(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 January 2016 (07.01.2016)

WIPO | PCT

(10) International Publication Number
WO 2016/000780 A1

(51) International Patent Classification:
A21C 1/14 (2006.01) *A47J 43/07* (2006.01)
A21C 1/02 (2006.01) *A21C 1/06* (2006.01)
B01F 7/00 (2006.01)

(21) International Application Number:
PCT/EP2014/064206

(22) International Filing Date:
3 July 2014 (03.07.2014)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant: **AKTIEBOLAGET ELECTROLUX** [SE/SE]; S:t Göransgatan 143, S-105 45 Stockholm (SE).

(72) Inventors: **ROJAS RESTREPO, Monica Maria**; S:t Göransgatan, 143, S-105 45 Stockholm (SE). **KWARN-MARK, Martin**; S:t Göransgatan, 143, S-105 45 Stockholm (SE).

(74) Agent: **WRETBLAD, Eva**; Aktiebolaget Electrolux, S:t Göransgatan 143, S-105 45 Stockholm (SE).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: HOOK FOR MIXING FOODSTUFF

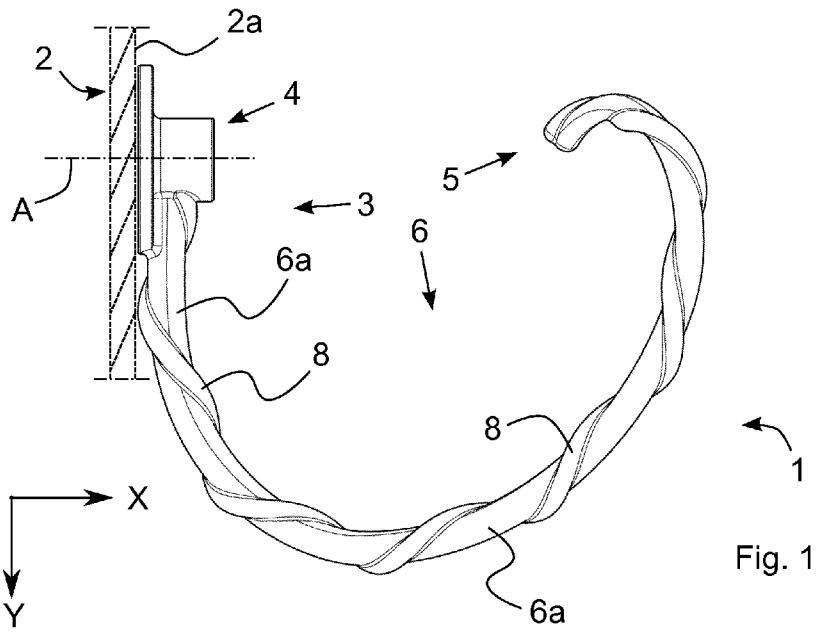


Fig. 1

(57) Abstract: A hook (1) for mixing foodstuff in a household appliance mixing container (2) is provided. The hook (1) comprises a proximal end (3) with an attachment portion (4), a distal end (5), a curved elongated portion (6), extending between the proximal end (3) and the distal end (5). At least a portion of an outer surface (6a) of the curved elongated portion (6) is provided with at least one helix-shaped protrusion (8).

WO 2016/000780 A1

HOOK FOR MIXING FOODSTUFF

TECHNICAL FIELD

Embodiments herein relate to a hook for mixing foodstuff.

BACKGROUND

Hooks for mixing foodstuff are commonly comprised in a household appliance mixing arrangement. Such an arrangement for mixing and/or blending foodstuff may also comprise a mixing container, a base unit, a drive arrangement and an electric motor. The base unit often forms a support for the mixing container and the electric motor is arranged to rotate the hook within the mixing container via the drive arrangement.

Hooks for household appliance mixing arrangements are typically vertically arranged, such that the hook rotates around a vertical rotation axis directed towards a bottom portion of the mixing container, describing a planetary motion. The hook is, at an upper end, attached to the drive arrangement which in turn is arranged above both the hook and the mixing container.

The design of the hook may depend on the type of foodstuff which is to be mixed. Hooks for mixing foodstuff with a lower viscosity or internal friction may not be suitable for foodstuff with higher viscosity and vice versa. Some foodstuff, such as a dough, needs to be thoroughly mixed and kneaded such that ingredients are finely divided and gluten strands are developed.

In US5758963A a hook is disclosed which aim at both reducing a load on a drive arrangement and minimizing the amount of time required for the mixing process. The hook and food mixer described in US5758963A are hence optimized for other aspects than the process of mixing and kneading ingredients. Due to the shape of the hook, dough may climb along the hook towards the drive arrangement. The hook described in US5758963A may be suitable for some applications, but a hook which further improves mixing and/or kneading and/or an alternative hook is still desirable.

