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(71) Applicant: **GERRI S.R.L.** [IT/IT]; Via Trieste, 16, I-25035 Ospitaletto, Brescia (IT).

(72) Inventors: **GERRI, Claudio**; c/o GERRI S.R.L., Via Trieste, 16, I-25035 Ospitaletto, Brescia (IT). **GERRI, Simone**; c/o GERRI S.R.L., Via Trieste, 16, I-25035 Ospitaletto, Brescia (IT).

taletto, Brescia (IT). **COLOSIO, Lorenzo**; Via Don Ori-
one, 14, I-25082 Botticino, Brescia (IT). **GERRI, Clau-
dia**; c/o GERRI S.R.L., Via Trieste, 16, I-25035 Ospitaletto,
Brescia (IT).

(74) Agent: **PULIERI, Gianluca Antonio** et al.; c/o JA-
COBACCI & PARTNERS S.P.A., Piazza della Vittoria, 11,
I-25122 BRESCIA (IT).

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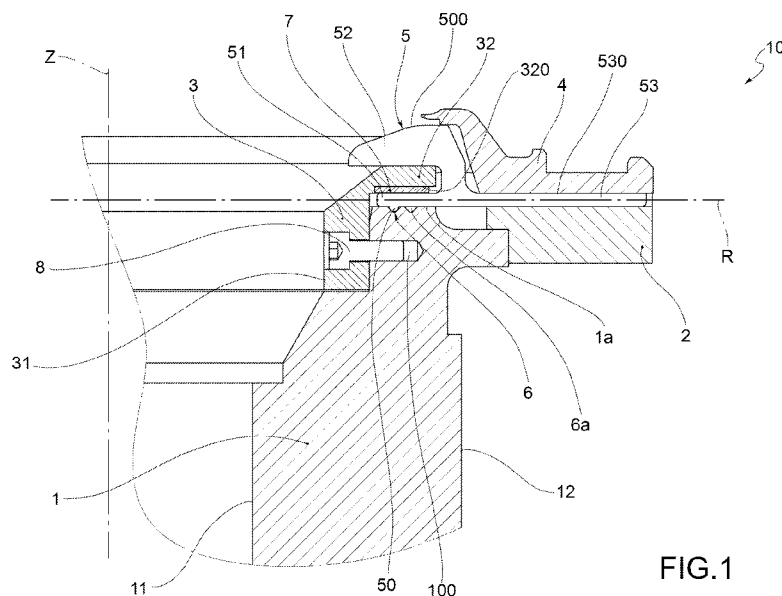


FIG.1

(57) Abstract: A sinker locking assembly for locking fixed sinker inserts (5) for a circular knitting machine comprises a hollow knitting cylinder (1) and a clamping crown (3) inside said cylinder; the clamping crown (3) comprises a clamping flange (32) which projects circumferentially therefrom facing an upper base (da) of the cylinder. The clamping crown (3) is constrainable to the cylinder so as to fasten a fixed sinker insert (5) interposed between the clamping flange (32) and the upper base (da) of the cylinder. A sinker locking system (10) comprises said sinker locking assembly and fixed sinker inserts (5). A circular knitting machine comprises said sinker locking system. An assembly method and assembly of said sinker locking system.



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"SINKER LOCKING ASSEMBLY, SINKER LOCKING SYSTEM, METHODS
FOR ASSEMBLING AND DISASSEMBLING SAID SYSTEM, KNITTING
MACHINE"

DESCRIPTION

5 Field of application

[0001]The present invention relates to a sinker locking system for a circular knitting or hosiery machine, in particular for a single jersey machine, and more specifically a sinker locking assembly.

10 [0002]According to a further aspect, the present invention relates to a circular knitting machine, preferably a single jersey knitting machine, comprising such a sinker locking system.

[0003]According to a still further aspect, the present
15 invention relates to a method for assembling and disassembling said sinker locking system.

[0004]In the knitting sector, and more specifically in the circular knitting sector, or also in the hosiery sector, the working of yarns allows tubular products of any kind
20 and size to be obtained. The working, as is known, is performed by means of the rotation of the cylinder, together with the controlled and synchronized movement of a plurality of needles and a series of sinkers, positioned on said cylinder, which, working on the
25 threads, generate knitting stitches according to more or

less predefined patterns.

[0005] As is known, the needles are generally arranged parallel to the central axis of the cylinder, all about the side wall thereof, and are moved by means of the most
5 diverse cam systems, so that they undergo controlled oscillating vertical translations. Such needles are suitable for automatically capturing the thread.

[0006] Generally, the thread is fed transversely, and the feed reels are placed on the upper frame of the machine
10 or on a side creel; before arriving at the needles, the thread follows a rather long path through tension regulators and stop devices suitable for locking the work in case the thread breaks.

[0007] At the same time, the sinkers are usually arranged
15 transversely to the axis of the cylinder, in particular, at the upper base thereof, according to a radial orientation. Generally, each sinker is interposed between two needles. The sinkers are basically flat elements that act as a "bridge" between one needle and the next and
20 allow for the creation of each knit stitch.

[0008] Some known systems also provide for sinkers to be moved in radial translation by cam systems to cooperate with the eyes of the nearest vertically translating needles.

25 [0009] Disadvantageously, such systems generate poor

finishing performance of the knitted fabric, especially for knitted fabrics that must be particularly fine. In fact, the movement of the sinker with respect to the thread generates torsions on the same, which are
5 unattractive and make the subsequent intervention by the needles complex.

