bar 12 oriented as the groove 103, i.e. along a radial direction, and a vertical flat upright developing from the horizontal flat bar 12. A pin 13 having a per se known shape is arranged on an upper end of the vertical flat upright and faces the central axis X when the assembly is properly mounted to the machine. The knockover sinker 7 further comprises a flat butt 14 extending vertically upwards from the horizontal flat bar 12 and at a distance from a radially outer end (with respect to the central axis X) of the horizontal flat bar 12. The knockover sinker 7 is made up of a single flat metal part, e.g. a cut part.

[0280] As disclosed above, the right shaped sinker 8 and the left shaped sinker 9 are both embodiments of a shaped sinker 1 according to the present invention. In further detail:

- the right shaped sinker 8 has its protrusion 6 offset laterally to the right with respect to its upright 3;
- the left shaped sinker 9 has its protrusion 6 offset laterally to the left with respect to its upright 3.

[0281] The right shaped sinker 8 comprises a main body shaped as a horizontal flat bar 15 and a vertical flat upright developing from the horizontal flat bar 15. The protrusion 6 of the right shaped sinker 8 extends like a sort of arm, when the first assembly A is properly mounted to the machine, towards the central axis X and is offset laterally with respect to the lying plane of the respective main body. The right shaped sinker 8 further comprises a flat butt 17 extending vertically upwards from the horizontal flat bar 15 and is placed near a radially outer end (with respect to the central axis X) of the horizontal flat bar 15. The right shaped sinker 8 is made up of a single flat metal part, e.g. a cut, stamped and/or bent part.

[0282] The left shaped sinker 9 comprises the same elements as the right shaped sinker 8 and is structurally identical with or corresponding to the right shaped sinker 8, except for the fact that the respective protrusion 6 is offset/displaced, with respect to its main body, to the opposed side. The right shaped sinker 8 and the left shaped sinker 9 therefore have respective protrusions 6 that are laterally displaced in opposed directions with respect to its main body and with respect to the knockover sinker 7 placed between them.

[0283] When the first assembly A is properly mounted in the respective groove 103, the right shaped sinker 8 and the left shaped sinker 9 are arranged on opposed sides of the respective knockover sinker 7 (Figure 11). The right shaped sinker 8 and the left shaped sinker 9 exhibit respective protrusions 6 that are laterally offset towards opposed sides of said knockover sinker 7 and placed above the pin 13 of the respective knockover sinker 7. Moreover, the butt 14 of the knockover sinker 7 is radially placed between the butt 17 and the protrusion 6 of the respective shaped sinkers 8, 9.

[0284] Preferably, the two pushing units 10 of the first assembly A are identical with one another. Each of the pushing units 10 comprises a horizontal flat bar 18 and a butt 19 that is flat, is placed on a radially outer end, with respect to the central axis X, of the horizontal flat bar 18 and extends vertically upwards. The pushing unit 10 further has an abutment surface 20 facing the central axis X and configured for resting against the respective shaped sinker 8, 9. The abutment surface 20 of the pushing unit 10 is placed near the butt 19 of said pushing unit 10, i.e. near said radially outer end of the horizontal flat bar 18. More particularly, a portion of the pushing unit placed near said radially outer end extends vertically upwards and defines the abutment surface 20 and the respective butt 19. Also the pushing unit 10 is made up of a single flat metal part, e.g. a cut part.

[0285] When the first assembly A is properly mounted in the respective groove 103 (Figure 11), the horizontal flat bar 18 of each pushing unit 10 is located under and in contact with the flat bar 15 of the respective shaped sinker 8, 9 and the abutment surface 20 faces the radially outer end of the respective shaped sinker 8, 9. The knockover sinker 7 is placed between the first and the second shaped sinker 8, 9.

[0286] Each of the two selectors 11 is a metal, basically flat element mainly developing vertically when it is properly mounted in the machine. The selector 11 has a base portion 21 with a rounded profile and configured for oscillating around an axis tangent to a horizontal circumference with its center in the central axis X. The selector 11 lies and oscillates in a radial plane. The selector 11 further exhibits an abutment portion 22 at a distance from the base portion 21, pointing towards the central axis X and configured for indirectly acting upon the respective shaped sinker 8, 9 through the respective pushing unit 10. The selector 11 further has a tooth 23 located on an edge of the flat element radially opposed to the abutment portion 22 and radially pointing outwards, i.e. to the opposed side with respect to the central axis X.

[0287] The abutment portion 22 has a rounded projection configured and sized for resting against the radially outer end of the horizontal flat bar 18 of the respective pushing unit 10 of the first assembly A.

[0288] Each selector 11 is oscillating in the radial plane between a rest position and an operating position. In the rest position, the abutment portion 22 of the selector 11 is located in a radially outer position and does not get in contact with the respective pushing unit 10. In the operating position, the selector 11 is rotated towards the central axis X, the abutment portion 22 of the selector 11 is located in a radially inner position and is configured for resting and pushing against the respective pushing unit 10 towards the central axis X. The pushing units 10 are

configured in their turn for pushing the shaped sinkers 8, 9.

[0289] The switching from the rest to the operating position of the selector 11 is caused by selecting actuators (not shown, e.g. of known type) acting upon a tooth 23 of the selector 11. By way of example, the number of the selecting actuators can be the same as the feeds of the knitting machine. The selecting actuators are stationary with respect to the casing and are preferably arranged at the same angular distance around the crown 102. Preferably, the selecting actuators comprise a plurality of selecting levers (e.g. of know type), each lever movable between a first position, in which it lies at a distance from the selectors, and a second position, in which it interferes with the selectors moving in front of the selecting actuator when the crown rotates with respect to the guiding ring and around the central axis, so as to move the selectors from the rest position to the operating position.

[0290] In one aspect, the selecting actuator is of magnetic or piezoelectric type.

[0291] Also the knockover sinker 7 may be driven by a respective pushing unit 10' which may interact with a respective selector 11', which are wholly similar to the pushing unit 10 and to the selector 11. For this reason the same elements have been referred to with the same reference numerals with an apostrophe.

[0292] The selector 11' exhibits a base portion 21' and an abutment portion 22' at a distance from the base portion 21', pointing towards the central axis X and configured for indirectly acting upon the respective knockover sinker 7 through the respective pushing unit 10'.

[0293] The selector 11' further has a tooth 23' located on an edge of the flat element radially opposed to the abutment portion 22' and radially pointing outwards, i.e. to the opposed side with respect to the central axis X. The abutment portion 22' has a rounded projection configured for resting against the radially outer end of the respective horizontal flat bar 18' of the pushing unit 10'.

[0294] Each of the pushing units 10' further exhibits a respective butt 19' and a respective abutment surface 20' configured for resting against the respective knockover sinker 7.

[0295] The knockover sinker 7 is further provided with a spring 31 so as to make terry stitches in cooperation with the needles N.

[0296] As can be observed, the position of the tooth 23' of the selector 11' differs from the one of the teeth 23 of the two selectors 11, so that the selecting actuators can catch the teeth 23 or as an alternative the teeth 23' depending on whether the first assembly A should work for making a hole in the fabric or make a terry stitch, respectively.

[0297] A guiding ring 90, consisting of one or more parts, is operatively associated to the crown 102. The guiding ring is coaxial with the central axis X and is stationary like the casing, i.e. the circular crown 102 is rotatable with respect to the guiding ring around the central axis X. The selecting actuators are therefore stationary with respect to the guiding ring and laterally face the crown. In one embodiment, the guiding ring 90 has a plurality of guides extending around the central axis X and configured for engaging with the above described metal parts of the first assembly A. These guides are for instance grooves delimited by cams.

[0298] The butt 14 of the knockover sinker 7 of each first assembly A engages into a first guide 91 obtained in an upper portion of the guiding ring 90. The first guide 91 is configured for radially moving the knockover sinkers 7 along the respective radial grooves 103 when the circular crown 102 rotates with respect to the guiding ring 90 and around the central axis X.

[0299] A further object of the present invention will now be described. Let us observe Figures 12 and 13.

[0300] According to a further possible embodiment of the present invention, these figures show a second assembly B comprising a group of metal flat parts which can slide radially in a respective radial groove 103 as well as one with respect to the other. This second assembly B comprises an "interstitch-knockover" sinker (referred to with the numeral 7'), a right shaped sinker 8, a left shaped sinker 9, two pushing units 10, one associated to the right shaped sinker 8 and the other one to the left shaped sinker 9, and a selector 11 for each of the pushing units 10. Note that by way of example, in Figures 8 and 9 a groove out of two (of said plurality of radial grooves 103) houses a respective second assembly B.

[0301] Considering the plurality of radial grooves 103, a possible embodiment might envisage a continuous alternation of a first assembly A and of a second assembly B, along the whole circumferential development of the crown 102.

[0302] The interstitch-knockover sinker 7' comprises a respective main body shaped as a horizontal flat bar 12' oriented as the groove 103, i.e. along a radial direction, and a vertical flat upright 50 developing from the horizontal flat bar 12'.

[0303] Preferably, a pin 13' having a per se known shape develops from a front side of the vertical flat upright towards the central axis X when the second assembly B is properly mounted to the machine.

[0304] The interstitch-knockover sinker 7' further comprises a vertical tooth 51 developing above said upright 50. Preferably, the tooth 51 develops rising from the top of the upright 50.

[0305] Preferably, the tooth 51 has a front surface 52 configured for retaining, or in technical jargon "knocking over", the interstitch loaded and stretched by the protrusions 6 of the right shaped sinker 8 and of the left shaped sinker 9. Preferably, the tooth 51 is configured for retaining, by means of the front surface 52, the interstitch carried by the protrusions of the right shaped sinker 8 and of the left shaped sinker 9 during their backward motion made so as to place the interstitch one or more adjacent needles so as to form an open work.

[0306] Preferably, the front surface 52 of the tooth 51 is configured from preventing the interstitch, during the

backward motion of the right and left shaped sinkers 8 and 9 so as to form an open work, from being drawn radially backwards, towards the outside of the crown of the sinkers.

[0307] Preferably, the front surface 52 of the tooth 51 is configured for pushing forward the interstitch on the protrusions 6, during the backward motion of the right 8 and left 9 shaped sinkers so as to form an open work, so that the interstitch is spread at its maximum on the protrusions themselves.

[0308] Preferably, the front surface 52 of the tooth 51 is configured for pushing forward the interstitch on the protrusions 6, during a forward motion of the interstitch-knockover sinker 7' (towards the central axis X).

[0309] Preferably, the front surface 52 points towards the central axis X.

[0310] Preferably, the front surface 52 is basically vertically, i.e. it develops parallel to the central axis X.

[0311] Preferably, the tooth 51 has a rear surface 53, opposed to the front surface 52.

[0312] Preferably, the rear surface 53 points towards the outside to the crown of the sinkers.

[0313] Preferably, the tooth 51 develops starting (below) from a base integral with the top of the upright 50, and ends above with a free end (or tip).

[0314] Preferably, the tooth 51 is shaped so that, with the second assembly B positioned in the respective groove 103, it rises above from the upper resting plane 30 of the upright 3 of each of the two right 8 and left 9 shaped sinkers belonging to the same assembly B and placed on the sides of the interstitch-knockover sinker 7'. "Rises above" means that the tooth 51 ends with its tip at a higher vertical level than the upper resting plane 30.

[0315] Preferably, the rear surface 53 is rounded off or inclined so as to reduce the overall rear size of the tooth 51 and avoid contacts with further elements of the cover of the sinkers, e.g. control cams.

[0316] Preferably, the tooth 51 develops above the upright so as to be higher than the pin 13'.

[0317] The interstitch-knockover sinker 7' comprises a flat butt 14' extending vertically upwards from the horizontal flat bar 12' and at a distance from a radially outer end (with respect to the central axis X) of the horizontal flat bar 12'. The interstitch-knockover sinker 7' is made up of a single flat metal part, e.g. a cut part.

[0318] As disclosed above, the right shaped sinker 8 and the left shaped sinker 9 are both embodiments of a shaped sinker 1 according to the present invention. In further detail:

- the right shaped sinker 8 has its protrusion 6 offset laterally to the right with respect to its upright 3;
- the left shaped sinker 9 has its protrusion 6 offset laterally to the left with respect to its upright 3.

[0319] Note that the right shaped sinker 8 and the left shaped sinker 9 of Figures 12 and 13 are the same as the respective right shaped sinker 8 and left shaped sinker 9 of Figures 10 and 11. In other words, the first assembly A and the second assembly B share the same right 8 an left 9 shaped sinkers, and differ in the central element of the assembly, which is the knockover sinker 7 in the first assembly A and the interstitch-knockover sinker 7' in the second assembly B. The right and left sinkers can operate correctly both in a first assembly A and in a second assembly B.

[0320] In the second assembly B, the right shaped sinker 8 and the left shaped sinker 9 have the respective protrusions 6 that are laterally displaced in opposed directions with respect to their main body and with respect to the interstitch-knockover sinker 7' placed between them.

[0321] When the second assembly B is properly mounted in the respective groove 103, the right shaped sinker 8 and the left shaped sinker 9 are arranged on opposed sides of the respective interstitch-knockover sinker 7' (Figure 13). The right shaped sinker 8 and the left shaped sinker 9 exhibit respective protrusions 6 that are laterally offset towards opposed sides of said knockover interstitch-sinker 7' and placed above the pin 13' of the respective interstitch-knockover sinker 7'. Moreover, the butt 14' of the interstitch-knockover sinker 7', with the assembly mounted to the machine, is radially placed between the butt 17 and the protrusion 6 of the respective shaped sinkers 8, 9.