Accordingly, there remains a need for an improved and/or an alternative hook for mixing and kneading foodstuff.

SUMMARY

The hook as set out herein eliminates or at least reduces the problems and/or drawbacks associated with previously known hooks for mixing foodstuff.

According to a first aspect, this is provided by a hook for mixing foodstuff in a household appliance mixing container. The hook comprises a proximal end with an attachment portion, a distal end and a curved elongated portion extending between the proximal end and the distal end. At least a portion of an outer surface of the curved elongated portion is provided with at least one helix-shaped protrusion.

Since at least a portion of an outer surface of the curved elongated portion is provided with at least one helix-shaped protrusion, foodstuff is efficiently mixed and kneaded. The foodstuff may not only be pressed in between the hook and a mixing container, but is also pressed along the curved elongated portion of the hook thanks to the at least one helix-shaped protrusion. Hence, the foodstuff, such as e.g. a dough, is intensively mixed and kneaded by the hook with the at least one helix-shaped protrusion. The hook is better to bring the dough along than conventional hooks and the working surface of the hook is increased due to the at least one helix-shaped protrusion. Hereby e.g. gluten strands may be effectively developed when a dough is mixed and/or kneaded by the hook. The hook is via the attachment portion attachable to a household mixing appliance drive arrangement via a through hole in a side wall of the household appliance mixing container.

The at least one helix-shaped protrusion may extend along at least 50%, preferably at least 70%, more preferably at least 90% of the curved elongated portion.

Since the at least one helix-shaped protrusion may extend along at least 50%, preferably at least 70%, more preferably at least 90% of the curved elongated portion, foodstuff is affected by the at least one helix-shaped protrusion along a large portion of the hook,

whereby the foodstuff is effectively mixed and kneaded. The at least one helix-shaped protrusion may extent all the way to the distal end.

The at least one helix-shaped protrusion may extend as a continuous ridge along the outer surface of the curved elongated portion.

Since at least one helix-shaped protrusion extends as a continuous ridge along the outer surface of the curved elongated portion, foodstuff is pressed along the ridge and effectively mixed and kneaded.

The at least one helix-shaped protrusion may extend discontinuously along the outer surface of the curved elongated portion.

Since the at least one helix-shaped protrusion may extend discontinuously along the outer surface of the curved elongated portion, foodstuff is both pushed along the discontinuous protrusion and mixed by the discontinuous shape of the protrusion.

A cross section of the curved elongated portion with the at least one helix-shaped protrusion may have a shape of two intersecting circles, whereof one circle is formed by the helix-shaped protrusion.

Since a cross section of the curved elongated portion with the at least one helix-shaped protrusion has a shape of two intersecting circles, whereof one circle is formed by the helix-shaped protrusion, the hook may effectively mix and knead foodstuff and may also be manufactured in an economically efficient manner. Further, there are no sharp angles or edges which may “trap” the foodstuff.

A cross section of the hook may have a shape of at least one of a trefoil and a quatrefoil.

Since a cross section of the hook has a shape of at least one of a trefoil and a quatrefoil the hook may effectively mix and knead foodstuff and also be manufactured in an economically efficient manner.

The attachment portion is arranged to be attachable to a drive arrangement and towards an inner side surface of a bowl-shaped household appliance mixing container such that an axis of rotation for the hook is arranged substantially normal to the inner side surface of the mixing container when the hook is attached towards the mixing container.

Since the attachment portion is arranged to be attachable to a drive arrangement and towards an inner side surface of a bowl-shaped household appliance mixing container such that an axis of rotation for the hook is arranged substantially normal to the inner side surface of the mixing container when the hook is attached towards the mixing container, the axis of rotation may be substantially horizontal. Hereby the hook does not obstruct an open top of the bowl-shaped household appliance mixing container, and a user may have free access to the open top, e.g. for adding foodstuff. A side wall of the mixing container comprises a through hole, and the attachment portion is also attachable to the drive arrangement which extends into the mixing container interior via the through hole,

The curved elongated portion may extend from the attachment portion in a first direction, being downwards from the axis of rotation, such that the curved elongated portion, at its proximal end, is substantially in parallel with the inner surface portion of the mixing container when the hook is attached towards the mixing container.

Since the curved elongated portion may extend from the attachment portion in a first direction, being downwards from the axis of rotation, such that the curved elongated portion, at its proximal end, is substantially in parallel with the inner surface portion of the mixing container when the hook is attached towards the mixing container the hook may co-operate with the inner side surface of the mixing container in the mixing and kneading of the foodstuff.