[0010] Furthermore, such torsions generate on the thread significant components of residual tension that affect the durability of said knitted fabric and could be points
10 of potential breakage after few uses of said product.

[0011] According to a still further disadvantage, the sinkers and the entire cylinder become very dirty due to the movement, which entails the risk of compromising the cleaning of the thread and the partially processed piece.

15 [0012] This, inconveniently, therefore requires frequent cleaning of said cylinder, with consequent waste in terms of resources, as well as significant machine downtime.

[0013] A further disadvantage of movable sinker systems consists in the fact that the sliding of the thread
20 combined with the translation of the sinker involves a wear phenomenon that is widespread on the felling surface of the sinker, which makes it completely unusable after the maximum working cycles of the project.

[0014] An alternative solution designed to overcome these
25 drawbacks involves the use of sinkers made in two pieces,

a fixed sinker insert, and a movable tooth insert.

[0015] In current systems that make use of this type of sinker, each fixed sinker insert is mounted on the cylinder by clip coupling or similar types of locking.

5 That is, each fixed sinker insert comprises a coupling tooth suitable for being inserted by force or snap coupling into a respective receiving portion of the cylinder.

[0016] Disadvantageously, each of these inserts must be
10 mounted individually on the cylinder. Clearly, since common knitting cylinders carry hundreds to thousands of such elements, the assembly of such inserts is expensive, impractical, and time-consuming.

[0017] According to a further disadvantage, currently, the
15 operation must be carried out manually by an operator.

[0018] Inconveniently, moreover, these inserts are suitable for use only on a dedicated machine, specially modified to support the coupling of such inserts. The current fixed sinker system is therefore not applicable for
20 performing the retro-fitting of traditional knitting machines without requiring a complete re-design.

[0019] According to a further disadvantage, the coupling of these fixed sinker inserts generates irreversible deformations on said inserts, which prevent a second
25 application. That is, once the insert has been coupled,

following its removal, it is no longer possible to reuse it.

[0020] According to a further disadvantage, moreover, these two-piece sinker systems provide for a double slit, one
5 for the fixed sinker insert and one for the movable sinker insert, made side by side in the circumferential direction. In other words, such systems require the creation of two adjacent slits in a circumferential direction between each pair of contiguous needles.

10 [0021] This requirement is also clearly an indication and cause of a complete redesign of said machine to make it suitable for working with such types of sinkers.

Solution of the invention

[0022] Therefore, there appears to be a significant need to
15 provide a sinker locking system and a circular knitting machine capable of overcoming the drawbacks typical of the prior art.

[0023] In particular, the object of the present invention is to provide a locking system which facilitates and
20 speeds up the assembly of the sinkers.

[0024] A further object of the present invention, moreover, is to provide a locking system which may also be applied to traditional machines, i.e. which allows the retro-fitting thereof.

25 [0025] A still further object is to provide a sinker

locking system that makes it possible to reuse the sinkers after their extraction.

[0026] This requirement is satisfied by a sinker locking system, a cylinder for a knitting machine and a knitting machine according to the accompanying independent claims. The claims dependent thereon describe preferred or advantageous embodiments of the invention, comprising further advantageous features.

Description of the drawings

[0027] The features and advantages of the sinker locking assembly will become apparent from the description below of a number of preferred embodiments, given by way of non-limiting example, with reference to the accompanying figures, in which:

- Fig. 1 is a sectional view of a sinker locking system for a knitting machine according to an embodiment of the present invention;

- Fig. 2 is a perspective view of a sinker locking system for a knitting machine according to an embodiment of the present invention;

- Fig. 3 is a sectional perspective view of a sinker locking system for a knitting machine in an embodiment of the present invention;

- Fig. 4 is a sectional perspective view of a portion of a sinker locking system for a knitting machine in an

embodiment of the present invention.

Detailed description

[0028] With reference to the aforesaid figures, a sinker locking system has been indicated as a whole with the
5 reference numeral 10.

[0029] The present invention refers to a sinker locking assembly for locking fixed sinker inserts 5 for a circular knitting machine, preferably single jersey.

[0030] In the present description, as will be easily
10 understood by reading the following discussion, reference is made only to single jersey, i.e., single-cylinder, knitting machines in which the knitted fabric is processed by means of a single bed of needles.

[0031] This is different from the sector of double jersey
15 knitting machines, where instead two cylinders are opposed in order to be able to process double jersey fabrics, using two needle beds.

[0032] The sinker locking assembly comprises a hollow knitting cylinder 1 extending with an inner side wall 11
20 and an outer side wall 12 along and about a central axis Z, between an upper base 1a and a lower base.

[0033] Preferably, the sinker locking assembly comprises a single knitting cylinder 1 (i.e., it is suitable for applications on single jersey machines).

[0034] In other words, the cylinder 1 has a central through cavity, also extending along and about said central axis Z.

[0035] In the present description, each element will be
5 defined, to promote clarity and conciseness of
description, with respect to a reference system
identified by the positioning of the cylinder in space,
i.e., a cylindrical reference system. That is to say,
once the central axis Z has been identified, an axial
10 direction will be referred thereto. Furthermore, any
direction perpendicular to said central axis and having a
point in common with said central axis will be defined as
the radial direction R. The circumferential direction,
meanwhile, will be the direction identified by a side
15 wall of said cylinder.

[0036] The cylinder 1 is operable in rotation about said
central axis Z.

[0037] The cylinder 1 is shaped to support a plurality of
knitting needles on its outer side surface, i.e., in
20 technical jargon, the cylinder 1 is shaped to support a
bed of needles. Said needles are suitable for being moved
in vertical translation, i.e. parallel to the central
axis Z, preferably by cam kinematic mechanisms.