[0322] As shown by way of example, through in a non-limiting manner, in Figures 12 and 13 the second assembly B may comprises pushing units 10 that are similar to the ones described with reference to the first assembly A.

[0323] When the second assembly B is properly mounted in the respective groove 103, the horizontal flat bar 18 of each pushing unit 10 is located under and in contact with the flat bar 15 of the respective shaped sinker 8, 9 and the abutment surface 20 faces the radially outer end of the respective shaped sinker 8, 9. The interstitch-knockover sinker 7' is placed between the first and the second shaped sinker 8, 9.

[0324] The second assembly B may further comprises selectors 11 that are similar to the ones described with reference to the first assembly A.

[0325] Preferably, the butt 14' of the interstitch-knockover sinker 7' of each second assembly B engages into the first guide 91 obtained in an upper portion of the guiding ring 90. The first guide 91 is configured for radially moving the interstitch-knockover sinkers 7' along the respective radial grooves 103 when the circular crown 102 rotates with respect to the guiding ring 90 and around the central axis X.

[0326] Figures 8 and 9 show by way of example an embodiment in which a groove 103 out of two grooves houses a respective second assembly B; single knockover sinkers are present in the remaining grooves. However, it should be considered that, in a further embodiment, a groove out of two may house a respective first assembly A as an alternative to the second assembly B.

[0327] In accordance with further possible embodiments, the plurality of grooves may house, alternating one after the other, an assembly A and an assembly B. In this case, each assembly A would be placed between two assemblies B and vice versa, according to an alternation along the circumferential development of the crown. In the framework of the present invention, "knockover sinker" may refer to and identify, depending on the embodiment, both the knockover sinker 7 (as shown in Figures 10 and 11 and being part of the first assembly A) and the interstitch-knockover sinker 7' (as shown in Figures 12 and 13 and being part of the second assembly B).

[0328] Preferably, the first assembly A or the second assembly B may comprise one or more separators (not shown), placed between two adjacent elements of the assembly itself. In further detail, when mounting the assembly (A or B) into the respective radial groove of the crown of the sinkers, a plate-like separator should be installed between the left shaped sinker and the knockover (or interstitch-knockover) sinker, and a further separator should be installed between the right shaped sinker and the knockover (or interstitch-knockover) sinker. The separator is a flat element, basically a thin plate, placed between two adjacent elements of the assembly so as to keep them separate and not in contact with each other. The separator, differently from shaped or knockover sinkers, is inserted into the groove in a fixed position, and cannot move during the operation of the knitting machine. In particular, the separator cannot shift inside the groove and is blocked on both sides in the groove itself. Conversely, in each assembly the right and left shaped sinkers and the central knockover (or interstitch-knockover) sinker shift inside the groove one with respect to the other when manufacturing the knitted fabric. The separators placed between adjacent elements of the assembly maintain the correct position thereof and prevent the translational motion of an element (e.g. a shaped sinker or the knockover sinker) from dragging in an undesired manner the adjacent element.

[0329] Preferably, an assembly includes:

- a first single-piece separator having a given length and shape, in the groove, so as to separate the left shaped sinker, the respective pushing unit and the respective selector of the knockover (or interstitch-knockover) sinker, the respective pushing unit and the respective selector (if present);
- a second single-piece separator having a given length and shape, in the groove, so as to separate the right shaped sinker, the respective pushing unit and the respective selector of the knockover (or interstitch-knockover) sinker, the respective pushing unit and the respective selector (if present).

[0330] An electronic control unit, not shown, is operatively connected to the motor or motors causing the rotation of the needle-holding cylinder 101 and of the crown 102, to the selecting actuators and to further actuating units, if any, of the machine. The electronic control unit is configured/programmed for commanding the motor or motors and the selecting actuators and said further actuating units, if any, of the machine. In particular, the electronic control unit is configured/programmed for selectively moving the levers of the selecting actuators so as to move the selectors 11, 11' singularly from the rest position to the operating position.

[0331] In a possible embodiment, the machine comprises only first assemblies circumferentially placed one beside the other, and each of said first assemblies can comprise one or two shaped sinkers 8, 9 for forming the open work. The present invention achieves important advantages both from a structural and a functional point of view. First of all, the Applicant has found out that the invention enables to solve the problems listed above related to the prior art and thus to obtain the intended aims.

[0332] In particular, the structure of the protrusion (with lowered and/or inclined sliding plane) advantageously enables to:

- correctly manage yarn tension when loading the interstitch for making open work;
- counterbalance the increase in tension on the yarn caused by the stretching introduced by the protrusion;
- counterbalance the stretching caused by the protrusion (6) while maintaining a correct length of the interstitch when making open work;
- reduce the pressure exerted by the interstitch upon the protrusion and the whole sinker.

[0333] Globally, the shaped sinker enables to effectively manufacture open-work knitted fabrics with the most different features.

[0334] Moreover, the structure of the fin (creating the rear supporting plane with respect to the resting plane of the upright) advantageously enables to:

- support yarns having at least a low trajectory portion, e.g. those fed below the throat plate, thus preventing the rear side of the upright from pushing, deviating or interfering with these yarns during the shifting motion of the shaped sinker;
- correctly operate when the shaped sinker makes an open work and at the same time adjacent needles make plain or terrycloth knitted structures;
- correctly manage also the trajectory (typically low at least in one portion thereof) of the yarns contributing to a plated operation.

[0335] The shaped sinker allows to manufactured high-quality open-work knitted fabrics, which may also be highly complex, in relatively short times.

[0336] A further advantage of the shaped sinker of the present invention consists in that it may be implemented in a simple and cost-effective way and be used in existing

knitting machines, too.

[0337] Moreover, the knitting machine according to the present invention (preferably an intarsia machine or argyle machine) is able to manufacture open-work knitted fabrics and at the same time to integrate further motifs and/or effects on the knitted fabric, preferably without having to reconfigure the machine itself or parts of it from a mechanical point of view. Moreover, the shaped sinker according to the present invention represents an alternative solution to prior art. More to the point, by programming the control unit commanding the selecting actuators it is easily possible to make the desired selectors operating and thus manufacture complex open-work and/or terrycloth knitted fabrics with the most different features.

[0338] The combination of shaped sinkers, for making open work, and knockover sinkers allows to manufacture plain, terrycloth and open-work knitted fabric on the same machine with high flexibility and with the possibility of an alternating motion. The machine according to the invention further allows to make open work and/or terry stitches and also other types of motifs with high speeds, thus dramatically reducing manufacturing times for even complex and sophisticated tubular knitted fabrics.

Claims

1. A shaped sinker (1) for knitting machines, the shaped sinker being configured in particular for manufacturing open-work knitted fabrics and comprising:

   - a main body (2) shaped like a horizontal flat bar and destined to be slidingly housed inside a radial groove (103) of a sinker-holding crown (102) of a knitting machine so as to move radially in a controlled manner inside the groove, the main body (2) having a main longitudinal development and extending between a rear portion (2A) and a front portion (2B);
   - an upright (3) shaped like a vertical flat element and developing vertically, i.e. rising, from said main body (2) near or at said front portion (2B) or in an intermediate position between the rear portion (2A) and the front portion (2B),

   wherein said main body (2) and said upright (3) lie on one lying plane (G) of the shaped sinker (1); the shaped sinker (1) further comprising a protrusion (6) rising from said upper portion (4) of the upright (3) and developing on the upright side facing the front portion (2B) of the main body (2), the shaped sinker being **characterized in that** said said upright (3) ends on top with an upper portion (4) defining an upper resting plane (30) destined to receive one or more yarns resting thereupon during stitch formation; and

   wherein said protrusion (6) has on top a sliding plane (60), the protrusion (6) protruding from the upper portion (4) of the upright (3) so that the sliding plane (60) of the protrusion is placed forward with respect to the upper resting plane (30) of the upright (3), according to a direction pointing to the front portion of the main body, wherein said protrusion (6) is laterally offset or inclined with respect to the lying plane (G) of the upright (3) of the shaped sinker (1) from it rises, the protrusion (6) being configured for loading and stretching an interstitch and arranging it on an adjacent needle of the knitting machine so as to form an open work,

   and wherein said sliding plane (60) of the protrusion (6) is at least partially lowered downwards, i.e. towards the main body (2), with respect to the upper resting plane (30) of the upright (3), the sliding plane (60) of the protrusion being configured for receiving thereon one or more yarns when loading and stretching the interstitch during open work formation.

2. The shaped sinker (1) according to claim 1, wherein the protrusion (6) is bent, inflected or curved laterally with respect to the upright (3), in particular with respect to the upper portion (4) of the upright (3), and/or wherein the protrusion (6) can be offset or inclined laterally, with respect to the upright, to the right or to the left with respect to the lying plane (G) of the shaped sinker.

3. The shaped sinker (1) according to claim 1 or 2, wherein the sliding plane (60), lowered with respect to the upper resting plane (30) of the upright (3), develops in a continuous manner with respect to the upper resting plane (30), by means of a connecting step (61) present, downwards, in the transition from the upper resting plane to the sliding plane, and wherein said connecting step (61) is rounded off or connected so that the passage from the upper resting plane (30) to the sliding plane (60) takes place without discontinuity between the surface of the upper resting surface (30) and the surface of the sliding plane (60), and/or wherein the resting plane (30) is a planar surface, i.e. lying on one, preferably horizontal plane.

4. The shaped sinker (1) according to any one of the preceding claims, wherein the protrusion (6) is configured so that, in use, the backward movement of the shaped sinker (1), carrying a yarn on the resting surface (30) of the upright, causes the passage of the yarn on the protrusion (6) which, being offset laterally, loads and stretches the interstitch so as to arrange it on an adjacent needle, wherein the sliding plane (60), lowered with respect to the upper resting plane (30), is configured for counterbalancing/containing the increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion (6), so as to maintain a correct and/or

constant tension of the interstitch when forming the open work, and/or wherein the structure, e.g. the respective shape or vertical height, of the resting plane (30) and the sliding plane (60) is configured for counterbalancing the stretching caused by the lateral offset of the protrusion (6), so as to maintain a correct length of the interstitch when forming the open work, and/or wherein the sliding plane (60) lowered with respect to the upper resting plane (30) is configured for reducing the tension and/or pressure exerted by the interstitch, during loading, on the protrusion (6).

5. The shaped sinker (1) according to any one of the preceding claims, wherein the protrusion (6) has a base (62), connected to a front side (3A) of the upper portion (4) of the upright (3), from which the protrusion itself develops and protrudes as far as an end tip (63) of the protrusion, opposed to said base (62), and wherein the sliding plane (60) of the protrusion, lowered with respect to the upper resting plane (30) of the upright, is made like an inclined plane (64) downwards, developing in a continuous manner from the base (62) of the protrusion to the end tip (63), and wherein the inclination of the sliding plane (60) of the protrusion (6) increases from the base (62) to the end tip (63), so that the lowering of the sliding plane (60), with respect to the resting plane (30), is greater towards the end tip.

6. The shaped sinker (1) according to the preceding claim, wherein the lateral offset of the protrusion (6) with respect to the lying plane (G) of the shaped sinker increases from the base (62) to the end tip of the protrusion (63), i.e. the protrusion (6) gets progressively away along the protrusion itself, from the base (62) to the end tip (63), and/or wherein, the protrusion (6) being bent with respect to the lying plane (G) so as to get progressively away from the lying plane itself towards the end tip (63), the stretching of the interstitch placed on the sliding plane (60) increases progressively as the shaped sinker moves backward, the tension on the yarn increasing at the same time when loading it onto the protrusion, and the downward inclination of the sliding plane (60) is configured for retrieving and counterbalancing gradually the progressive increase in tension on the yarn caused by the stretching introduced by the lateral offset of the protrusion (6), so as to maintain a correct and/or constant tension of the interstitch while forming the open work, and/or as the protrusion (6), with the shaped sinker moving backward, widens the interstitch and increases progressively the tension on the yarn, the inclined plane (64) of the protrusion counterbalances the increase in tension that would be introduced without a lowering or an inclination of the sliding plane of the protrusion (6), and/or wherein the end tip (63) comprises a stopping portion (65), raised with respect to a lower end of the sliding plane (60), and wherein the stopping portion (65) represents an abutment at the end of the sliding plane, configured for stopping the sliding of the yarn at the end of the protrusion (6) and retaining the yarn and preventing it from detaching from the sliding plane (60) and separating from the protrusion.

7. The shaped sinker (1) according to any one of the preceding claims, comprising a fin (70) placed behind the upper portion (4) of the upright (3), i.e. on the upright side opposed to the side from which the protrusion (6) develops, wherein the fin (70) has on top a supporting plane (71), and wherein the fin (70) can be positioned so that its supporting plane (71) is placed backward with respect to the upper resting plane (30) of the upright (3), according to a direction towards the rear end (2A) of the main body (2).

8. The shaped sinker (1) according to claims 5 and 7, wherein the fin (70) rises from the upper portion (4) of the upright (3) and develops from the upright side facing the rear portion of the main body, and/or wherein the fin (70) develops from a rear side (3B) of the upright, opposed to the front side (3A) from which the protrusion (6) develops, and/or wherein the fin (70) protrudes on the back from the upper portion (4) of the upright (3) so that said supporting plane (71) is placed backward with respect to the upper resting plane (30) of the upright (3), according to a direction towards the rear end (2A) of the main body (2), and/or wherein the fin (70) protrudes on the back from the upright (3) so that the supporting plane (71) of the fin develops in a continuous manner from the resting plane (30) of the upright, and/or wherein the supporting plane (71) of the fin (70) and the resting plane (30) of the upright (3) are coplanar and have the same vertical height.