A curvature of the curved elongated portion, when the hook is in its lowest position, may substantially follow a curvature of the inner surface of the mixing container along at least 50%, preferably at least 70%, of is length.

The curved elongated portion may extend three-dimensionally, and the extension in each dimension is larger than a thickness of the hook.

Since the curved elongated portion extends three-dimensionally, and the extension in each dimension is larger than a thickness of the hook, foodstuff is mixed and kneaded in all three directions by the hook. The three dimensions may be defined by a Cartesian coordinate system.

A curvature of the curved elongated portion between the proximal end and the distal end may be less than 360 degrees in all dimensions.

Since the curvature of the curved elongated portion between the proximal end and the distal end is less than 360 degrees in all dimensions, small radiuses of curvature are avoided whereby e.g. dough is prevented from getting stuck to the hook.

The curved elongated portion may extend in an angle of attack α relatively a plane defined by the first direction and the axis of rotation, α being in the range of 10-60 degrees, preferably 20-50 degrees, more preferably 30-40 degrees.

Since the curved elongated portion may extend in an angle of attack α relatively a plane defined by the first direction and the axis of rotation, α being in the range of 10-60 degrees, preferably 20-50 degrees, more preferably 30-40 degrees, foodstuff are forced to follow the hook along the curved elongated portion when the hook is rotated. Hereby the foodstuff are efficiently mixed and the kneaded.

A helix angle β of the helix-shaped protrusion may be in the range of 20-70 degrees, more preferably 30-60 degrees.

Since the helix angle β of the helix-shaped protrusion is in the range of 20-70 degrees, more preferably 30-60 degrees, the foodstuff is affected to follow along protrusion in a pace which is effective for the mixing and kneading.

Thus, hereby is provided an alternative hook and/or a hook eliminating or at least reducing the problems and/or drawbacks associated with prior art hooks for mixing foodstuff.

BRIEF DESCRIPTION OF THE DRAWINGS

The various aspects of embodiments herein, including its particular features and advantages, will be readily understood from the following detailed description and the accompanying drawings, in which:

Fig. 1 illustrates a hook according to some embodiments from a horizontal side view.

Fig. 2 illustrates the Fig. 1 hook as seen along the axis of rotation.

Fig. 3 illustrates the hook of Fig. 1 from above.

Fig. 4a illustrates a cross section of the hook according to some embodiments.

Fig. 4b illustrates a cross section of the hook according to a further embodiment.

Fig. 4c illustrates a trefoil cross section of the hook.

Fig. 4d illustrates a quatrefoil cross section of the hook.

Fig. 5 illustrates the Fig. 1 hook in perspective.

Fig. 6 illustrates the hook arranged in a mixing container.

DETAILED DESCRIPTION

Embodiments herein will now be described more fully with reference to the accompanying drawings. Like numbers refer to like elements throughout.

Well-known functions or constructions will not necessarily be described in detail for brevity and/or clarity.

Fig. 1 illustrates a hook **1** for mixing foodstuff in a household appliance mixing container **2**, see also Fig. 6. The hook 1 may be made e.g. of metal and/or plastics. The hook 1 comprises a proximal end **3** with an attachment portion **4**. The attachment portion 4 is

arranged to be attachable towards an inner side surface **2a** of the household appliance mixing container 2 such that an axis of rotation A for the hook is arranged substantially normal to the inner side surface 2a of the mixing container 2 when the hook 1 is attached towards the mixing container 2. The hook 1 may also be referred to as a dough whisk. The hook 1 is also attachable to an axle shaft of a drive arrangement. Such an axle shaft may extend into the mixing container interior via a through hole in a side wall of the mixing container 2. Such a through hole thus also extends through the inner side surface 2a of the mixing container 2. The drive arrangement can transfer a rotational movement from an electric motor to the hook 3 via the axle shaft and the through hole.

The hook 1 further comprises a distal end **5**. A curved elongated portion **6** extends between the proximal end 3 and the distal end 5. The curved elongated portion 6 may be continuously curved or may have at least one straight portion in between curved portions. The curved elongated portion 6 has an outer surface **6a**. As illustrated in Fig. 1, at least a portion of the outer surface **6a** of the curved elongated portion 6 is provided with at least one helix-shaped protrusion **8**.

The helix-shaped protrusion 8 may extend along at least 50%, preferably at least 70%, more preferably at least 90% of the curved elongated portion 6. In the Fig. 1 embodiment the helix-shaped protrusion 8 extends along the entire curved elongated portion 6, from the attachment portion 4 to the distal end 5. In other, not illustrated embodiments, the at least one helix-shaped protrusion 8 extends discontinuously along the outer surface 6a, e.g. as a plurality of subsequent bulges.