[0038] In particular, the aforesaid needles slide in
25 special respective vertical channels made in the outer

side surface of the cylinder 1. This description will not dwell on the movement of the needles and the shape of said channels, which are well known to a person skilled in the art.

5 [0039] The sinker locking assembly also comprises an inner clamping crown 3, comprising a crown body 31 which extends about said central axis Z inside said cylinder 1 and from which a clamping flange 32 that faces the upper base 1a of the cylinder 1 projects circumferentially in a
10 radial direction R transverse to said central axis Z.

[0040] In other words, the clamping crown 3 has a smaller diameter than the outermost diameter of the cylinder 1.

[0041] The clamping crown 3 is constrainable to the cylinder 1 so as to clamp a plurality of fixed sinker
15 inserts 5 at least partially interposed between said clamping flange 32 and the upper base 1a of the cylinder.

[0042] In one embodiment, the clamping crown 3 is constrainable to the cylinder 1 at the inner side wall 11 of the cylinder 1 by means of fastening elements 8. For
20 example, the clamping crown 3 has a side wall 31 in which through holes 300 are obtained, suitable for matching with respective fastening seats 100 obtained on the inner side wall 11 of the cylinder 1, and the fastening elements 8 are screws clamped in said fastening seats
25 100.

[0043] According to a further aspect, the present invention relates to a sinker locking system 10 comprising a sinker locking assembly according to the present invention and comprising fixed sinker inserts 5.

5 [0044] Each fixed sinker insert 5 of said fixed sinker inserts 5 extends in the radial direction R between a head end 5a facing the central axis Z and a tail end 5b opposite said head end 5a.

[0045] Each fixed sinker insert 5 comprises, at the head
10 end 5a, a locking protrusion 51 suitable to be interposed and clamped between the clamping flange 32 and the upper base 1a of the cylinder 1.

[0046] Preferably, the fixed sinker insert 5 is a shape obtained from a thin plate.

15 [0047] In one embodiment, each fixed sinker insert 5 comprises, at said head end 5a, a felling protrusion 52 which remains at least partially axially spaced - i.e., in the direction parallel to the central axis Z - with respect to the locking protrusion 51 and which is
20 suitable for being raised above the clamping flange 32 when the inner clamping crown 3 is constrained to the cylinder 1.

[0048] In other words, the felling protrusion 52 and the locking protrusion 51 are shaped to form a kind of C in
25 the radial plane, i.e. to delimit an inner recess

suitable to accommodate the clamping flange 32 of the crown 3 when this is in the locked condition.

[0049] The aforesaid felling protrusion 52 is delimited at the top by an upper edge 500 which identifies an area for
5 loop formation (or felling). In other words, the thread being worked in the knitting machine is suitable for resting on and sliding on said upper edge 500.

[0050] Preferably, in the clamping crown 3 - and in particular in the clamping flange 32 - radial slits 350
10 are obtained, each suitable for accommodating the felling protrusion 52 of each fixed sinker insert 5 in such a way as to constrain it so as not to allow circumferential deviations - unless geometric tolerances are reduced - and at the same time leaving the upper edge 500 free and
15 elevated with respect to the tightening flange 3.

[0051] That is, preferably, each radial slit 350 has a thickness less than the overall height of the felling protrusion 52.

[0052] Preferably, the clamping flange 32 is delimited at
20 the bottom by an abutment surface 320 facing the upper base 1a of the cylinder 1.

[0053] The clamping crown 3 comprises an annular pad 7 applied at said abutment surface 320 suitable for compensating for any mechanical tolerances in clamping

each fixed sinker insert 5 between the clamping flange 32 and the upper base 1a.

[0054] That is, the annular pad 7 directly faces the locking protrusion 51 of the fixed sinker insert 5 and, in the locked configuration, comes into pressing contact therewith to stably constrain the fastening of the fixed sinker insert 5 between the clamping flange 32 and the upper base 1a.

[0055] Preferably, the annular pad 7 is made of a soft material.

[0056] Preferably, therefore, the clamping of the fixed sinker insert 5 is ensured by friction.

[0057] Advantageously, the presence of such an annular pad allows for any geometric tolerances existing between the thickness of the locking protrusion 1 and the space delimited by the clamping flange 32 and the upper base 1a to be compensated.

[0058] In one embodiment, the sinker locking system 10 also comprises an outer crown 2 fastened to the cylinder 1, preferably in proximity to the upper base 1a.

[0059] In a preferred embodiment, the outer crown 2 externally surrounds the cylinder in proximity to the upper base 1a.

[0060] Each fixed sinker insert 5 comprises a tail portion 53 extending in the radial direction R, preferably from the locking protrusion 51 toward the tail end 5b.

[0061] The outer crown 2 has an upper wall 20 in which
5 radial grooves 200 are obtained, which are equally spaced apart from one another in the circumferential direction and each suitable for accommodating at least partially the tail portion 53 of a fixed sinker insert 5 resting thereon.

10 [0062] Preferably, said radial grooves 200 are suitable for matching, in locked configuration, with the radial slits 350 obtained on the clamping crown 3.

[0063] Preferably, said radial grooves 200 are each suitable for accommodating the tail portion 53 of each
15 fixed sinker insert 5 in such a way as to constrain it so as not to allow circumferential deviations thereof - unless low geometric tolerances.

[0064] Preferably, each radial groove 200 has a greater thickness than the thickness of the tail portion 53.