9. The shaped sinker (1) according to claim 7 or 8, wherein:

- during a knitting operation combining an open work with the use of at least one yarn having at least one low trajectory portion, i.e. passing at a lower height that the height of the resting plane (30) of the upright (3);
- for making the open work the shaped sinker, in order to transfer the interstitch to one of the adjacent needles, has to perform a backward motion during which the rear side (3B) of the upright (3) might push, deviate or interfere with the yarn having said at least one low trajectory portion;
- the fin (70) is configured for supporting, by means of said supporting plane (71), said at least one yarn having said at least one low trajectory portion, by letting said trajectory pass above the supporting plane of the fin and pre-

venting the rear side of the upright from pushing or interfering with said at least one yarn during the backward shifting movement of the shaped sinker, and wherein the yarn having at least one low trajectory portion is a yarn fed below a yarn guiding element, typically, a "box", and/or wherein said yarn having at least one low trajectory portion is a yarn design to take part in a plated design, and/or wherein the fin (70) is configured for working, supporting a yarn by means of said supporting plane (71), when the shaped sinker (1) makes an open works and at the same time adjacent needles make plain or terrycloth knitted structures.

10. The shaped sinker (1) according to any claims 7 to 9, wherein the supporting plane (71) of the fin (70) and the resting plane (30) of the upright (3) are both horizontal surfaces, preferably parallel to the underlying main body of the shaped sinker, and/or wherein the supporting plane (71) of the fin (70) is not lowered with respect to the resting plane (30) of the upright (3), and/or wherein the supporting plane (71) of the fin and the resting plane (30) of the upright are aligned along a longitudinal direction, i.e. the fin (70) is coplanar with the upright (3) and lies on said lying plane (G) of the shaped sinker, or wherein the fin (70) is offset or inclined laterally with respect to the upright (3), from it rises, so as not to lie on said lying plane (G) of the shaped sinker (1), and/or wherein the lateral offset of the fin (70) is configured for avoiding interferences with a further sinker placed laterally, and/or wherein the fin (70) is offset or inclined laterally, with respect to the upright (3), in the same offset direction of the protrusion (6).

11. The shaped sinker (1) according to any claims 7 to 10, wherein the main body (2), the upright (3) and the protrusion (6) are made as one piece, thus forming a single-piece shaped sinker, and/or wherein the fin (70) is made as one piece with said upright (3), or wherein the fin (70) is a distinct element from the upright (3), placed behind the upper portion of the upright, so that the supporting plane (71) of the fin is placed backward and aligned with respect to the upper plane of the upright, and/or wherein the shaped sinker (1) is completely made as one piece, and/or wherein the shaped sinker (1) has in all its part a constant thickness.

12. An assembly (A; B) of flat parts of a circular knitting machine, the assembly comprising:

- a knockover sinker (7) or an interstitch-knockover sinker (7'), provided with a pin (13, 13') configured for cooperating with the needles (N) of a knitting machine and with a butt (14, 14') destined to cooperate with suitable driving means of the knitting machine so as to cause a shifting movement of the knockover sinker (7) or interstitch-knockover sinker (7'), in radial direction with respect to a central axis (X) of the knitting machine;
- at least one shaped sinker (1) according to any one of the preceding claims, the shaped sinker (1) being movable with respect to the knockover sinker (7) or interstitch-knockover sinker (7');

wherein the assembly (A; B) is configured for being housed in a respective radial groove (103) of a crown (102) arranged around a needle-holding cylinder (101) of the knitting machine, so that said at least one shaped sinker (1) lies beside said knockover sinker (7) or interstitch-knockover sinker (7'), said at least one shaped sinker (1) and said knockover sinker (7) or interstitch-knockover sinker (7') being movable radially, in an independent manner, in the respective radial groove (103).

13. The assembly according to the preceding claim comprising a group of flat metal parts destined to slide radially in a respective radial groove (103) and one with respect to the other, too, the assembly comprising an interstitch-knockover sinker (7'), a right shaped sinker (8) and a left shaped sinker (9);

wherein the interstitch-knockover sinker (7') comprises a respective main body shaped like a horizontal flat bar (12') oriented as the groove (103), and a vertical flat upright (50) developing from the horizontal flat bar (12'), the interstitch-knockover sinker (7') further comprising a vertical tooth (51) developing above said upright (50), wherein the tooth (51) has a front surface (52) configured for retaining, or "knocking over", the interstitch loaded and stretched by the protrusions (6) of the right shaped sinker (8) and of the left shaped sinker (9),
and wherein the tooth (51) is configured for retaining, by means of the front surface (52), the interstitch carried by the protrusions of the right shaped sinker (8) and of the left shaped sinker (9) during their backward motion made so as to place the interstitch one or more adjacent needles so as to form an open work, and wherein the front surface (52) of the tooth (51) is configured from preventing, during the backward motion of the right and left shaped sinker so as to form an open work, the interstitch from being drawn radially backwards, and wherein the front surface (52) of the tooth (51) is configured for pushing forward the interstitch on the protrusions (6), during the backward motion of the right (8) and left (9) shaped sinkers so as to form an open work, so that the interstitch is spread at its maximum on the protrusions themselves.

14. A circular knitting machine for manufacturing open-work knitted fabric, comprising:

- a needle-holding cylinder (101) having a plurality of longitudinal grooves arranged around a central axis (X) of the needle-holding cylinder (101);
- a plurality of needles (N), each being housed in a respective longitudinal groove;
- at least one yarn feed operatively associated to the needles (N);
- a crown (102) arranged around the needle-holding cylinder (101) and having a plurality of radial grooves (103);
- at least one guiding ring (90) operatively associated to the crown (102), wherein the crown (102) is rotatable with respect to the guiding ring (90) and around the central axis (X);
- a plurality of knockover sinkers (7) and/or of interstitch-knockover sinkers (7'), each housed in one of the radial grooves (103) and radially movable in the respective radial groove (103), each knockover sinker (7) or interstitch-knockover sinker (7') having a pin (13, 13') configured for cooperating with the needles (N) and a butt (14, 14') engaged with a first guide (91) obtained in the guiding ring (90) and developing around the central axis (X); wherein the first guide (91) is configured for moving the knockover sinker (7) or the interstitch-knockover sinker (7') radially along the respective radial groove (103) when the crown (102) rotates with respect to the guiding ring (91) and around the central axis (X);

wherein the machine comprises at least one shaped sinker (1) according to any one of the claims 1 to 11, beside a respective knockover sinker (7) or interstitch-knockover sinker (7'), wherein the shaped sinker (1) is movable with respect to the knockover sinker (7) or interstitch-knockover sinker (7').

15. The knitting machine according to claim 14, wherein said at least one shaped sinker (1) comprises a right shaped sinker (8) and a left shaped sinker (9) arranged on opposed sides of the respective knockover sinker (7) or interstitch-knockover sinker (7'), and wherein:

- the right shaped sinker (8) has its protrusion offset laterally to the right with respect to the respective upright;
- the left shaped sinker (9) has its protrusion offset laterally to left the with respect to the respective upright; and wherein the right shaped sinker (8) and the left shaped sinker (9) have their protrusions offset laterally to opposed sides of said knockover sinker (7) or interstitch-knockover sinker (7') and preferably located above the respective knockover sinker (7) or interstitch-knockover sinker (7'), and wherein the protrusions (6) are configured for loading and stretching the interstitch and arrange it on two adjacent needles placed on opposed sides of the respective knockover sinker (7) or interstitch-knockover sinker (7') and form the open work,

and wherein said at least one shaped sinker (1) is housed in one of the radial grooves (103) together with the respective knockover sinker (7) or interstitch-knockover sinker (7'), and wherein one of the radial grooves (103) houses:

- a first assembly (A) made up of the knockover sinker (7) and of the shaped sinker (1), or right shaped sinker (8) and left shaped sinker (9); or
- a second assembly (B) made up of the interstitch-knockover sinker (7') and of the shaped sinker (1), or right shaped sinker (8) and left shaped sinker (9).

Patentansprüche

1. Formplatine (1) für Strickmaschinen, wobei die Formplatine insbesondere zum Herstellen von Lochgewirk-Strickgeweben eingerichtet ist und umfasst:

- einen Hauptkörper (2), welcher wie ein horizontaler flacher Stab geformt und dazu vorgesehen ist, gleitbar innerhalb einer radialen Nut (103) einer Platine-Haltekrone (102) einer Strickmaschine aufgenommen zu sein, um sich so in einer gesteuerten Weise innerhalb der Nut radial zu bewegen, wobei der Hauptkörper (2) eine Haupt-Längenausdehnung aufweist und sich zwischen einem hinteren Abschnitt (2A) und einem vorderen Abschnitt (2B) erstreckt;
- einen Ständer (3), welcher wie ein vertikales flaches Element geformt ist und sich vertikal, d.h. ansteigend, von dem Hauptkörper (2) in der Nähe von oder an dem vorderen Abschnitt (2B) oder in einer Zwischenposition zwischen dem hinteren Abschnitt (2A) und dem vorderen Abschnitt (2B) erstreckt,

wobei der Hauptkörper (2) und der Ständer (3) an einer Liegeebene (G) der Formplatine (1) liegen; die Formplatine (1) ferner einen Vorsprung (6) umfasst, welcher von dem oberen Abschnitt (4) des Ständers (3) ansteigt und sich an der Ständerseite erstreckt, welche zu dem vorderen Abschnitt (2B) des Hauptkörpers (2) weist,
wobei die Formplatine **dadurch gekennzeichnet ist, dass** der Ständer (3) an einer Oberseite mit einem oberen Abschnitt (4) endet, welcher eine obere Ruheebene (30) definiert, welche dazu vorgesehen ist, ein oder mehrere Garne auf-

zunehmen, welche darauf während einer Maschenbildung ruhen; und
wobei der Vorsprung (6) an einer Oberseite eine Gleitebene (60) aufweist, wobei der Vorsprung (6) von dem oberen Abschnitt (4) des Ständers (3) vorsteht, so dass die Gleitebene (60) des Vorsprungs nach vorne bezüglich der oberen Ruheebene (30) des Ständers (3) gemäß einer Richtung platziert ist, welche zu dem vorderen Abschnitt des Hauptkörpers zeigt,
wobei der Vorsprung (6) bezüglich der Liegeebene (G) des Ständers (3) der Formplatine (1) lateral versetzt oder geneigt ist, von welcher er ansteigt, wobei der Vorsprung (6) dazu eingerichtet ist, eine Zwischenmasche zu laden und zu strecken und sie an einer benachbarten Nadel der Strickmaschine anzuordnen, um so ein Lochgewirk zu bilden,
und wobei die Gleitebene (60) des Vorsprungs (6) wenigstens teilweise nach unten abgesenkt ist, d.h. in Richtung des Hauptkörpers (2), bezüglich der oberen Ruheebene (30) des Ständers (3), wobei die Gleitebene (60) des Vorsprungs dazu eingerichtet ist, daran ein oder mehrere Garne aufzunehmen, wenn die Zwischenmasche während des Bildens des Lochgewirks geladen und gestreckt wird.

2. Formplatine (1) nach Anspruch 1, wobei der Vorsprung (6) lateral bezüglich des Ständers (3) gebogen, abgelenkt oder gekrümmt ist, insbesondere bezüglich des oberen Abschnitts (4) des Ständers (3), und/oder wobei der Vorsprung (6) lateral bezüglich des Ständers nach rechts oder nach links bezüglich der Liegeebene (G) der Formplatine versetzt oder geneigt sein kann.

3. Formplatine (1) nach Anspruch 1 oder 2, wobei sich die Gleitebene (60), welche bezüglich der oberen Ruheebene (30) des Ständers (3) abgesenkt ist, in einer kontinuierlichen Weise bezüglich der oberen Ruheebene (30) erstreckt, mittels einer Verbindungsstufe (61), welche nach unten in dem Übergang von der oberen Ruheebene zu der Gleitebene vorliegt, und wobei die Verbindungsstufe (61) derart abgerundet oder verbunden ist, dass der Durchgang von der oberen Ruheebene (30) zu der Gleitebene (60) ohne Diskontinuität zwischen der Fläche der oberen Ruhefläche (30) und der Fläche der Gleitebene (60) stattfindet, und/oder wobei die Ruheebene (30) eine planare Fläche ist, d.h. an einer vorzugsweise horizontalen Ebene liegt.

4. Formplatine (1) nach einem der vorhergehenden Ansprüche, wobei der Vorsprung (6) derart eingerichtet ist, dass in Verwendung die Rückwärtsbewegung der Formplatine (1), welche ein Garn an der Ruhefläche (30) des Ständers trägt, den Durchgang des Garns an dem Vorsprung (6) veranlasst, welcher lateral versetzt die Zwischenmasche lädt und streckt, um sie so an einer benachbarten Nadel anzuordnen, wobei die Gleitebene (60), welche bezüglich der oberen Ruheebene (30) abgesenkt ist, dazu eingerichtet ist, die Erhöhung einer Spannung an dem Garn auszugleichen/aufzunehmen, welche durch das Strecken verursacht wird, welches durch den lateralen Versatz des Vorsprungs (6) eingeführt wird, um so eine korrekte und/oder konstante Spannung der Zwischenmasche beizubehalten wenn das Lochgewirk gebildet wird, und/oder wobei die Struktur, z.B. die entsprechende Form oder vertikale Höhe der Ruheebene (30) und der Gleitebene (60) für ein Ausgleichen des Streckens eingerichtet ist, welches durch den lateralen Versatz des Vorsprungs (6) hervorgerufen wird, um so eine korrekte Länge der Zwischenmasche beizubehalten, wenn das Lochgewirk gebildet wird, und/oder wobei die Gleitebene (60), welche bezüglich der oberen Ruheebene (30) abgesenkt ist, dazu eingerichtet ist, die Spannung und/oder den Druck zu reduzieren, welche/r durch die Zwischenmasche während des Ladens an dem Vorsprung (6) ausgeübt wird.