When the hook 1 is attached towards the mixing container 2 and in the lowest possible position, the curved elongated portion 6 extends from the attachment portion 4 in a first direction Y, being downwards from the axis of rotation A. The curved elongated portion 6 at its proximal 3 end thus extends substantially in parallel with the inner side surface 2a of the mixing container 2 when the hook 1 is attached towards the mixing container 2.

In **Fig. 2** the hook 1 is illustrated as seen along the axis of rotation. The hook 1 comprises the curved elongated portion 6 with the outer surface 6a and the at least one helix-shaped protrusion 8. In Fig. 2 also the distal end 5 and the attachment portion 4 at the proximal end 3 are illustrated. The attachment portion 4 at the proximal end 3 may

be integrated as one unit with the curved elongated portion 6 or may be a separate part which is attachable to the curved elongated portion 6 such that they together form the hook 1.

The curved elongated portion 6 extends three-dimensionally, i.e. along the Z- and Y-directions illustrated in Fig. 2 and in the X-direction e.g. illustrated in Fig. 1. The extension in the different directions is also illustrated in Fig. 5. The extension in each dimension is larger than a thickness of the hook 1. The three directions X, Y, Z form a Cartesian coordinate system having right angles between the axes.

Fig. 3 illustrates the hook 1 with the proximal end 3, the attachment portion 4, the distal end 5 and the curved elongated portion 6 with its outer surface 6a and at least one helix-shaped protrusion 8 as seen from above. The curved elongated portion 6 extends in an angle of attack α relatively a plane defined by the first direction Y (illustrated e.g. in Fig 2) and the axis of rotation A. The angle α may be in the range of 10-60 degrees, preferably 20-50 degrees, more preferably 30-40 degrees.

In Fig. 3 also a helix angle **β** of the helix-shaped protrusion 8 is illustrated. The helix angle β may be in the range of 20-70 degrees, more preferably 30-60 degrees

In the **Fig. 4a** and **Fig. 4b** embodiments**,** a cross section of the curved elongated portion 6 with the at least one helix-shaped protrusion 8 has a shape of two intersecting circles, whereof one circle is formed by the helix-shaped protrusion 8. In Fig. 4a the at least one helix-shaped protrusion 8 is smaller than in Fig. 4b. According to a not illustrated embodiment, the cross section of the at least one helix-shaped protrusion 8 has approximately the same size as the cross section of the curved elongated portion 6.

Fig. 4c illustrates a trefoil-shaped 10 cross section of the hook and in **Fig. 4d** the cross section of the hook has a shape of a quatrefoil 11. The illustrated embodiments show that the cross-sections of the at least one helix-shaped protrusion 8 are about the same as for the curved elongated portion 6, but may also be less. The protrusions may have different cross sections.

In **Fig. 5** the hook 1 of Fig. 1, with the proximal end 3, the attachment portion 4, the distal end 5 and the curved elongated portion 6 with its outer surface 6a and at least one helix-shaped protrusion 8 is illustrated in perspective. In Fig. 5 also the axis of rotation **A** is illustrated. Since the curved elongated portion 6 extends three-dimensionally, and the extension in each dimension X, Y, Z, is larger than a thickness of the hook 1, foodstuff is mixed and kneaded in all three directions by the hook 1. The three dimensions may be defined by a Cartesian coordinate system. A curvature of the curved elongated portion between the proximal end and the distal end is less than 360 degrees in all dimensions.

In **Fig. 6** the hook 1 of Fig. 1 is arranged in a bowl-shaped open top mixing container 2. In Fig. 6 the hook 1 is illustrated in its lowest position, i.e. when the centre of gravity of the hook 1 is as low as possible within the mixing container 2. In Fig. 6 an axle shaft **16** of a drive arrangement is illustrated. The axle shaft 16 is at a first portion **16a** arranged to be driven, directly or via a drive belt or similar, by an electric motor. The axle shaft 16 is further arranged to be engaged to the hook 1 at a second portion **16b**. The axle shaft 16 extends into the interior of the mixing container 2 via a through hole in a side wall and thus also the inner side surface 2a of the mixing container 2. When attached to the second portion 16b of the axle shaft, the hook 3 may be brought to rotate relatively the inner surface 2a. The hook is pressed towards the inner side surface 2a such that ingredients in the mixing container 2 are prevented from escaping from the mixing container interior via the through hole. The hook 1 may be attached to the axle shaft e.g. via a locking pin arrangements, via a thread/bolt arrangement, via a snap-on-arrangement or via a bayonet coupling arrangement.