20 [0065] In one embodiment, the locking protrusion 51 and the tail portion 53 form the base of the fixed sinker insert 5, from which the felling protrusion 52 protrudes at the top and in an at least partially spaced apart manner.

[0066] Preferably, the tail portion 53 of each fixed sinker
25 insert 5 identifies an upper rim 530 at the top.

[0067] In an advantageous embodiment, the sinker locking system 10 also comprises movable sinker inserts 4. Said movable sinker inserts 4 are suitable for cooperating with the fixed sinker inserts 5 to operate synergistically and synchronously with the needles of the cylinder to continue the working of the knitted fabric.

[0068] In one embodiment, each movable sinker insert 4 of said movable sinker inserts 4 extends in a radial direction R between a toothed end 4a facing the central axis Z and a free end 4b opposite the toothed end 4a and is delimited at the bottom by a sliding edge 43.

[0069] Each movable sinker insert 4 is accommodated in the same radial groove 200 of the respective fixed sinker insert 5 and is slidable on the upper rim 530 of the respective fixed sinker insert 5. That is, the sliding edge 43 is suitable for sliding on the upper rim 530 guided by the radial groove 200, preferably directly in contact therewith.

[0070] That is, contrary to that which happens in known fixed sinker knitting machines, wherein a movable element is slidable in a slit circumferentially adjacent to the slit dedicated to the fixed element, in this case the movable element (the movable sinker insert 4) is slidable in the same radial groove 200 of the fixed element (of

the fixed sinker insert 5) and in a manner superimposed with respect thereto.

[0071] That is, preferably, the movable sinker insert 4 slides directly in contact with the upper rim 530 of the
5 tail portion 53.

[0072] Advantageously, this embodiment makes the system adaptable to all circular knitting machines that provide a single radial groove - preferably made in two portions, one on the outer crown and one on the clamping crown -
10 interposed between two axial channels for the needles and not requiring further work operations on the cylinder or on the outer crown to be performed.

[0073] In a variant embodiment, each movable sinker insert 4 comprises a tooth 40 protruding radially therefrom at
15 the toothed end 4a and suitable for gripping a thread being worked in the circular knitting machine while working in synchronization with a knitting needle mounted on the cylinder.

[0074] Preferably, when the movable sinker insert is in an
20 advanced position along the radial direction R toward the central axis Z, the tooth 40 faces the felling protrusion 52 of the fixed sinker insert 5.

[0075] That is, the movable sinker insert 4 carries the tooth 40 at its toothed end 4a and is operated in a
25 sliding manner on the fixed sinker insert 5 so that the

tooth 40 intercepts the thread in contact with the felling protrusion 52 and causes it to form the knitting stitch or the felling.

[0076] Preferably, the sliding of said movable sinker
5 inserts 4 is also actuated by cam mechanisms, preferably in a synchronized manner with the upward and downward motion of the needles.

[0077] In an advantageous variant embodiment, a plurality of slots 6 are obtained in the upper base 1a of the
10 cylinder 1 so that each is located at a radial slit 350.

[0078] Said plurality of slots are preferably equidistant from each other circumferentially.

[0079] In an advantageous alternative variant, the slots 6 are part of a single annular groove obtained
15 circumferentially on the upper base 1a of the cylinder 1.

[0080] According to such embodiments, the locking protrusion 51 of each fixed sinker insert 5 has a ridge 50 at the bottom which is engageable in the respective slot 6 of said plurality of slots 6 - or in the annular
20 groove - to ensure the positioning of each fixed sinker insert 5 with respect to the radial direction R.

[0081] In a further advantageous embodiment, a plurality of auxiliary slots 6a spaced apart from each other circumferentially - or, an auxiliary annular groove in
25 addition to the aforesaid annular groove - are also

obtained in the upper base 1a of the cylinder. Such auxiliary slots 6a or such auxiliary annular groove are suitable for engaging the ridge 50 of each fixed sinker insert 5 in such a way that, when a fixed sinker insert 5
5 has signs of wear, said insert may be slightly translated into the respective groove 200 to take a second working position in the auxiliary slot 6a.

[0082] In other words, such auxiliary slots 6a allow the fixed sinker inserts 5 to be repositioned in the
10 respective radial groove 200, so that working is allowed in two working positions, a standard working position and a secondary working position.

[0083] This, advantageously, makes the sinker insert 5 reusable for a greater number of working cycles. In fact,
15 the heavy stresses in the loop formation process, due to mechanical processes, cause the fixed sinker insert 5 to wear, in particular at the felling protrusion portion 52 on which the thread slides. The auxiliary slot 6a allows for a second positioning of the fixed sinker insert 5, so
20 that the thread may slide on an unworn portion of the felling protrusion.

[0084] The present invention also refers to method of assembling a sinker locking system 10 comprising the following steps:

[0085] - radially inserting the fixed sinker inserts 5 to place them at least partially interposed between the clamping crown 3 and the upper base 1a of the cylinder 1;

[0086] - stably constraining the clamping crown 3 to the cylinder 1 so as to lock the fixed sinker inserts 5.

[0087] The present invention also refers to a disassembling method of a sinker locking system 10 comprising the following steps:

[0088] - releasing the clamping crown 3 from the constraint with the cylinder 1;

[0089] - extracting the fixed sinker inserts 5 by sliding in the radial direction R away from the central axis Z.

[0090] It is clear that the present invention also refers to a circular knitting machine comprising a sinker locking system according to the present invention.

[0091] Innovatively, the present invention solves the drawbacks of the knitting systems with fixed sinker typical of the prior art.