5. Formplatine (1) nach einem der vorhergehenden Ansprüche, wobei der Vorsprung (6) eine Basis (62) aufweist, welche mit einer vorderen Seite (3A) des oberen Abschnitts (4) des Ständers (3) verbunden ist, von welcher sich der Vorsprung selbst erstreckt und sich so weit wie eine Endspitze (63) des Vorsprungs gegenüber der Basis (62) erstreckt und vorsteht, und wobei die Gleitebene (60) des Vorsprungs, welcher bezüglich der oberen Ruheebene (30) des Ständers abgesenkt ist, wie eine geneigte Ebene (64) nach unten hergestellt ist, welche sich in einer kontinuierlichen Weise von der Basis (62) des Vorsprungs zu dem Spitzenende (63) erstreckt, und wobei die Neigung der Gleitebene (60) des Vorsprungs (6) von der Basis (62) zu der Endspitze (63) zunimmt, so dass das Absenken der Gleitebene (60) bezüglich der Ruheebene (30) größer in Richtung der Endspitze ist.

6. Formplatine (1) nach dem vorhergehenden Anspruch, wobei der laterale Versatz des Vorsprungs (6) bezüglich der Liegeebene (G) der Formplatine von der Basis (62) zu der Endspitze des Vorsprungs (63) zunimmt, d.h. dass der Vorsprung (6) progressiv entlang dem Vorsprung selbst von der Basis (62) zu der Endspitze (63) wegläuft, und/oder wobei, da der Vorsprung (6) bezüglich der Liegeebene (G) gebogen ist, um so progressiv von der Liegeebene selbst in Richtung der Endspitze (63) wegzulaufen, das Strecken der Zwischenmasche, welche an der Gleitebene (60) platziert ist, progressiv zunimmt, wenn sich die Formplatine nach hinten bewegt, die Spannung an dem Garn zu derselben Zeit zunimmt, wenn

es auf den Vorsprung geladen wird, und die Neigung der Gleitebene (60) nach unten dazu eingerichtet ist, graduell die progressive Zunahme in der Spannung an dem Garn aufzunehmen und auszugleichen, welche durch das Strecken hervorgerufen wird, welches durch den lateralen Versatz des Vorsprungs (6) eingeführt wird, um so eine korrekte und/oder konstante Spannung der Zwischenmasche beizubehalten, während das Lochgewirk gebildet wird, und/oder wenn der Vorsprung (6) mit der sich nach hinten bewegenden Formplatine die Zwischenmasche aufweitet und progressiv die Spannung auf das Garn erhöht, die geneigte Ebene (64) des Vorsprungs die Zunahme in der Spannung ausgleicht, welche eingeführt werden würde ohne ein Absenken oder eine Neigung der Gleitebene des Vorsprungs (6), und/oder wobei die Endspitze (63) einen Stoppabschnitt (65) umfasst, welcher bezüglich einem unteren Ende der Gleitebene (60) angehoben ist, und wobei der Stoppabschnitt (65) eine Anlage an dem Ende der Gleitebene repräsentiert, welche dazu eingerichtet ist, das Gleiten des Garns an dem Ende des Vorsprungs (6) zu stoppen und das Garn zurückzuhalten und es daran zu hindern, sich von der Gleitebene (60) zu lösen und sich von dem Vorsprung zu trennen.

7. Formplatine (1) nach einem der vorhergehenden Ansprüche, umfassend eine Rippe (70), welche hinter dem oberen Abschnitt (4) des Ständers (3) platziert ist, d.h. an der Ständerseite gegenüber der Seite, von welcher sich der Vorsprung (6) erstreckt, wobei die Rippe (70) an einer Oberseite eine Trageebene (71) aufweist, und wobei die Rippe (70) derart positioniert werden kann, dass ihre Trageebene (71) nach hinten bezüglich der oberen Ruheebene (30) des Ständers (3) platziert ist, gemäß einer Richtung zu dem hinteren Ende (2a) des Hauptkörpers (2) hin.

8. Formplatine (1) nach den Ansprüchen 5 und 7, wobei die Rippe (70) von dem oberen Abschnitt (4) des Ständers (3) ansteigt und sich von der Ständerseite erstreckt, welche zu dem hinteren Abschnitt des Hauptkörpers weist, und/oder wobei sich die Rippe (70) von einer hinteren Seite (3B) des Ständers erstreckt, gegenüber der vorderen Seite (3A), von welcher sich der Vorsprung (6) erstreckt, und/oder wobei die Rippe (70) an der Hinterseite von dem oberen Abschnitt (4) des Ständers (3) vorsteht, so dass die Trageebene (71) nach hinten bezüglich der oberen Ruheebene (30) des Ständers (3) platziert ist, gemäß einer Richtung zu dem hinteren Ende (2A) des Hauptkörpers (2) hin, und/oder wobei die Rippe (70) an der Hinterseite von dem Ständer (3) vorsteht, so dass sich die Trageebene (71) der Rippe in einer kontinuierlichen Weise von der Ruheebene (30) des Ständers erstreckt, und/oder wobei die Trageebene (71) der Rippe (70) und die Ruheebene (30) des Ständers (3) koplanar sind und dieselbe vertikale Höhe aufweisen.

9. Formplatine (1) nach Anspruch 7 oder 8, wobei:

- während eines Strickbetriebs, welcher ein Lochgewirk kombiniert, mit der Verwendung von wenigstens einem Garn, welches wenigstens einen Abschnitt mit niedriger Bahnkurve aufweist, d.h. an einer niedrigeren Höhe als die Höhe der Ruheebene (30) des Ständers (3) verläuft;
- zum Herstellen des Lochgewirks die Formplatine, um die Zwischenmasche zu einer der benachbarten Nadeln zu transferieren, eine Bewegung nach hinten durchzuführen hat, während welcher die hintere Seite (3B) des Ständers (3) das Garn drücken, ablenken oder behindern kann, welches wenigstens einen Abschnitt mit niedriger Bahnkurve aufweist;
- die Rippe (70) dazu eingerichtet ist, mittels der Trageebene (71) wenigstens ein Garn zu tragen, welches den wenigstens einen Abschnitt mit niedriger Bahnkurve aufweist, indem die niedrige Bahnkurve über die Trageebene der Rippe laufen gelassen wird und die hintere Seite des Ständers daran gehindert wird, das wenigstens eine Garn während der Verschiebungsbewegung der Formplatine nach hinten zu drücken oder zu behindern,

und wobei das Garn, welches wenigstens einen Abschnitt mit niedriger Bahnkurve aufweist, ein Garn ist, welches unter einem Garn-Führungselement zugeführt wird, typischerweise eine "Kiste", und/oder wobei das Garn, welches wenigstens einen Abschnitt mit niedriger Bahnkurve aufweist, ein Garndesign ist, um in einem beschlagenen Design teilzunehmen, und/oder wobei die Rippe (70) dazu eingerichtet ist, zu arbeiten, indem ein Garn mittels der Trageebene (71) getragen wird, wenn die Formplatine (1) ein Lochgewirk herstellt und zur selben Zeit benachbarte Nadeln gestrickte einfache oder Frottee-Strukturen herstellen.

10. Formplatine (1) nach einem der Ansprüche 7 bis 9, wobei die Trageebene (71) der Rippe (70) und die Ruheebene (30) des Ständers (3) beide horizontale Flächen sind, vorzugsweise parallel zu dem darunterliegenden Hauptkörper der Formplatine, und/oder wobei die Trageebene (71) der Rippe (70) bezüglich der Ruheebene (30) des Ständers (3) nicht abgesenkt ist, und/oder wobei die Trageebene (71) der Rippe und die Ruheebene (30) des Ständers entlang einer longitudinalen Richtung ausgerichtet sind, d.h. die Rippe (70) koplanar mit dem Ständer (3) ist und an der Liegeebene (G) der Formplatine liegt, oder wobei die Rippe (70) bezüglich des Ständers (3), von welchem sie ansteigt, lateral versetzt oder ge-

neigt ist, um so nicht an der Liegeebene (G) der Formplatine (1) zu liegen, und/oder wobei der laterale Versatz der Rippe (70) dazu eingerichtet ist, Behinderungen mit einer weiteren Platine zu verhindern, welche lateral platziert ist, und/oder wobei die Rippe (70) bezüglich des Ständers (3) in derselben Versatzrichtung des Vorsprungs (6) lateral versetzt oder geneigt ist.

11. Formplatine (1) nach einem der Ansprüche 7 bis 10, wobei der Hauptkörper (2), der Ständer (3) und der Vorsprung (6) einstückig hergestellt sind, wodurch eine einstückige Formplatine gebildet ist, und/oder wobei die Rippe (70) einstückig mit dem Ständer (3) hergestellt ist, oder wobei die Rippe (70) ein gesondertes Element von dem Ständer (3) ist, welches hinter dem oberen Abschnitt des Ständers platziert ist, so dass die Trageebene (71) der Rippe nach hinten platziert ist und bezüglich der oberen Ebene des Ständers ausgerichtet ist, und/oder wobei die Formplatine (1) vollständig einstückig hergestellt ist, und/oder wobei die Formplatine (1) in allen ihrer Teile eine konstante Dicke aufweist.

12. Anordnung (A; B) von flachen Teilen einer Rundstrickmaschine, wobei die Anordnung umfasst:

- eine Abschlagplatine (7) oder eine Zwischenmasche-Abschlagplatine (7'), welche mit einem Stift (13, 13') bereitgestellt ist, welcher dazu eingerichtet ist, mit den Nadeln (N) einer Strickmaschine und mit einem Stumpf (14, 14') zusammenzuwirken, welcher dazu eingerichtet ist, mit geeigneten Antriebsmitteln der Strickmaschine zusammenzuwirken, um so eine Verschiebungsbewegung der Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') in einer radialen Richtung bezüglich einer zentralen Achse (X) der Strickmaschine hervorzurufen;
- wenigstens eine Formplatine (1) nach einem der vorhergehenden Ansprüche, wobei die Formplatine (1) bezüglich der Abschlagplatine (7) oder der Zwischenmasche-Abschlagplatine (7') bewegbar ist;

wobei die Anordnung (A; B) dazu eingerichtet ist, in einer entsprechenden radialen Nut (103) einer Krone (102) aufgenommen zu sein, welche um einen Nadel-Haltezylinder (101) der Strickmaschine herum angeordnet ist, so dass die wenigstens eine Formplatine (1) neben der Abschlagplatine (7) oder der Zwischenmasche-Abschlagplatine (7') liegt, wobei die wenigstens eine Formplatine (1) und die Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') in einer unabhängigen Weise in der entsprechenden radialen Nut radial bewegbar sind.

13. Anordnung nach dem vorhergehenden Anspruch, umfassend eine Gruppe von flachen Metallteilen, welche dazu vorgesehen sind, radial in einer entsprechenden radialen Nut (103) und ebenfalls das eine bezüglich dem anderen zu gleiten, wobei die Anordnung eine Zwischenmasche-Abschlagplatine (7'), eine rechte Formplatine (8) und eine linke Formplatine (9) umfasst;

wobei die Zwischenmasche-Abschlagplatine (7') einen entsprechenden Hauptkörper umfasst, welcher wie ein horizontaler flacher Stab (12') geformt ist, welcher wie die Nut orientiert ist, sowie einen vertikalen flachen Ständer (50), welcher sich von dem horizontalen flachen Stab (12') erstreckt, wobei die Zwischenmasche-Abschlagplatine (7') ferner einen vertikalen Zahn (51) umfasst, welcher sich oberhalb des Ständers (50) erstreckt, wobei der Zahn (51) eine vordere Fläche (52) aufweist, welche dazu eingerichtet ist, die von den Vorsprüngen (6) der rechten Formplatine (8) und der linken Formplatine (9) geladene und gestreckte Zwischenmasche zu halten oder "abzuschlagen",
und wobei der Zahn (51) dazu eingerichtet ist, mittels der vorderen Fläche (52) die von den Vorsprüngen der rechten Formplatine (8) und der linken Formplatine (9) getragene Zwischenmasche während ihrer Rückwärtsbewegung zu halten, welche ausgeführt wird, um die Zwischenmasche an einer oder mehreren benachbarten Nadeln zu platzieren, um ein Lochgewirk zu bilden, und wobei die vordere Fläche (52) des Zahns (51) dazu eingerichtet ist, während der Rückwärtsbewegung der rechten und linken Formplatine, um so ein Lochgewirk zu bilden, die Zwischenmasche daran zu hindern, radial nach hinten gezogen zu werden, und wobei die vordere Fläche (52) des Zahns (51) dazu eingerichtet ist, die Zwischenmasche an den Vorsprüngen (6) während der Rückwärtsbewegung der rechten (8) und linken (9) Formplatinen nach vorne zu schieben, um so ein Lochgewirk zu bilden, so dass die Zwischenmasche um ihr Maximum an den Vorsprüngen selbst gestreckt ist.