It may also be realised that the hook 1 is attachable to a vertical axle shaft or drive arrangement. The hook 1 may then be rotated in an open top mixing container along a vertical rotation axis. In principle the axle shaft could have an arbitrary direction.

CLAIMS

1. A hook (1) for mixing foodstuff in a household appliance mixing container (2), the hook (1) comprising;
   - a proximal end (3) with an attachment portion (4),
   - a distal end (5),
   - a curved elongated portion (6), extending between the proximal end (3) and the distal end (5),

   characterized in that at least a portion of an outer surface (6a) of the curved elongated portion (6) is provided with at least one helix-shaped protrusion (8).

2. The hook (1) according to claim 1, **wherein** the at least one helix-shaped protrusion (8) extends along at least 50%, preferably at least 70%, more preferably at least 90% of the curved elongated portion (6).

3. The hook (1) according to claim 1 or 2, **wherein** the at least one helix-shaped protrusion (8) extends as a continuous ridge along the outer surface (6a) of the curved elongated portion (6).

4. The hook (1) according to claim 1 or 2, **wherein** the at least one helix-shaped protrusion (8) extends discontinuously along the outer surface (6a) of the curved elongated portion (6).

5. The hook (1) according to any one of claims 1 - 4, **wherein** a cross section of the curved elongated portion (6) with the at least one helix-shaped protrusion (8) has a shape of two intersecting circles, whereof one circle is formed by the helix-shaped protrusion (8).

6. The hook (1) according to any one of claims 1 - 4, **wherein** a cross section of the hook has a shape of at least one of a trefoil (10) and a quatrefoil (11).

7. The hook (1) according to any one of the preceding claims, **wherein** the attachment portion (4) is arranged to be attachable to a drive arrangement and towards an inner

side surface (2a) of a bowl-shaped household appliance mixing container (2) such that an axis of rotation (A) for the hook is arranged substantially normal to the inner side surface (2a) of the mixing container (2) when the hook (1) is attached towards the mixing container (2).

8. The hook (1) according to claim 7, **wherein** the curved elongated portion (6) extends from the attachment portion (4) in a first direction (Y), being downwards from the axis of rotation (A), such that the curved elongated portion (6), at its proximal end (3), is substantially in parallel with the inner surface portion (2a) of the mixing container (2) when the hook (1) is attached towards the mixing container (2).

9. The hook (1) according to any one of the preceding claims, **wherein** the curved elongated portion (6) extends three-dimensionally, and wherein the extension in each dimension is larger than a thickness of the hook (1).

10. The hook (1) according to any one of the preceding claims, **wherein** a curvature of the curved elongated portion (6) between the proximal end (3) and the distal end (5) is less than 360 degrees in all dimensions.

11. The hook (1) according to any one of the preceding claims, **wherein** the curved elongated portion (6) extends in an angle of attack (α) relatively a plane (XY) defined by the first direction (Y) and the axis of rotation (A), (α) being in the range of 10-60 degrees, preferably 20-50 degrees, more preferably 30-40 degrees.

12. The hook (1) according to any one of the preceding claims, **wherein** a helix angle (β) of the helix-shaped protrusion (8) is in the range of 20-70 degrees, more preferably 30-60 degrees.