[0092] Advantageously, the sinker locking system according to the present invention allows for the use of fixed sinker inserts that ensure better working, without causing torsions on the thread sliding on the felling surface thereof.

[0093] According to a further advantage, the sinker locking system facilitates the insertion and assembly operations

of the fixed sinker inserts, generating a consequent time savings and resulting in a gain in terms of piece production.

[0094] At the same time, according to a still further
5 advantage, the sinker locking system, in the embodiment which provides for the use of an annular pad, is suitable for compensating for any geometric deviations due to the working tolerances of the inserts and cylinders and allows for stable, optimal and reliable locking of the
10 inserts.

[0095] Advantageously, this type of locking does not generate plastic deformations on the fixed sinker inserts. Consequently, these inserts may be reused even after being extracted from the cylinder following
15 disassembly.

[0096] Advantageously, providing two working positions of the fixed sinker insert, by arranging two (or more) slots made on the cylinder, allows the same inserts to continue to be used even after undergoing wear on the portion
20 where the thread slides simply by translating them into the second working position in the auxiliary slot.

[0097] According to a further advantage, the sinker inserts are insertable and extractable from the locking system by simply sliding them along the radial groove thereof, from
25 outside the cylinder.

[0098] This entails a huge advantage in the operational convenience of operators who do not have to intervene inside the cylinder in reduced spaces but may operate from outside the cylinder, also moving a large plurality
5 of inserts simultaneously.

[0099] According to a further advantage, the sinker locking system according to the present invention is applicable to traditional knitting machines, as well as to machines that generally support movable sinkers, by making reduced
10 modifications to only the clamping crown and to the clamping cylinder to allow the releasable constraint thereof.

[00100] It is clear that, to the embodiments of the aforesaid invention, a person skilled in the art, in
15 order to meet specific needs, could make variations or substitutions of elements with functionally equivalent ones.

[00101] These variants are also contained within the scope of protection as defined by the following claims.
20 Moreover, each variant described as belonging to a possible embodiment may be implemented independently of the other variants described.

CLAIMS

1. A sinker locking assembly for locking fixed sinker inserts (5) for a circular knitting machine, comprising:
- a hollow knitting cylinder (1) extending with an inner side wall (11) and an outer side wall (12) along and about a central axis (Z), between an upper base (1a) and a lower base;
 - an inner clamping crown (3), comprising a crown body (31) extending about said central axis (Z) inside said cylinder (1) and from which a clamping flange (32) facing the upper base (1a) of the cylinder (1) projects circumferentially in a radial direction (R) transverse to said central axis (Z), and wherein the clamping crown (3) is constrainable to the cylinder (1) so as to clamp fixed sinker inserts (5) at least partially interposed between said clamping flange (32) and the upper base (1a) of the cylinder.
2. Sinker locking assembly according to claim 1, wherein the clamping crown (3) is constrainable to the cylinder (1) at the inner side wall (11) of the cylinder by means of fastening elements (7).
3. A sinker locking system (10) comprising a sinker locking assembly according to claim 1 or 2 and comprising fixed sinker inserts (5),
- wherein each fixed sinker insert (5) of said fixed sinker

inserts (5) extends in the radial direction (R) between a head end (5a) facing the central axis (Z) and a tail end (5b) opposite to said head end (5a),

and wherein each fixed sinker insert (5) comprises a locking protrusion (51) at the head end (5a), suitable for being interposed and clamped between the clamping flange (32) and the upper base (1a) of the cylinder (1).

4. Sinker locking system (10) according to claim 3, wherein each fixed sinker insert (5) comprises a felling protrusion (52) at said head end (5a), which is axially spaced apart with respect to the locking protrusion (51) and adapted to be raised with respect to the clamping flange (32) when the inner clamping crown (3) is constrained to the cylinder (1), said felling protrusion (52) being delimited at the top by an upper edge (500) which identifies a loop formation (or felling) surface.

5. Sinker locking system (10) according to claim 3 or 4, wherein the clamping flange (32) is delimited at the bottom by an abutment surface (320) facing the upper base (1a) of the cylinder (1), and wherein the clamping crown (3) comprises an annular pad (7) applied at said abutment surface (320) and suitable for compensating for any mechanical tolerances in the clamping of each fixed sinker insert (5) between the clamping flange (32) and the upper base (1a).

6. Sinker locking system (10) according to any one of the preceding claims, further comprising an outer crown (2) fastened to the cylinder (1) in proximity to the upper base (1a),

5 wherein each fixed sinker insert (5) comprises a tail portion (53) extending in the radial direction (R) towards the tail end (5b),

wherein the outer crown (2) has an upper wall (20) in which radial grooves (200) are obtained, which are
10 equally spaced apart from one another in a circumferential direction and each suitable for accommodating at least partially the tail portion (53) of a fixed sinker insert (5) resting thereon.

7. Sinker locking system (10) according to claim 6,
15 comprising movable sinker inserts (4),

wherein each movable sinker insert (4) of said movable sinker inserts (4) extends in a radial direction between a toothed end (4a) facing the central axis (Z) and a free end (4b) opposite to the toothed end (4a), and is
20 delimited at the bottom by a sliding edge (43),

wherein the tail portion (53) of each fixed sinker insert (5) identifies an upper rim (530) at the top,
and wherein each movable sinker insert (4) is accommodated in the same radial groove (200) of the
25 respective fixed sinker insert (5) and slides on the

upper rim (530) of the respective fixed sinker insert (5).