14. Rundstrickmaschine zum Herstellen eines Lochgewirk-Strickgewebes, umfassend:

- einen Nadel-Haltezylinder (101), welcher eine Mehrzahl von longitudinalen Nuten aufweist, welche um eine zentrale Achse (X) des Nadel-Haltezylinders (101) herum angeordnet sind;
- eine Mehrzahl von Nadeln (N), welche jeweils in einer entsprechenden longitudinalen Nut aufgenommen sind;
- wenigstens eine Garnzuführung, welche betriebsmäßig den Nadeln (N) zugeordnet ist;
- eine Krone (102), welche um den Nadel-Hal-

tezylinder (101) herum angeordnet ist und eine Mehrzahl von radialen Nuten (103) aufweist;
- wenigstens einen Führungsring (90), welcher betriebsmäßig der Krone (102) zugeordnet ist, wobei die Krone (102) bezüglich des Führungsrings (90) und um die zentrale Achse (X) herum rotierbar ist;
- eine Mehrzahl von Abschlagplatinen (7) und/oder von Zwischenmasche-Abschlagplatinen (7'), welche jeweils in einer der radialen Nuten (103) aufgenommen und radial in der entsprechenden radialen Nut (103) bewegbar sind, wobei jede Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') einen Stift (13, 13') aufweist, welcher für ein Zusammenwirken mit den Nadeln (N) und einem Stumpf (14, 14') eingerichtet ist, welcher mit einer ersten Führung (91) eingreift, welche in dem Führungsring (90) erhalten ist und sich um die zentrale Achse (X) erstreckt; wobei die erste Führung (91) dazu eingerichtet ist, die Abschlagplatine (7) oder die Zwischenmasche-Abschlagplatine (7') radial entlang der entsprechenden radialen Nut (103) zu bewegen, wenn die Krone (102) bezüglich des Führungsrings (91) und um die zentrale Achse (X) rotiert;

wobei die Maschine wenigstens eine Formplatine (1) nach einem der Ansprüche 1 bis 11 neben einer entsprechenden Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') umfasst, wobei die Formplatine (1) bezüglich der Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') bewegbar ist.

15. Strickmaschine nach Anspruch 14, wobei die wenigstens eine Formplatine (1) eine rechte Formplatine (8) und eine linke Formplatine (9) umfasst, welche an gegenüberliegenden Seiten der entsprechenden Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') angeordnet sind, und wobei:

- die rechte Formplatine (8) ihren Vorsprung lateral nach rechts bezüglich des entsprechenden Ständers versetzt aufweist;
- die linke Formplatine (9) ihren Vorsprung lateral nach links bezüglich des entsprechenden Ständers versetzt aufweist;

und wobei die rechte Formplatine (8) und die linke Formplatine (9) ihre Vorsprünge lateral zu gegenüberliegenden Seiten der Abschlagplatine (7) oder der Zwischenmasche-Abschlagplatine (7') versetzt aufweisen und vorzugsweise oberhalb der entsprechenden Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') angeordnet, und wobei die Vorsprünge (6) dazu eingerichtet sind, die Zwischenmasche zu laden und strecken und sie an zwei benachbarten Nadeln anzuordnen, welche an gegenüberliegenden Seiten der entsprechenden Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') angeordnet sind, und das Lochgewirk zu bilden,
und wobei die wenigstens eine Formplatine (1) in einer der radialen Nuten (103) zusammen mit der entsprechenden Abschlagplatine (7) oder Zwischenmasche-Abschlagplatine (7') aufgenommen ist, und wobei eine der radialen Nuten (103) aufnimmt:

- eine erste Anordnung (A), welche aus der Abschlagplatine (7) und der Formplatine (1) oder rechten Formplatine (8) und linken Formplatine (9) aufgebaut ist; oder
- eine zweite Anordnung (B), welche aus der Zwischenmasche-Abschlagplatine (7') und der Formplatine (1) oder rechten Formplatine (8) und linken Formplatine (9) aufgebaut ist.

Revendications

1. Platine façonnée (1) pour machines à tricoter, la platine façonnée étant configurée en particulier pour la fabrication de textiles tricotés à jours et comprenant :

- un corps principal (2) mis en forme comme une barre horizontale plate et destiné à être logé de manière coulissante à l'intérieur d'une rainure radiale (103) d'une couronne (102) de maintien de platine d'une machine à tricoter pour un déplacement radialement d'une manière contrôlée à l'intérieur de la rainure, le corps principal (2) ayant un développement longitudinal principal et s'étendant entre une partie arrière (2A) et une partie avant (2B) ;
- un montant (3) mis en forme comme un élément vertical plat et se développant verticalement, c'est-à-dire s'élevant, depuis ledit corps principal (2) près ou au niveau de ladite partie avant (2B) ou dans une position intermédiaire entre la partie arrière (2A) et la partie avant (2B), dans laquelle ledit corps principal (2) et ledit montant (3) reposent sur un plan de repos (G) de la platine façonnée (1) ;

la platine façonnée (1) comprenant en outre une protubérance (6) s'élevant depuis ladite partie supérieure (4) du montant (3) et se développant sur le côté du montant faisant face à la partie avant (2B) du corps principal (2), la platine façonnée étant **caractérisée en ce que** ledit montant (3) se termine sur le dessus avec une partie supérieure (4) définissant un plan de repos supérieur (30) destiné à recevoir un ou plusieurs

fils reposant dessus durant la formation de maille ; et,

dans laquelle ladite protubérance (6) présente sur le dessus un plan de coulissement (60), la protubérance (6) faisant saillie depuis la partie supérieure (4) du montant (3) de sorte que le plan de coulissement (60) de la protubérance est placé vers l'avant par rapport au plan de repos supérieur (30) du montant (3), selon un sens pointant vers la partie avant du corps principal, dans laquelle ladite protubérance (6) est latéralement décalée ou inclinée par rapport au plan de repos (G) du montant (3) de la platine façonnée (1) depuis laquelle il s'élève, la protubérance (6) étant configurée pour charger et étirer une intermaille et pour l'agencer sur une aiguille adjacente de la machine à tricoter afin de former un jour, et

dans laquelle ledit plan de coulissement (60) de la protubérance (6) est au moins partiellement abaissé vers le bas, c'est-à-dire vers le corps principal (2), par rapport au plan de repos supérieur (30) du montant (3), le plan de coulissement (60) de la protubérance étant configuré pour recevoir dessus un ou plusieurs fils lors du chargement et de l'étirage de l'intermaille durant la formation de jour.

2. Platine façonnée (1) selon la revendication 1, dans laquelle la protubérance (6) est fléchie, infléchie ou incurvée latéralement par rapport au montant (3), en particulier par rapport à la partie supérieure (4) du montant (3), et/ou dans laquelle la protubérance (6) peut être décalée ou inclinée latéralement, par rapport au montant, vers la droite ou vers la gauche par rapport au plan de repos (G) de la platine façonnée.

3. Platine façonnée (1) selon la revendication 1 ou 2, dans laquelle le plan de coulissement (60), abaissé par rapport au plan de repos supérieur (30) du montant (3), se développe d'une manière continue par rapport au plan de repos supérieur (30), à l'aide d'une étape de raccordement (61) présente, vers le bas, dans la transition depuis le plan de repos supérieur vers le plan de coulissement, et dans laquelle ladite étape de raccordement (61) est arrondie ou raccordée de sorte que le passage depuis le plan de repos supérieur (30) vers le plan de coulissement (60) a lieu sans discontinuité entre la surface de le plan de repos supérieur (30) et la surface du plan de coulissement (60), et/ou dans laquelle le plan de repos (30) est une surface plane, c'est-à-dire reposant sur un plan, préférablement horizontal.

4. Platine façonnée (1) selon l'une quelconque des revendications précédentes, dans laquelle la protubérance (6) est configurée de sorte que, durant l'utilisation, le mouvement vers l'arrière de la platine façonnée (1), portant un fil sur le plan de repos (30) du montant, entraîne le passage du fil sur la protubérance (6) qui, lorsque décalée latéralement, charge et étire l'intermaille afin de l'agencer sur une aiguille adjacente, dans laquelle le plan de coulissement (60), abaissé par rapport au plan de repos supérieur (30), est configuré pour contrebalancer/contenir l'augmentation de tension sur le fil causée par l'étirage introduit par le décalage latéral de la protubérance (6), afin de maintenir une tension correcte et/ou constante de l'intermaille lors de la formation du jour, et/ou dans laquelle la structure, par exemple la forme ou la hauteur verticale respective, du plan de repos (30) et du plan de coulissement (60) est configurée pour contrebalancer l'étirage causé par le décalage latéral de la protubérance (6), afin de maintenir une longueur correcte de l'intermaille lors de la formation du jour, et/ou dans laquelle le plan de coulissement (60) abaissé par rapport au plan de repos supérieur (30) est configuré pour réduire la tension et/ou la pression exercée par l'intermaille, durant la charge, sur la protubérance (6).

5. Platine façonnée (1) selon l'une quelconque des revendications précédentes, dans laquelle la protubérance (6) présente une base (62), raccordée à un côté avant (3A) de la partie supérieure (4) du montant (3), depuis laquelle la protubérance elle-même se développe et fait saillie aussi loin qu'une pointe d'extrémité (63) de la protubérance, opposée à ladite base (62), et dans laquelle le plan de coulissement (60) de la protubérance, abaissé par rapport au plan de repos supérieur (30) du montant, est en forme de plan incliné (64) vers le bas, se développant d'une manière continue depuis la base (62) de la protubérance vers la pointe d'extrémité (63), et dans laquelle l'inclinaison du plan de coulissement (60) de la protubérance (6) augmente depuis la base (62) vers la pointe d'extrémité (63), de sorte que l'abaissement du plan de coulissement (60), par rapport au plan de repos (30), est supérieur vers la pointe d'extrémité.

6. Platine façonnée (1) selon la revendication précédente, dans laquelle le décalage latéral de la protubérance (6) par rapport au plan de repos (G) de la platine façonnée augmente depuis la base (62) vers la pointe d'extrémité de la protubérance (63), c'est-à-dire que la protubérance (6) s'éloigne progressivement le long de la pointe d'extrémité elle-même, depuis la base (62) vers la pointe d'extrémité (63), et/ou dans laquelle, la protubérance (6) étant fléchie par rapport au plan de repos (G) afin de s'éloigner progressivement du plan de repos lui-même vers la pointe d'extrémité (63), l'étirage de l'intermaille placée sur le plan de coulissement (60) augmente progressivement lorsque la platine façonnée se déplace vers l'arrière, la tension sur le fil croissant en même temps lors de sa charge sur la protubérance, et l'in-

clinaison vers le bas du plan de coulissement (60) est configurée pour récupérer et contrebalancer graduellement l'augmentation progressive dans la tension sur le fil causée par l'étirage introduit par le décalage latéral de la protubérance (6), afin de maintenir une tension correcte et/ou constante de l'intermaille tout en formant le jour, et/ou lorsque la protubérance (6), avec la platine façonnée se déplaçant vers l'arrière, élargit l'intermaille et augmente progressivement la tension sur le fil, le plan incliné (64) de la protubérance contrebalance l'augmentation de tension qui serait introduite sans un abaissement ou une inclinaison du plan de coulissement de la protubérance (6), et/ou dans laquelle la pointe d'extrémité (63) comprend une partie d'arrêt (65), élevée par rapport à une extrémité inférieure du plan de coulissement (60), et dans laquelle la partie d'arrêt (65) représente une butée à l'extrémité du plan de coulissement, configurée pour stopper le coulissement du fil à l'extrémité de la protubérance (6) et retenant le fil et l'empêchant de se détacher du plan de coulissement (60) et de se séparer de la protubérance.

7. Platine façonnée (1) selon l'une quelconque des revendications précédentes, comprenant une ailette (70) placée à l'arrière de la partie supérieure (4) du montant (3), c'est-à-dire sur le côté du montant opposé au côté depuis lequel la protubérance (6) se développe, dans laquelle l'ailette (70) présente sur le sommet un plan de support (71), et dans laquelle l'ailette (70) peut être positionnée de sorte que son plan de support (71) est placé vers l'arrière par rapport au plan de repos supérieur (30) du montant (3), selon un sens vers l'extrémité arrière (2A) du corps principal (2).

8. Platine façonnée (1) selon les revendications 5 et 7, dans laquelle l'ailette (70) s'élève depuis la partie supérieure (4) du montant (3) et se développe depuis le côté du montant faisant face à la partie arrière du corps principal, et/ou dans laquelle l'ailette (70) se développe depuis un côté arrière (3B) du montant, opposé au côté avant (3A) depuis lequel la protubérance (6) se développe, et/ou dans laquelle l'ailette (70) fait saillie sur l'arrière depuis la partie supérieure (4) du montant (3) de sorte que ledit plan de support (71) est placé vers l'arrière par rapport au plan de repos supérieur (30) du montant (3), selon un sens vers l'extrémité arrière (2A) du corps principal (2), et/ou dans laquelle l'ailette (70) fait saillie sur l'arrière depuis le montant (3) de sorte que le plan de support (71) de l'ailette se développe d'une manière continue depuis le plan de repos (30) du montant, et/ou dans laquelle le plan de support (71) de l'ailette (70) et le plan de repos (30) du montant (3) sont coplanaires et présentent la même hauteur verticale.