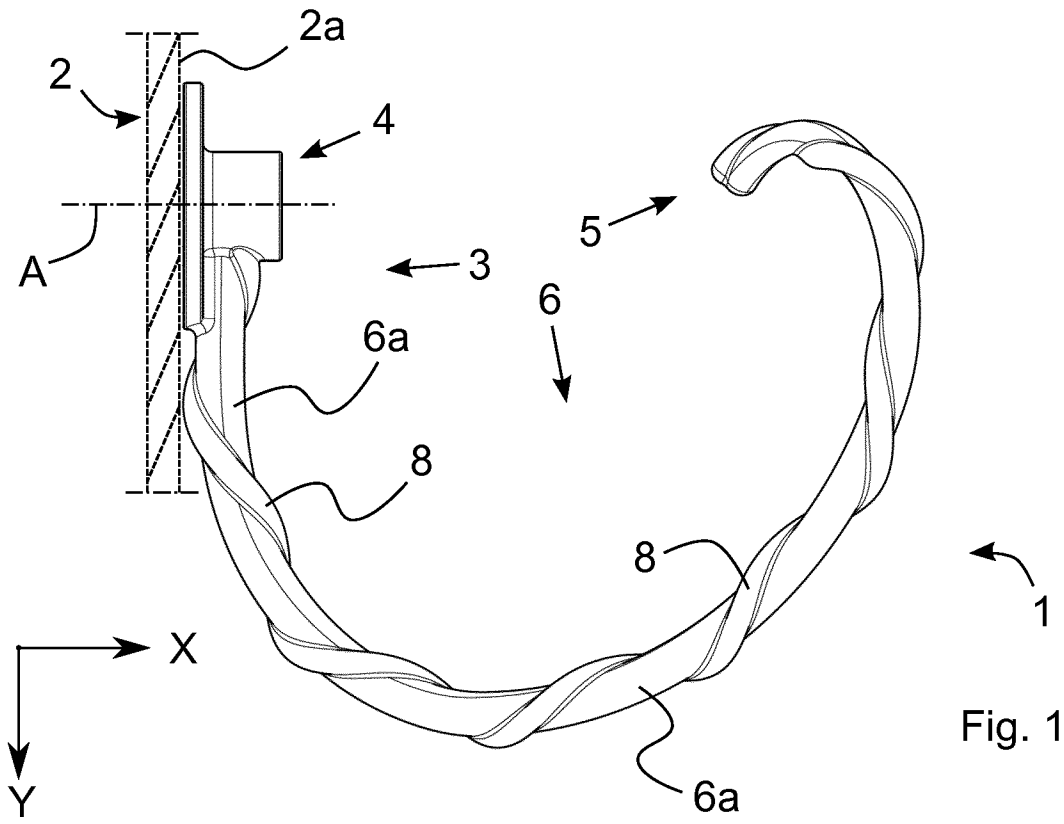


Fig. 1

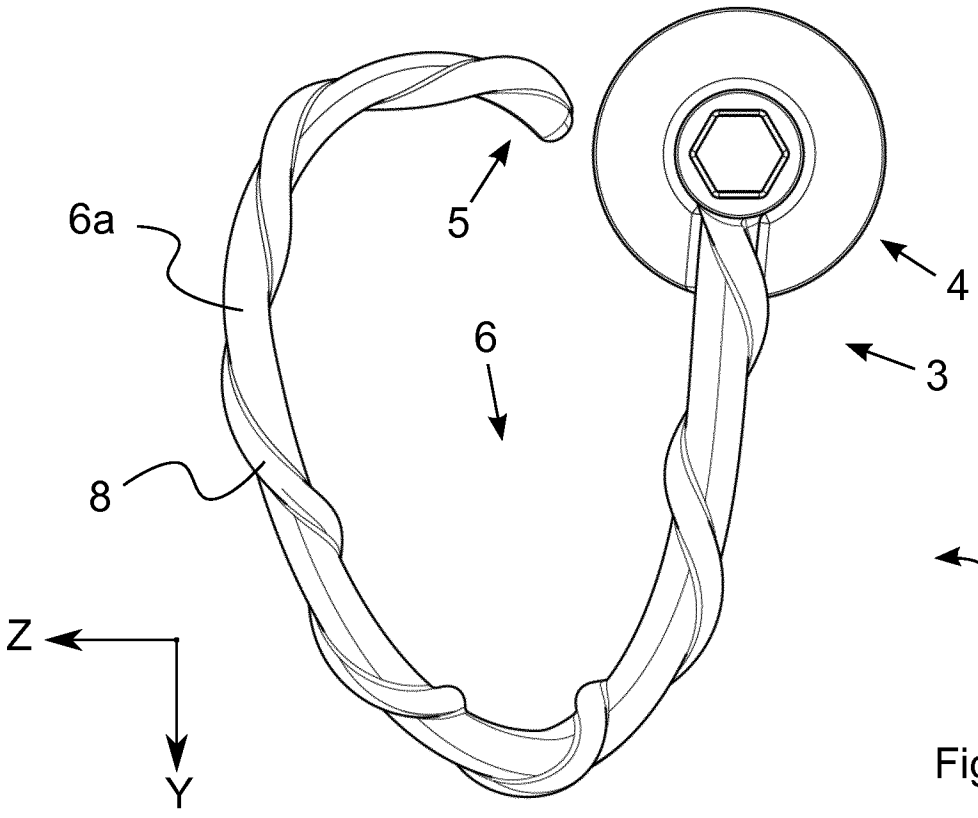


Fig. 2

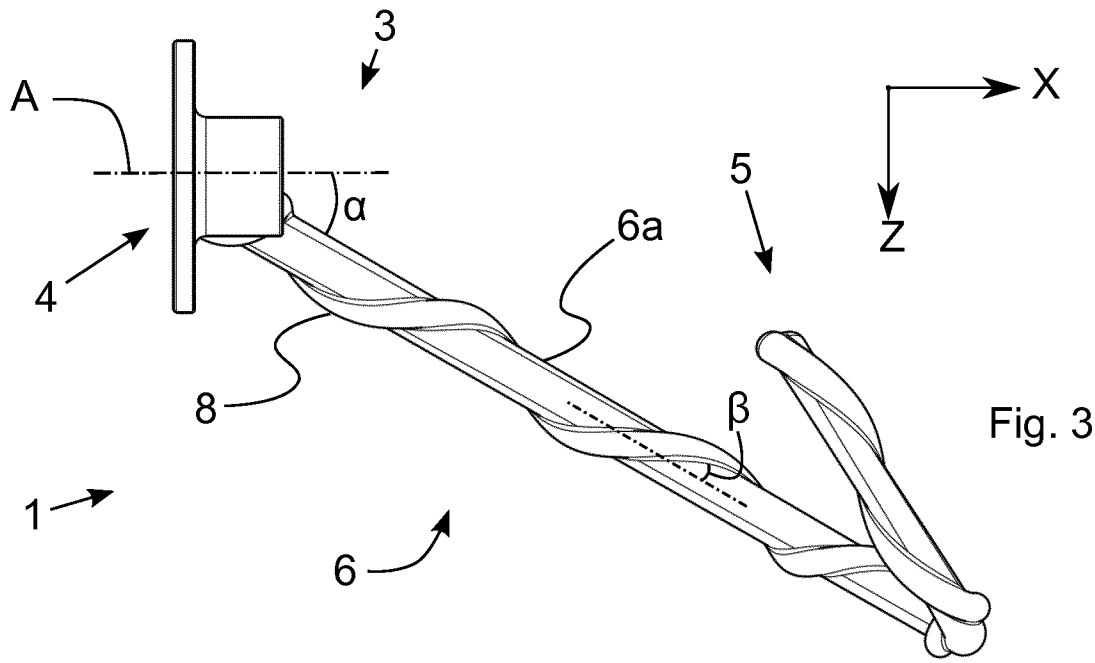


Fig. 3

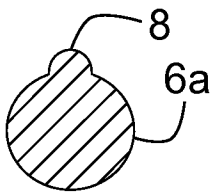


Fig. 4a

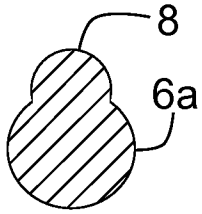


Fig. 4b

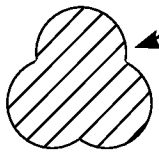


Fig. 4c

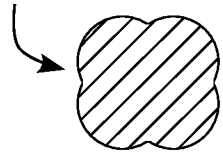


Fig. 4d

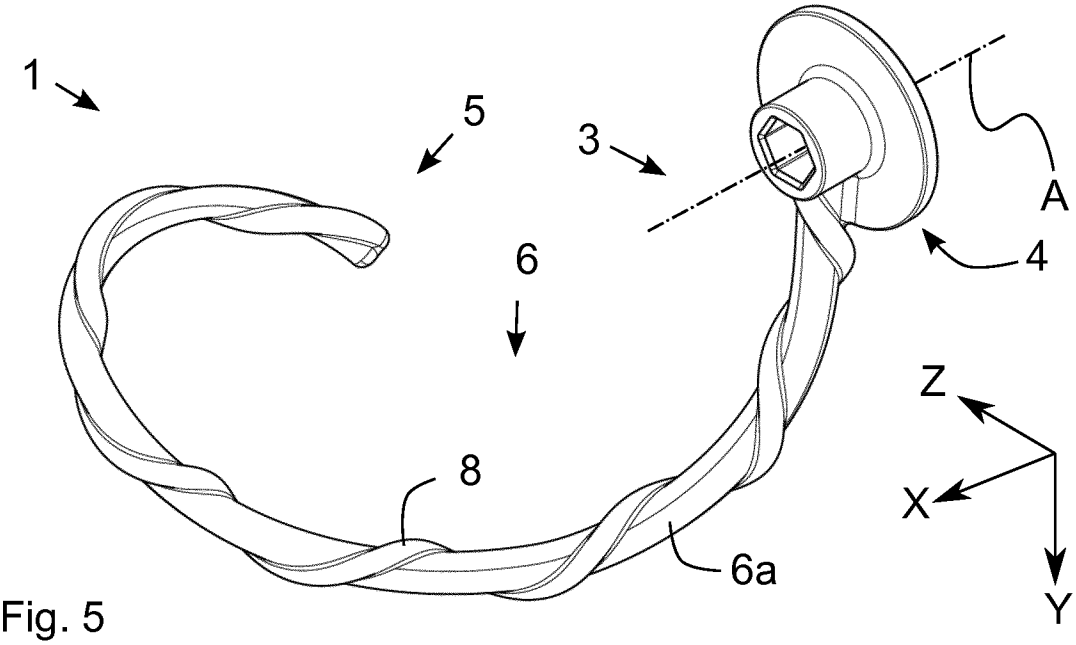


Fig. 5

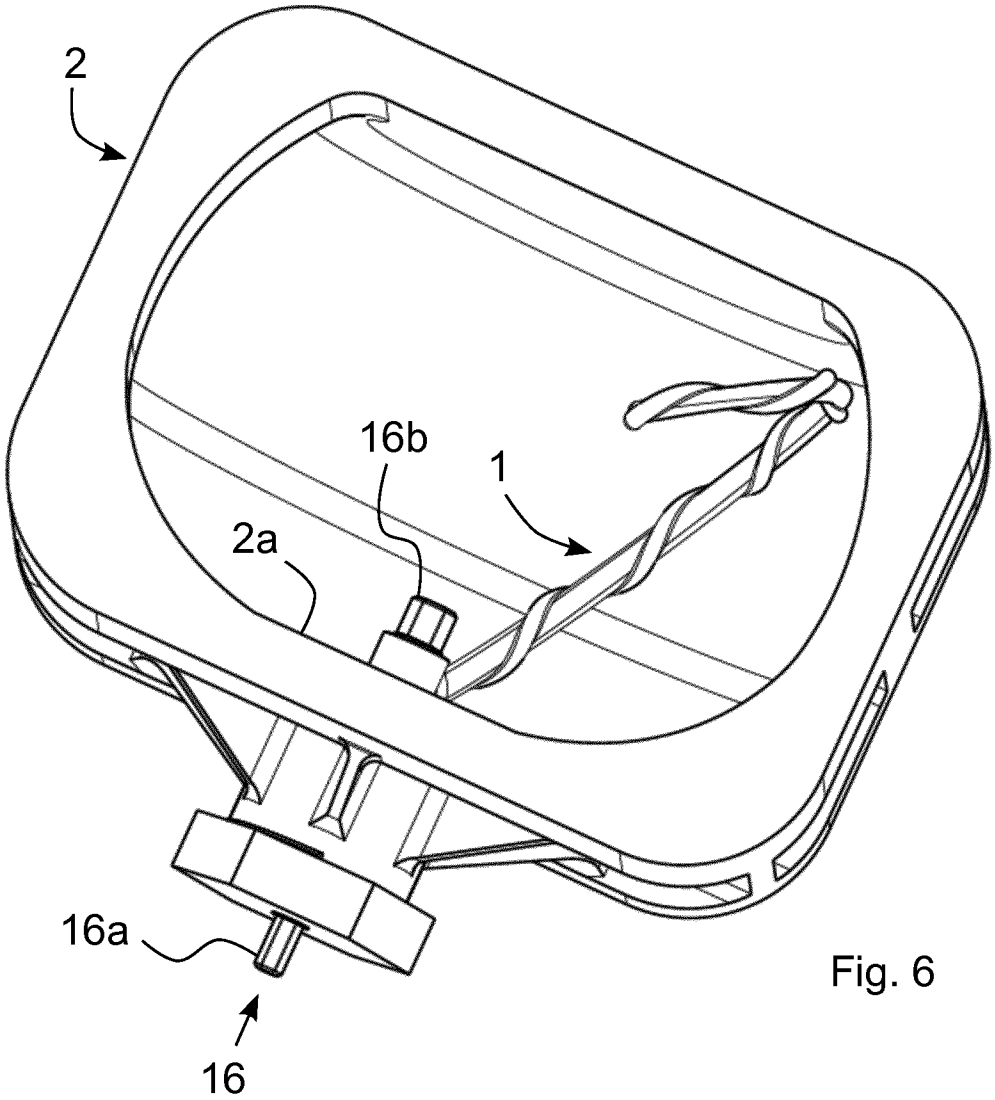


Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2014/064206

A. CLASSIFICATION OF SUBJECT MATTER
INV. A21C1/14 A21C1/02 B01F7/00 A47J43/07 A21C1/06
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)
A21C B01F A47J

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 14 29 839 A1 (GOTTLOB WIDMANN & SOEHNE KG) 28 November 1968 (1968-11-28)	1-3,5,7, 12
A	page 1 page 2, paragraph 4 page 3, paragraph 3 figures	4,6,8-11

X	US 2 641 412 A (BYBERG JONAS J) 9 June 1953 (1953-06-09)	1-3,7, 10,12
A	column 1, line 1 - line 3 column 3, line 29 - line 58 figures	4-6,8,9, 11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 November 2014	03/12/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Real Cabrera, Rafael

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2014/064206

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 1429839 A1	28-11-1968	NONE	
US 2641412 A	09-06-1953	NONE	