8. Sinker locking system (10) according to claim 7, wherein each movable sinker insert (4) comprises a tooth (40) protruding radially therefrom at the toothed end (4a) and suitable for grasping a thread being processed in the circular knitting machine working in synchronization with a knitting needle mounted to the cylinder.
9. Sinker locking system (10) according to any one of claims 3 to 8, wherein a plurality of slots (6) are obtained in the upper base (1a) of the cylinder (1), being preferably part of a single annular groove obtained in the upper base (1a),
- and wherein the locking protrusion (51) of each fixed sinker insert (5) has a ridge (50) at the bottom, which is engageable in the respective slot (6) of said plurality of slots (6) for ensuring the positioning of each fixed sinker insert (5) with respect to the radial direction (R).
10. Sinker locking system (10) according to claim 9, wherein a plurality of auxiliary slots (6a) are obtained in the upper base (1a) of the cylinder, each suitable for engaging the ridge (50) of each fixed sinker insert (5) when one or more fixed sinker inserts (5) have signs of

wear after use, so that, when a fixed sinker insert (5) has signs of wear, such an insert can be slightly translated in the respective groove (200) to take a second working position.

5 **11.** A method for assembling a sinker locking system (10) according to any one of claims 3 to 10, comprising the following steps:

- radially inserting the fixed sinker inserts (5) to place them at least partially interposed between the
10 clamping crown (3) and the upper base (1a) of the cylinder (1);

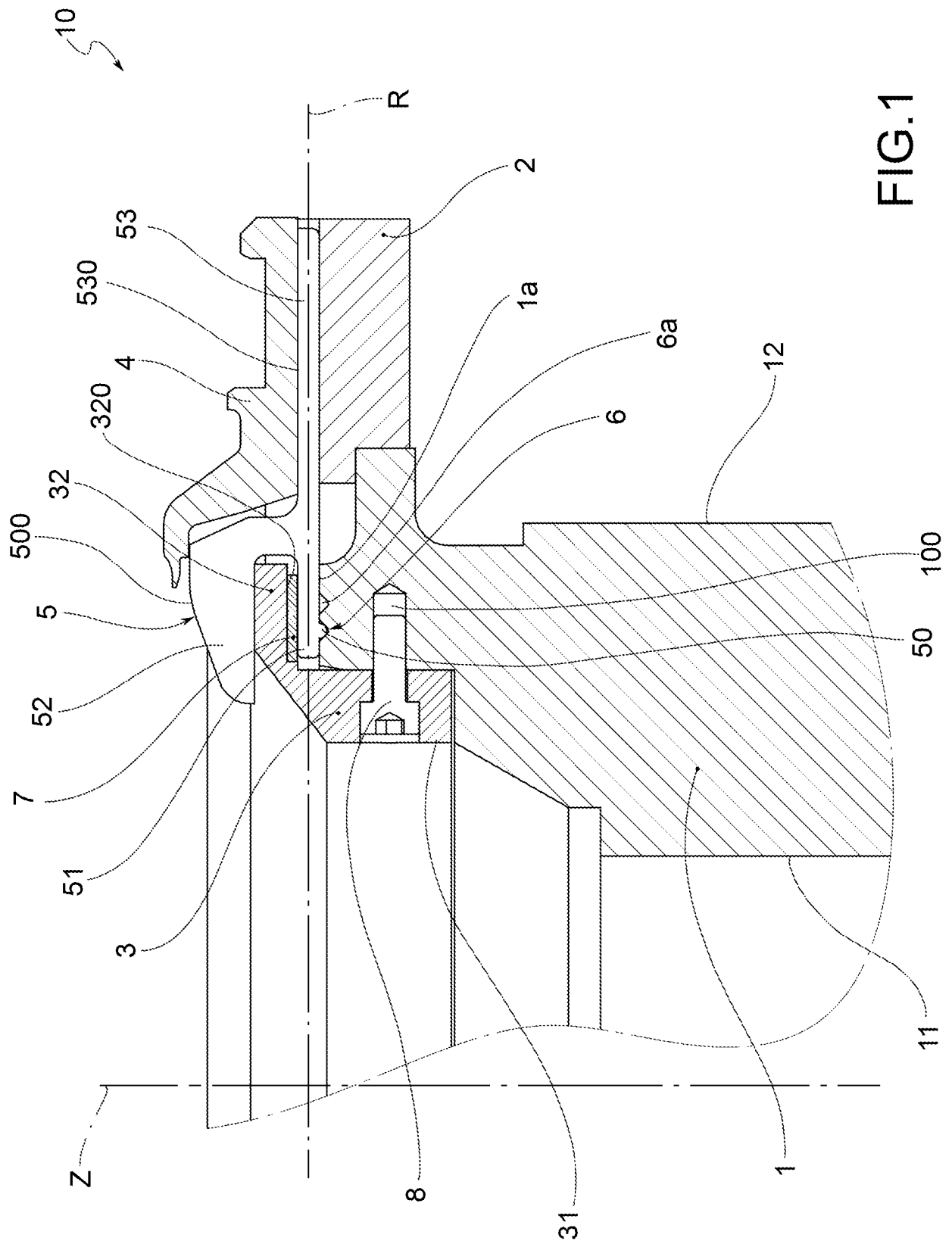
- stably constraining the clamping crown (3) to the cylinder (1) so as to lock the fixed sinker inserts (5).

12. A method for disassembling a sinker locking system
15 (10) according to any one of claims 3 to 10, comprising the following steps:

- releasing the clamping crown (3) from the constraint with the cylinder (1);

- extracting the fixed sinker inserts (5) by sliding in
20 the radial direction (R) away from the central axis (Z).