9. Platine façonnée (1) selon la revendication 7 ou 8, dans laquelle :

- durant une opération de tricotage combinant un jour avec l'utilisation d'au moins un fil ayant au moins une partie de trajectoire basse, c'est-à-dire passant à une hauteur inférieure à la hauteur du plan de repos (30) du montant (3) ;
- pour fabriquer le jour, la platine façonnée, afin de transférer l'intermaille vers l'une des aiguilles adjacentes, doit exécuter un mouvement vers l'arrière durant lequel le côté arrière (3B) du montant (3) doit être poussé, dévié ou interféré avec le fil ayant ladite au moins une partie de trajectoire basse ;
- l'ailette (70) est configurée pour supporter, à l'aide dudit plan de support (71), ledit au moins un fil ayant ladite au moins une partie de trajectoire basse, en laissant ladite trajectoire passer au-dessus du plan de support de l'ailette et en empêchant le côté arrière du montant de pousser ou d'interférer avec ledit au moins un fil durant le mouvement de décalage vers l'arrière de la platine façonnée, et

dans laquelle le fil ayant au moins une partie de trajectoire basse est un fil alimenté en-dessous d'un élément de guidage de fil, typiquement, une « boîte », et/ou dans laquelle ledit fil ayant au moins une partie de trajectoire basse est une conception de fil pour sa partie d'une conception plaquée, et/ou dans laquelle l'ailette (70) est configurée pour travailler, en supportant un fil à l'aide dudit plan de support (71), lorsque la platine façonnée (1) fabrique un jour et qu'en même temps des aiguilles adjacentes fabriquent des structures tricotées de type toile ou bouclettes.

10. Platine façonnée (1) selon l'une quelconque des revendications 7 à 9, dans laquelle le plan de support (71) de l'ailette (70) et le plan de repos (30) du montant (3) sont tous deux des surfaces horizontales, préférablement parallèles au corps principal sous-jacent de la platine façonnée, et/ou dans laquelle le plan de support (71) de l'ailette (70) n'est pas abaissé par rapport au plan de repos (30) du montant (3), et/ou dans laquelle le plan de support (71) de l'ailette et le plan de repos (30) du montant sont alignés le long d'un sens longitudinal, c'est-à-dire que l'ailette (70) est coplanaire avec le montant (3) et repose sur ledit plan de repos (G) de la platine façonnée, ou dans laquelle l'ailette (70) est décalée ou inclinée latéralement par rapport au montant (3), depuis lequel elle s'élève, afin de ne pas reposer sur ledit plan de repos (G) de la platine façonnée (1), et/ou dans laquelle le décalage latéral de l'ailette (70) est configuré pour éviter des interférences avec une platine supplémentaire placée latéralement, et/ou dans la-

quelle l'ailette (70) est décalée ou inclinée latéralement, par rapport au montant (3), dans le même sens décalé de la protubérance (6).

11. Platine façonnée (1) selon l'une quelconque des revendications 7 à 10, dans laquelle le corps principal (2), le montant (3) et la protubérance (6) sont fabriqués d'une seule pièce, formant ainsi une platine façonnée de pièce unique, et/ou dans laquelle l'ailette (70) est constituée d'une seule pièce avec ledit montant (3), ou dans laquelle l'ailette (70) est un élément distinct du montant (3), placé à l'arrière de la partie supérieure du montant, de sorte que le plan de support (71) de l'ailette est placé vers l'arrière et aligné par rapport au plan supérieur du montant, et/ou dans laquelle la platine façonnée (1) est entièrement constituée d'une pièce, et/ou dans laquelle la platine façonnée (1) présente dans toute sa pièce une épaisseur constante.

12. Ensemble (A ; B) de pièces plates d'une machine à tricoter circulaire, l'ensemble comprenant :

- une platine d'abattage (7) ou une platine d'intermaille-abattage (7'), pourvue d'une goupille (13, 13') configurée pour coopérer avec les aiguilles (N) d'une machine à tricoter et d'une butée (14, 14') destinée à coopérer avec un moyen d'entraînement approprié de la machine à tricoter afin d'amener un mouvement de décalage de la platine d'abattage (7) ou de la platine d'intermaille-abattage (7'), dans un sens radial par rapport à un axe central (X) de la machine à tricoter ;
- au moins une platine façonnée (1) selon l'une quelconque des revendications précédentes, la platine façonnée (1) étant mobile par rapport à la platine d'abattage (7) ou à la platine d'intermaille-abattage (7') ;

dans lequel l'ensemble (A ; B) est configuré pour être logé dans une rainure radiale (103) respective d'une couronne (102) agencée autour d'un cylindre porte-aiguilles (101) de la machine à tricoter, de sorte que ladite au moins une platine façonnée (1) repose à côté desdites platine d'abattage (7) ou platine d'intermaille-abattage (7'), ladite au moins une platine façonnée (1) et ladite platine d'abattage (7) ou platine d'intermaille-abattage (7') étant radialement mobiles, d'une manière indépendante, dans la rainure radiale (103) respective.

13. Ensemble selon la revendication précédente comprenant un groupe de pièces métalliques plates destinées à coulisser radialement dans une rainure radiale (103) respective et l'une par rapport à l'autre, également, l'ensemble comprenant une platine d'intermaille-abattage (7'), une platine façonnée droite (8) et une platine façonnée gauche (9) ;

dans lequel la platine d'intermaille-abattage (7') comprend un corps principal respectif mis en forme comme une barre horizontale plate (12') orientée comme la rainure (103), et un montant (50) vertical plat se développant depuis la barre horizontale plate (12'), la platine d'intermaille-abattage (7') comprenant en outre une dent (51) verticale se développant au-dessus dudit montant (50),
dans lequel la dent (51) présente une surface avant (52) configurée pour retenir, ou « abattre dessus », l'intermaille chargée et étirée par les protubérances (6) de la platine façonnée droite (8) et de la platine façonnée gauche (9), et
dans lequel la dent (51) est configurée pour retenir, à l'aide de la surface avant (52), l'intermaille portée par les protubérances de la platine façonnée droite (8) et de la platine façonnée gauche (9) durant leur mouvement vers l'arrière fabriquée ainsi pour placer l'intermaille sur une ou plusieurs aiguilles adjacentes afin de former un jour, et dans lequel la surface avant (52) de la dent (51) est configurée pour empêcher, durant le mouvement vers l'arrière des platines façonnée droite et gauche de former un jour, l'intermaille étant étirée radialement vers l'arrière, et dans lequel la surface avant (52) de la dent (51) est configurée pour pousser vers l'avant l'intermaille sur les protubérances (6), durant le mouvement vers l'arrière des platines façonnées droite (8) et gauche (9) afin de former un jour, de sorte que l'intermaille s'étale à son maximum sur les protubérances elles-mêmes.

14. Machine à tricoter circulaire pour fabriquer un textile tricoté à jours, comprenant :

- un cylindre porte-aiguilles (101) ayant une pluralité de rainures longitudinales agencées autour d'un axe central (X) du cylindre porte-aiguilles (101) ;
- une pluralité d'aiguilles (N), étant chacune logée dans une rainure longitudinale respective ;
- au moins une alimentation de fil associée fonctionnellement aux aiguilles (N) ;
- une couronne (102) agencée autour du cylindre porte-aiguilles (101) et ayant une pluralité de rainures radiales (103) ;
- au moins une bague de guidage (90) fonctionnellement associée à la couronne (102), dans laquelle la couronne (102) peut tourner par rapport à la bague de guidage (90) et autour de l'axe central (X) ;
- une pluralité de platines d'abattage (7) et/ou de platines d'intermaille-abattage (7'), chacune logée dans l'une des rainures radiales (103) et

mobile radialement dans la rainure radiale (103) respective, chaque platine d'abattage (7) ou platine d'intermaille-abattage (7') ayant une goupille (13, 13') configurée pour coopérer avec les aiguilles (N) et une butée (14, 14') engagée avec un premier guide (91) obtenu dans la bague de guidage (90) et se développant autour de l'axe central (X) ; dans laquelle le premier guide (91) est configuré pour déplacer la platine d'abattage (7) ou la platine d'intermaille-abattage (7') radialement le long de la rainure radiale (103) respective lorsque la couronne (102) tourne par rapport à la bague de guidage (90) et autour de l'axe central (X) ;

dans laquelle la machine comprend au moins une platine façonnée (1) selon l'une quelconque des revendications 1 à 11, à côté d'une platine d'abattage (7) ou une platine d'intermaille-abattage (7') respective, dans laquelle la platine façonnée (1) est mobile par rapport à la platine d'abattage (7) ou la platine d'intermaille-abattage (7').

15. Machine à tricoter selon la revendication 14, dans laquelle ladite au moins une platine façonnée (1) comprend une platine façonnée droite (8) et une platine façonnée gauche (9) agencées sur des côtés opposés de la platine d'abattage (7) ou de la platine d'intermaille-abattage (7') respective, et dans laquelle :

- la platine façonnée droite (8) a sa protubérance décalée latéralement vers la droite par rapport au montant respectif ;
- la platine façonnée gauche (9) a sa protubérance décalée latéralement vers la gauche par rapport au montant respectif ;

et dans laquelle la platine façonnée droite (8) et la platine façonnée gauche (9) ont leurs protubérances décalées latéralement vers des côtés opposés de ladite platine d'abattage (7) ou platine d'intermaille-abattage (7') et préférablement localisées au-dessus de la platine d'abattage (7) ou de la platine d'intermaille-abattage (7') respective, et dans laquelle les protubérances (6) sont configurées pour charger et étirer l'intermaille et l'agencer sur deux aiguilles adjacentes placées sur des côtés opposés de la platine d'abattage (7) ou de la platine d'intermaille-abattage (7') respective et former le jour,
et dans laquelle ladite au moins une platine façonnée (1) est logée dans l'une des rainures radiales (103) conjointement à la platine d'abattage (7) ou la platine d'intermaille-abattage (7') respective, et dans laquelle l'une des rainures radiales (103) loge :

- un premier ensemble (A) constitué de la platine d'abattage (7) et de la platine façonnée (1), ou de la platine façonnée droite (8) et de la platine façonnée gauche (9) ; ou
- un second ensemble (B) constitué de la platine d'intermaille-abattage (7') et de la platine façonnée (1), ou de la platine façonnée droite (8) et de la platine façonnée gauche (9).

FIG.1

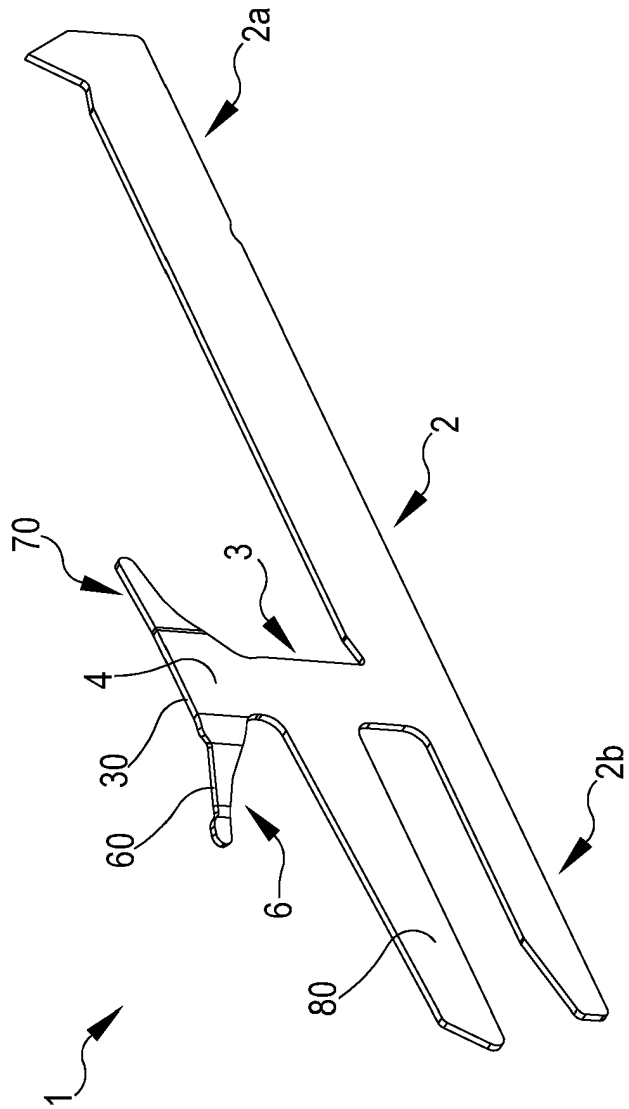
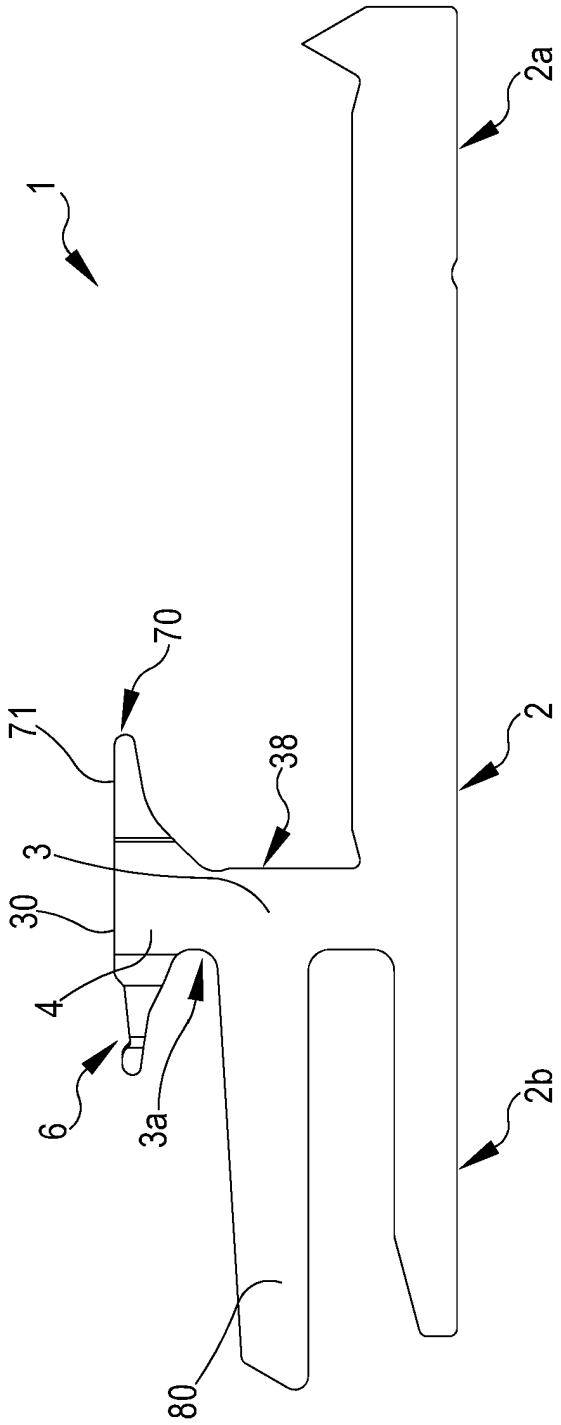