13. A circular knitting machine comprising a sinker locking system according to any one of claims 3 to 10.



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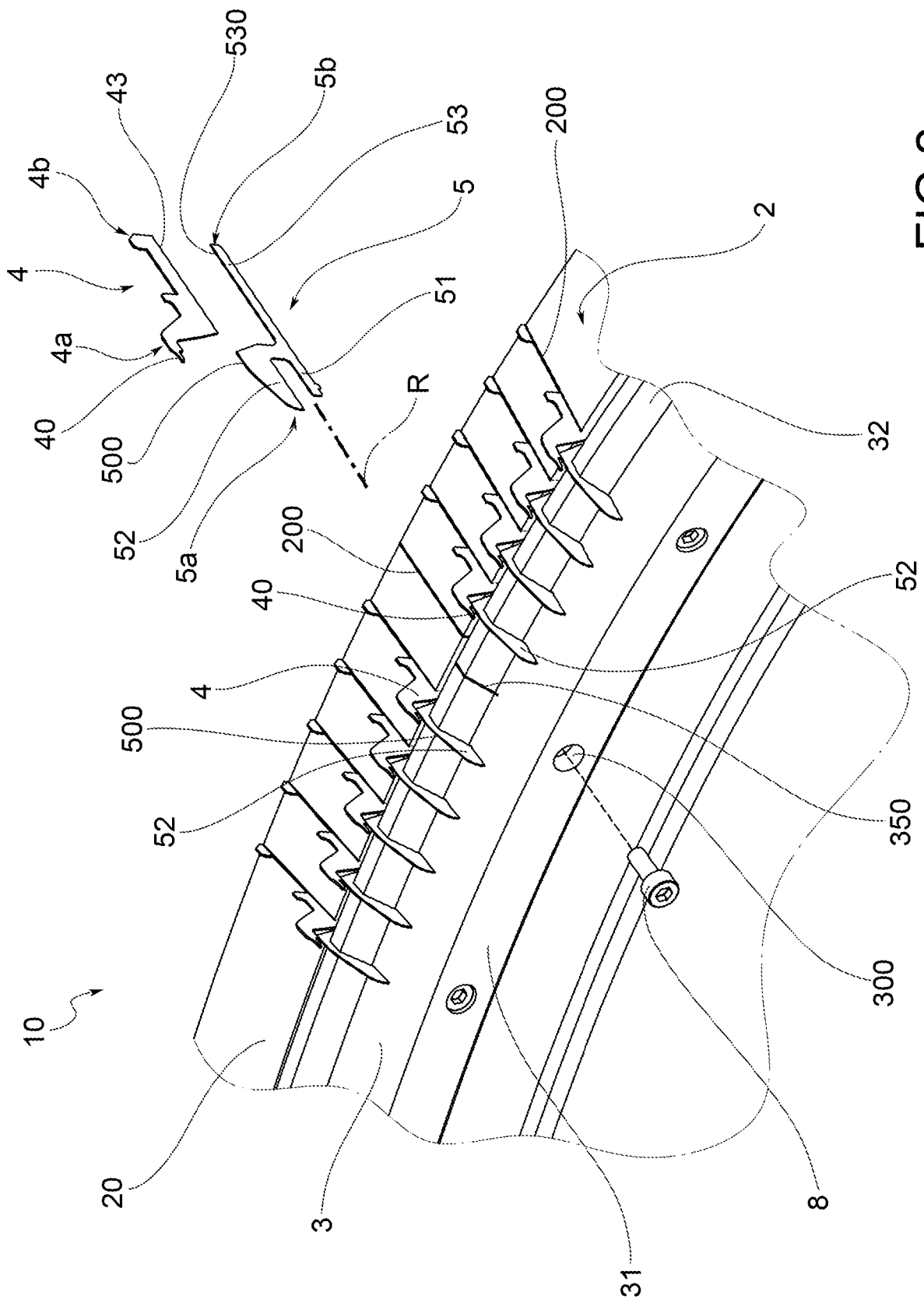