FIG.2



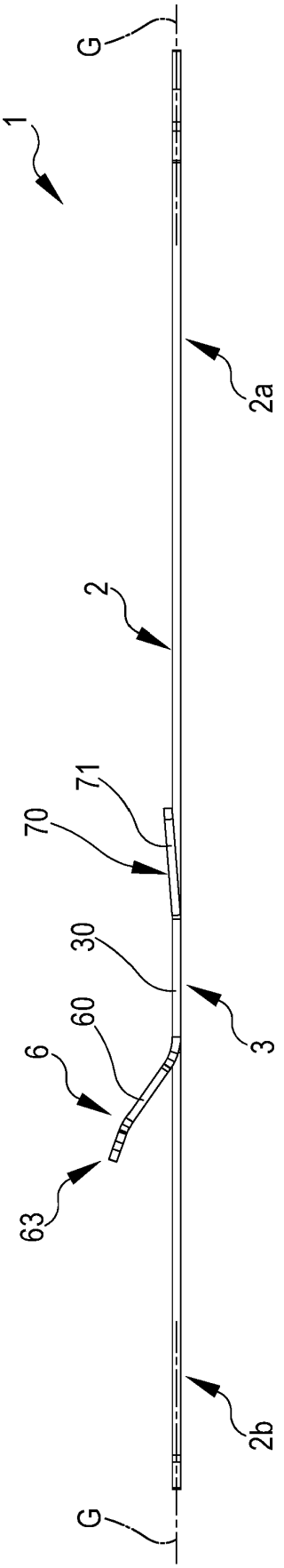


FIG.3

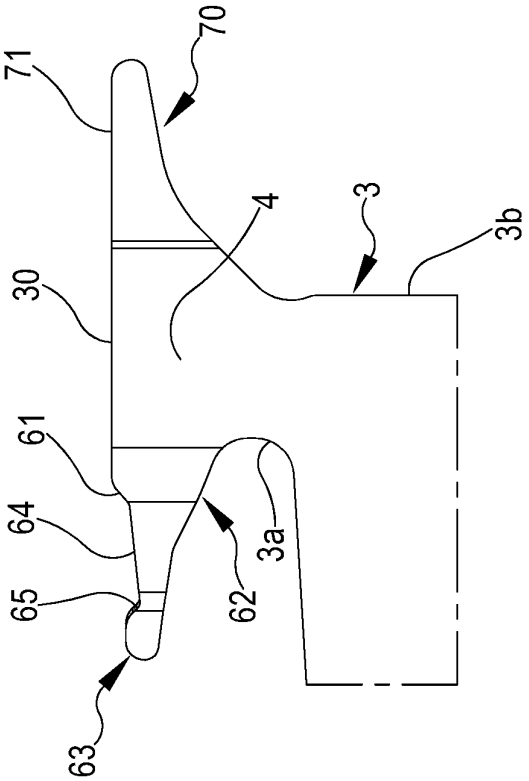


FIG.5

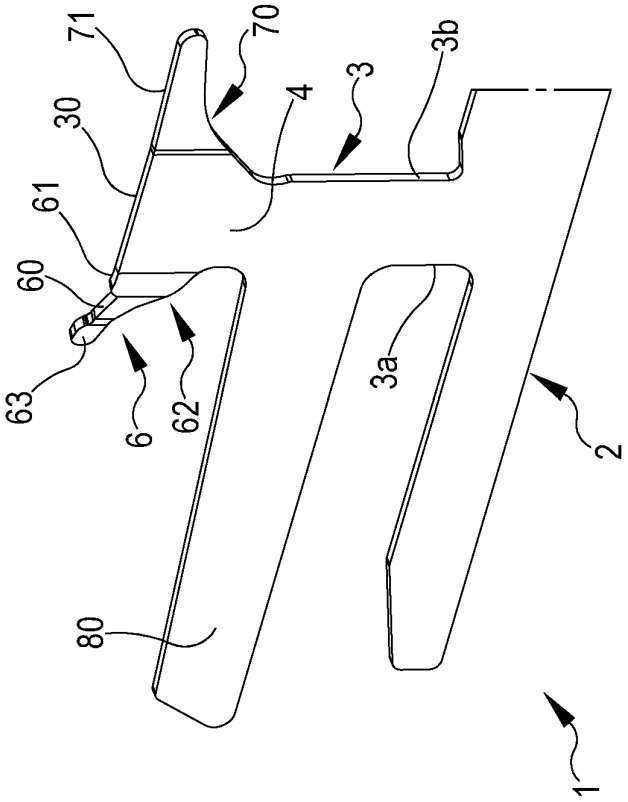


FIG.4

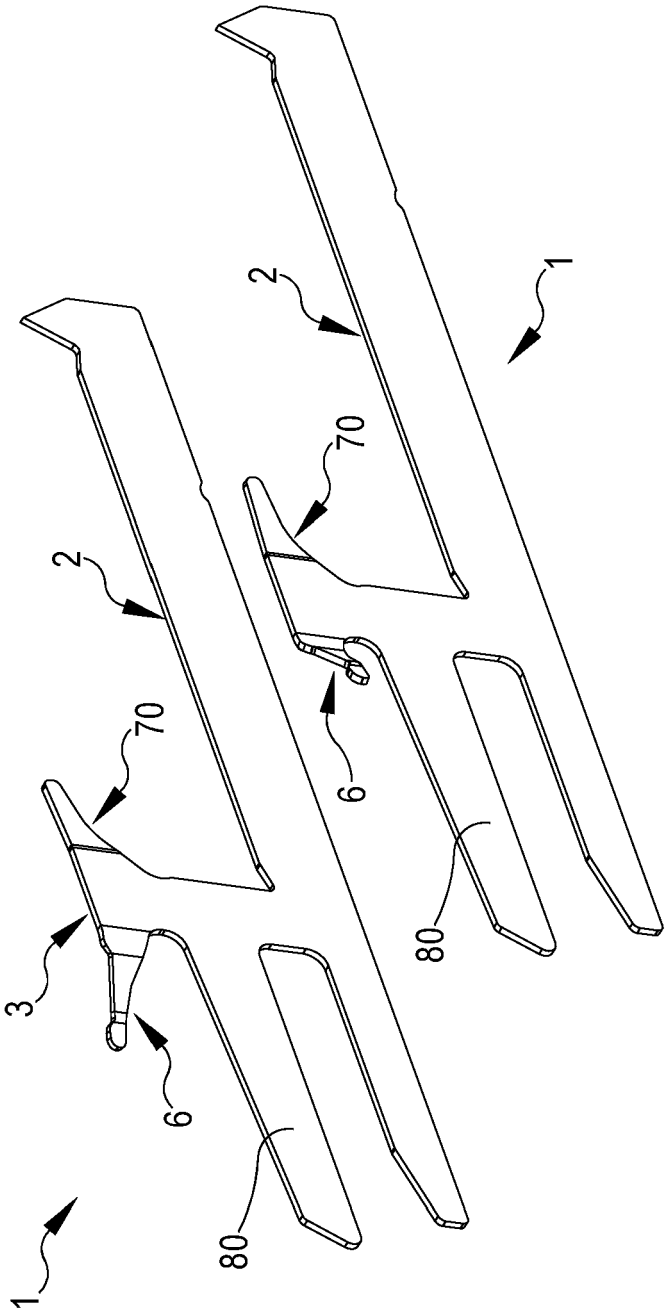


FIG.6

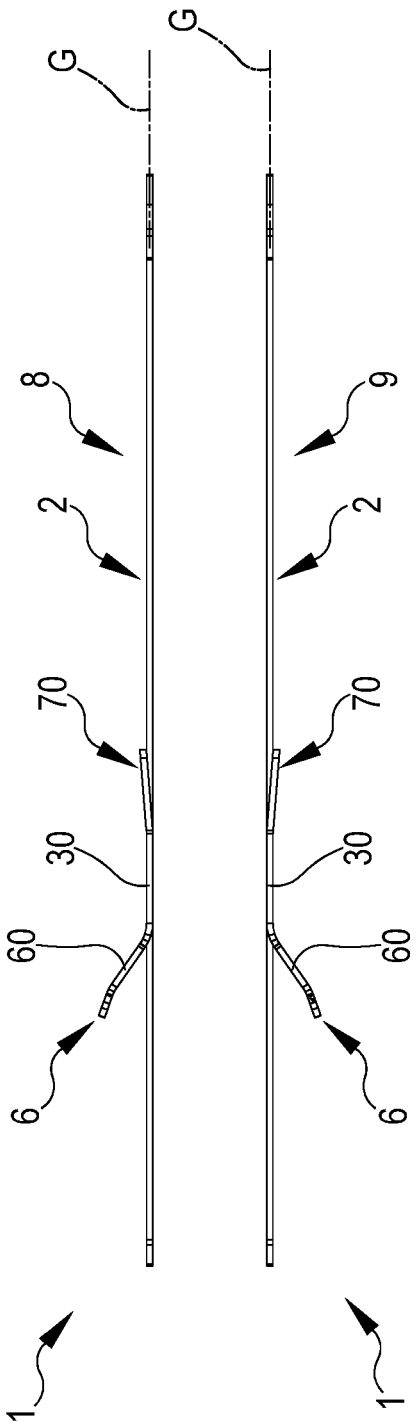


FIG.7

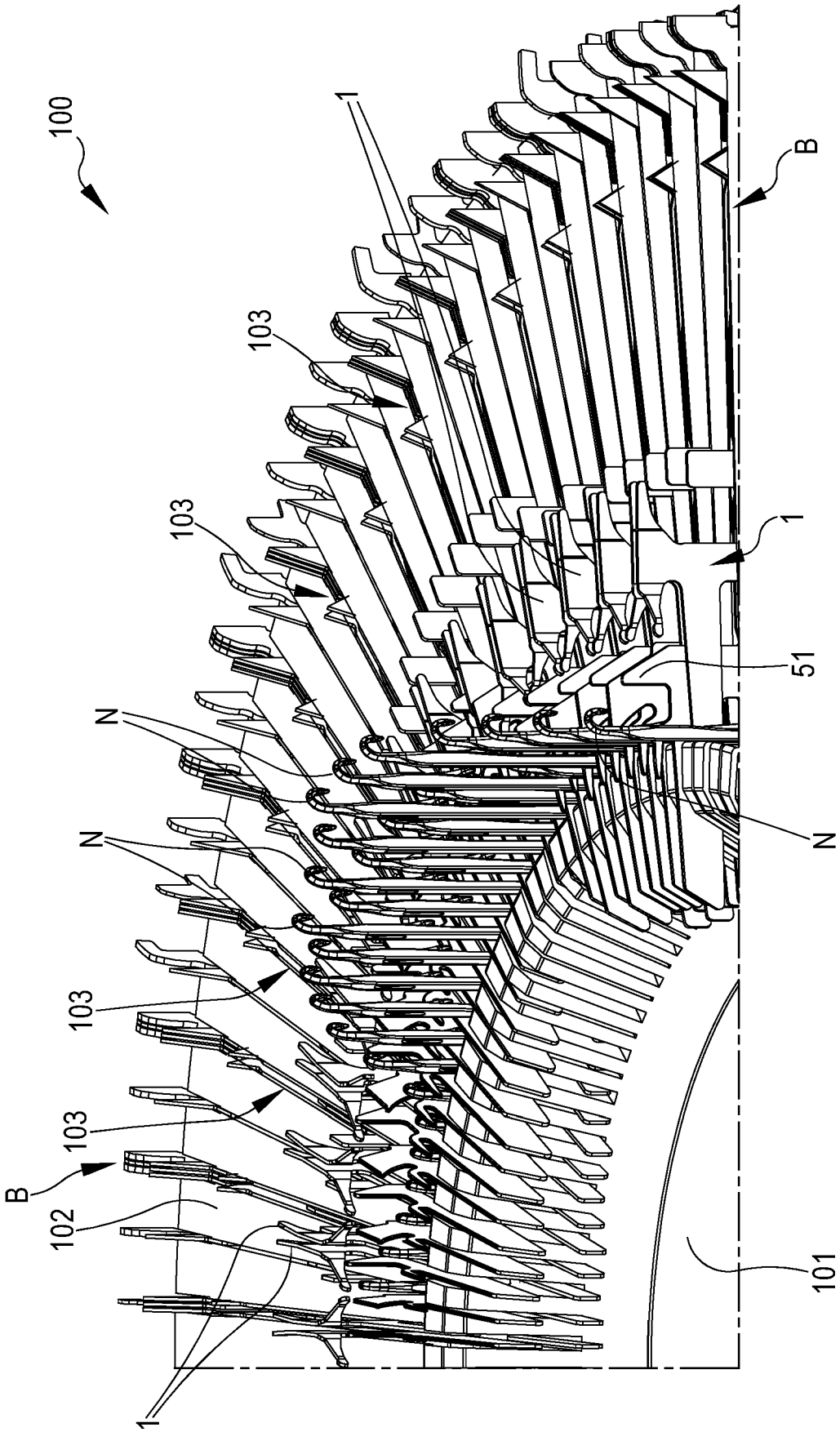


FIG.8

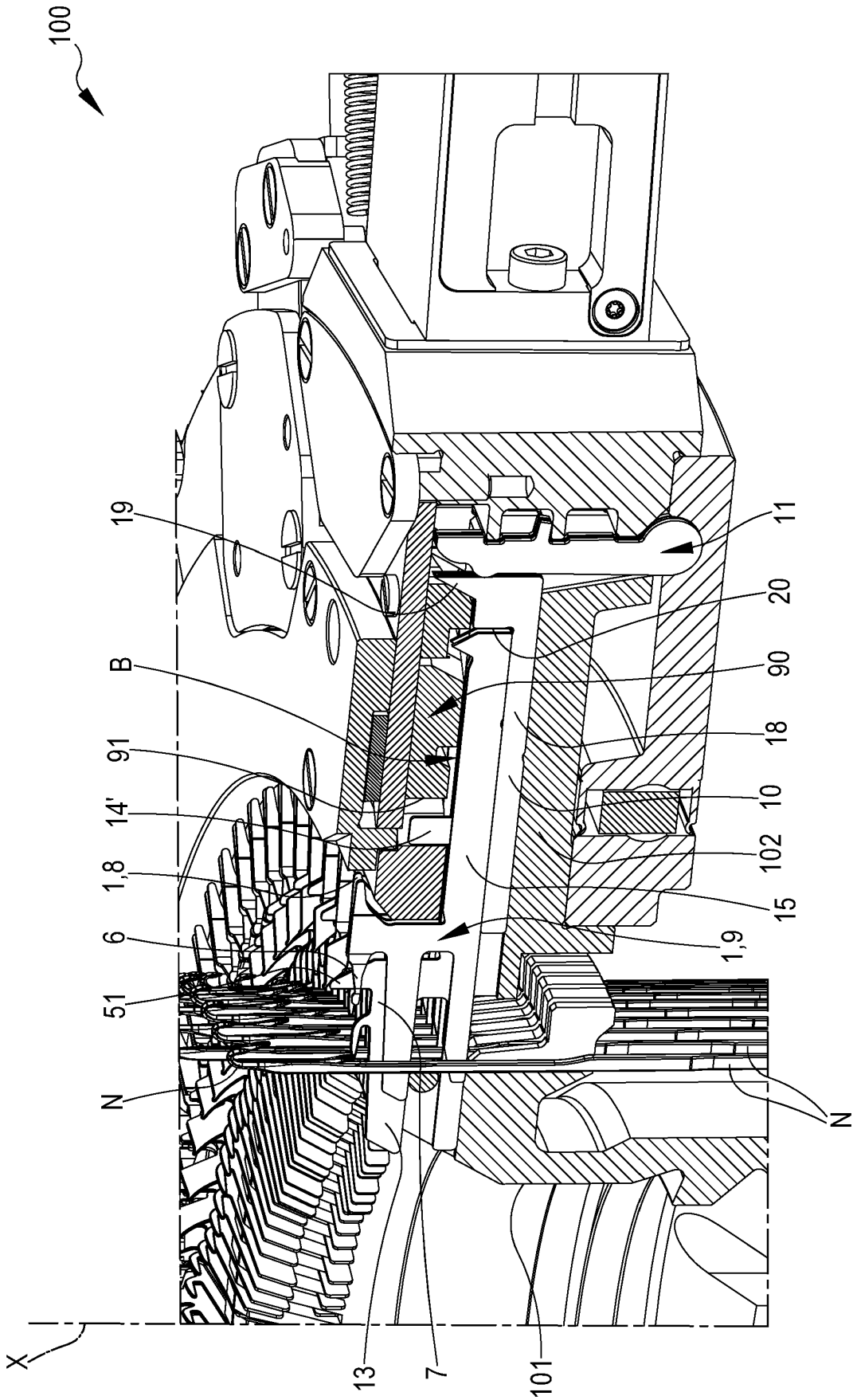


FIG.9

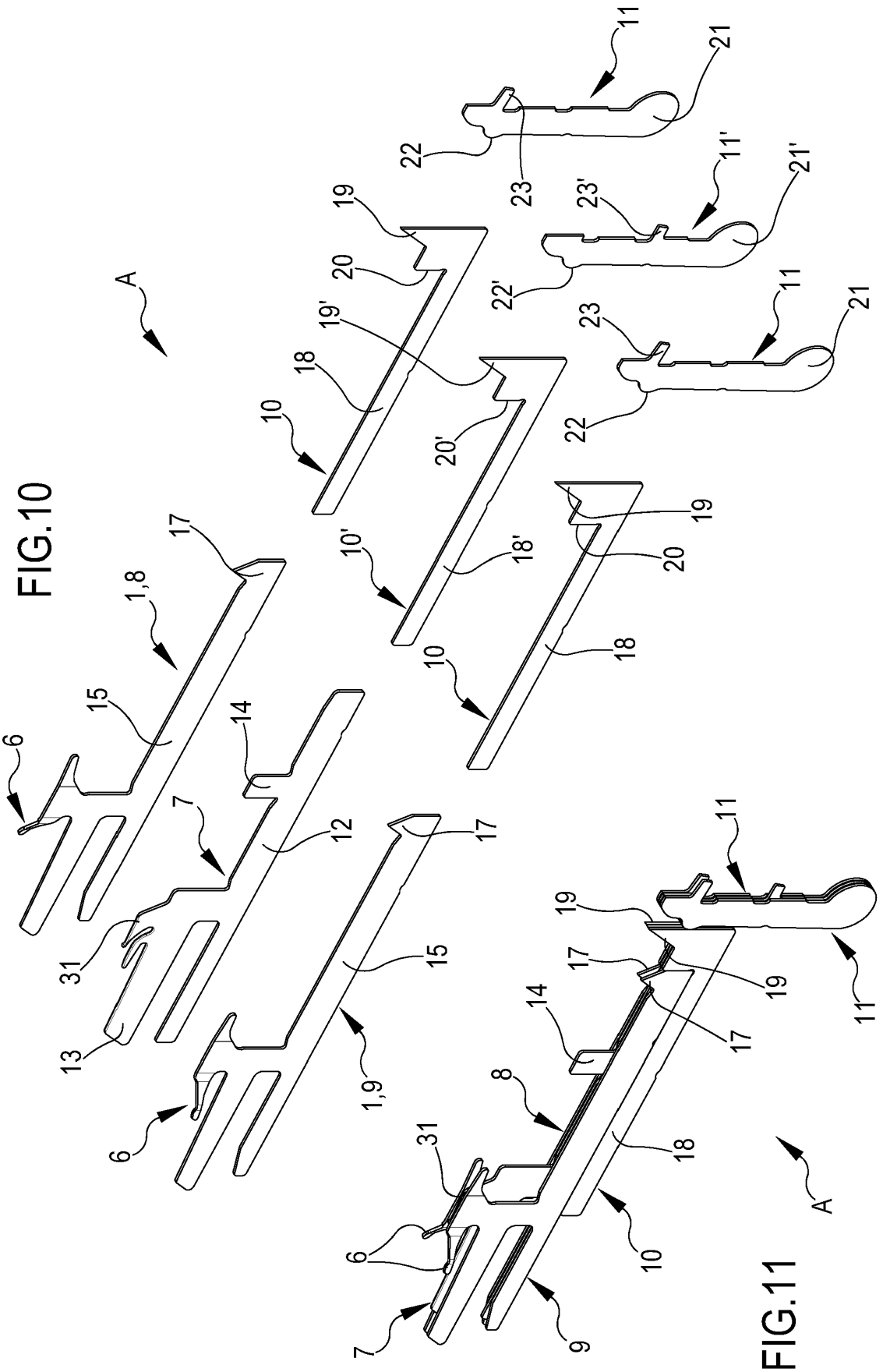

A
11
21
22
23
11'
21'
22'
23'
19
20
19'
18
10
20'
10'
18'
1,8
17
15
14
6
7
12
31
13
1,9
8
9

FIG.10

FIG.11

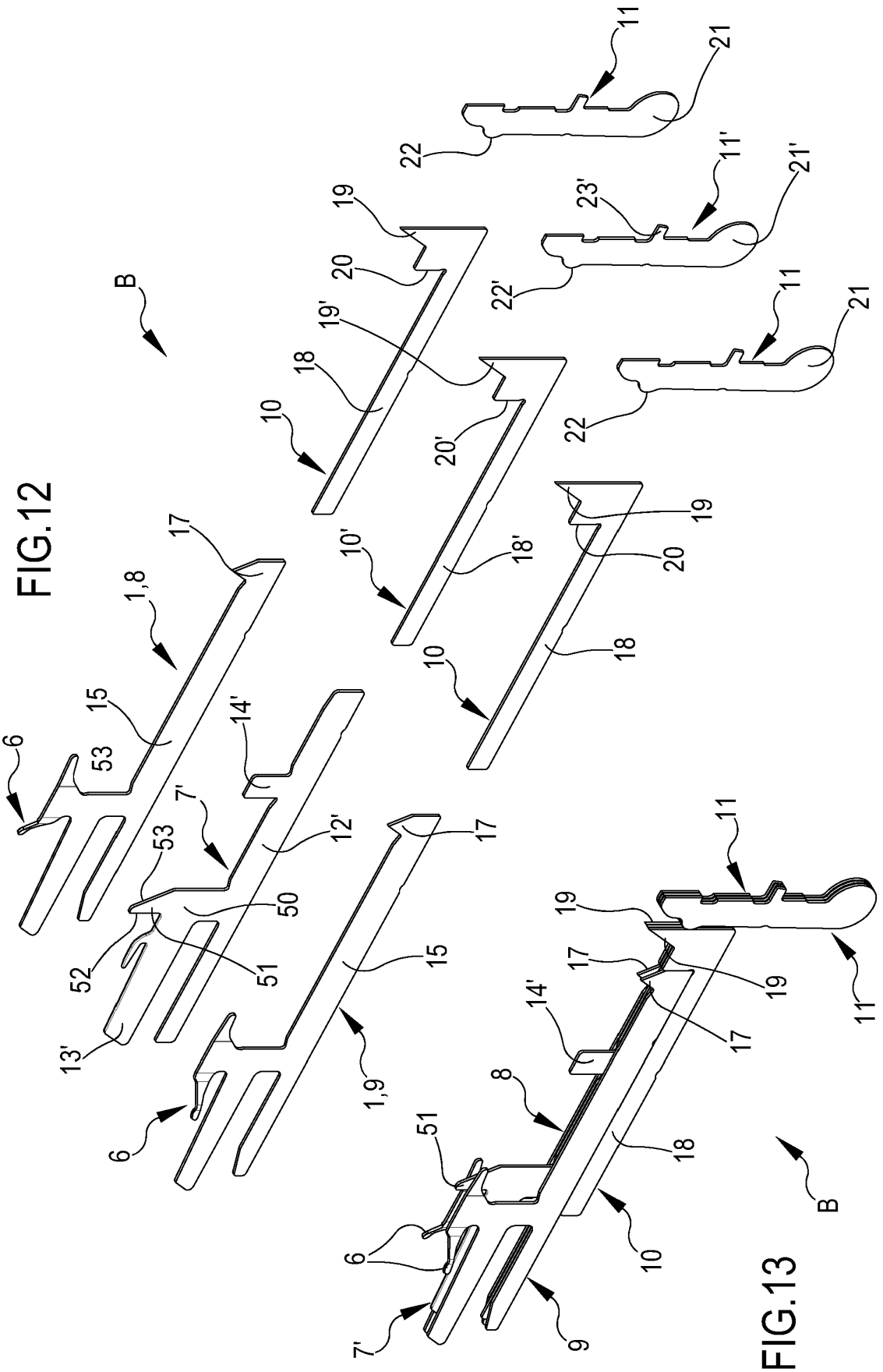

B
1,8
1,9
6
7'
8
9
10
10'
11
11'
12'
13'
14'
15
17
18
18'
19
19'
20
20'
21
21'
22
22'
23'
50
51
52
53

FIG.12

FIG.13

REFERENCES CITED IN THE DESCRIPTION

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