FIG. 2

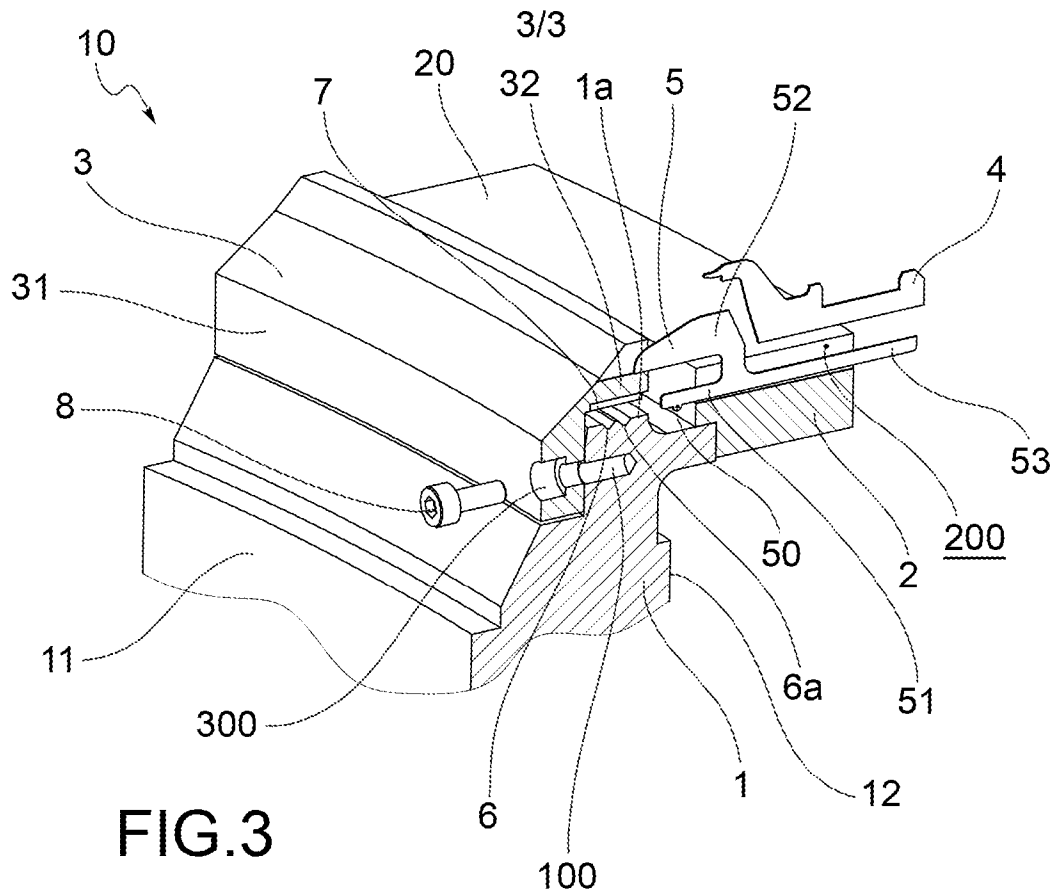


FIG.3

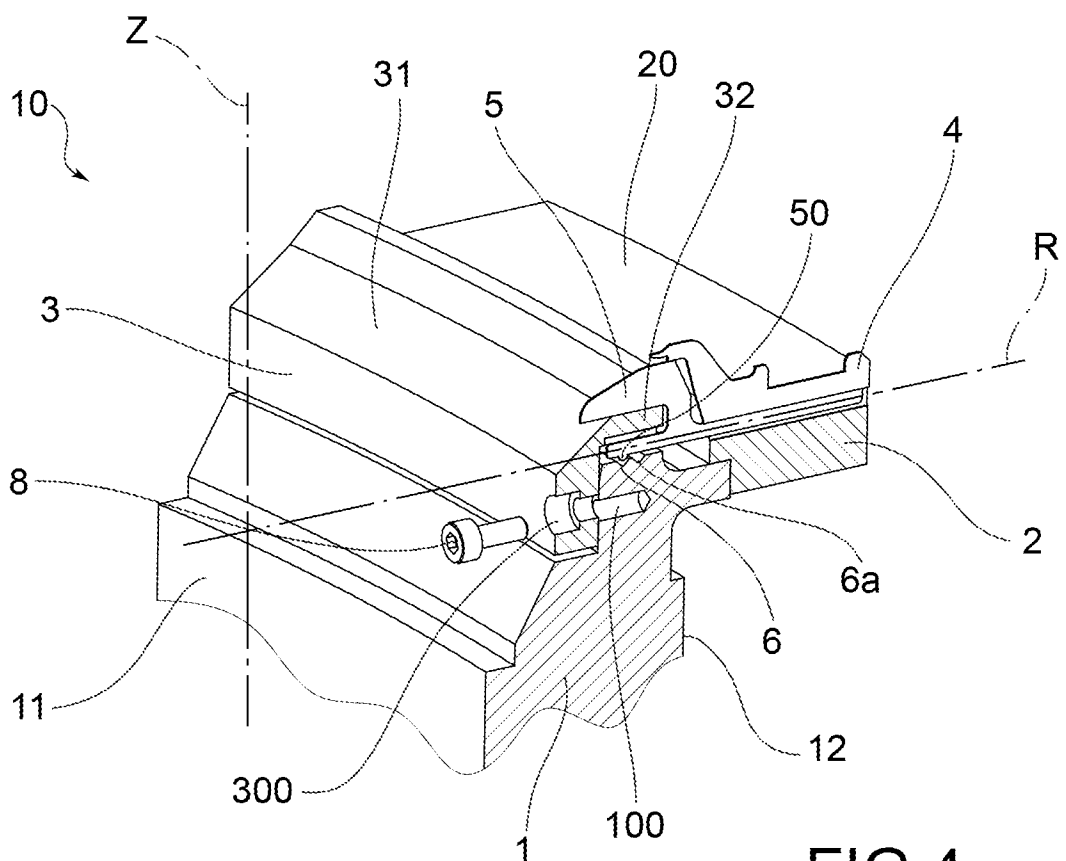


FIG.4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2024/055396

A. CLASSIFICATION OF SUBJECT MATTER

INV. D04B15/06 D04B15/14
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 458 073 A1 (UNIPLET AS [CS]) 27 November 1991 (1991-11-27)	1-3,9, 11-13
Y	column 2, line 5; figure 1	5
A	-----	4,6-8,10
Y	GB 2 261 883 A (UNIPLET AS [CS]) 2 June 1993 (1993-06-02)	5
	page 4, lines 16-25; figure 6	

A	WO 2023/281328 A1 (SANTONI & C SPA [IT]) 12 January 2023 (2023-01-12)	6
	figures 12-14	

A	IT 2017 0003 8900 A1 (PILOTELLI ALBERTO [IT]) 7 October 2018 (2018-10-07)	1-13
	figure 1	



Further documents are listed in the continuation of Box C.



See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search

14 August 2024

Date of mailing of the international search report

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Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Messai, Sonia

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2024/055396

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