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(71) Applicant *(for all designated States except US)*: **SLAYER BLADES S.R.L.** [IT/IT]; Via Milano, 37, I-21040 Oggiona con Santo Stefano (IT).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **SCATTOLIN, Gaetano** [IT/IT]; Via Milano, 35, I-21040 Oggiona con Santo Stefano (IT).

(74) Agent: **MODIANO, Micaela**; MODIANO & PARTNERS, Via Meravigli, 16, I-20123 Milano (IT).

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(54) **Title**: CUTTING ASSEMBLY WITH REMOVABLE BLADE FOR SLICING MACHINES OR THE LIKE

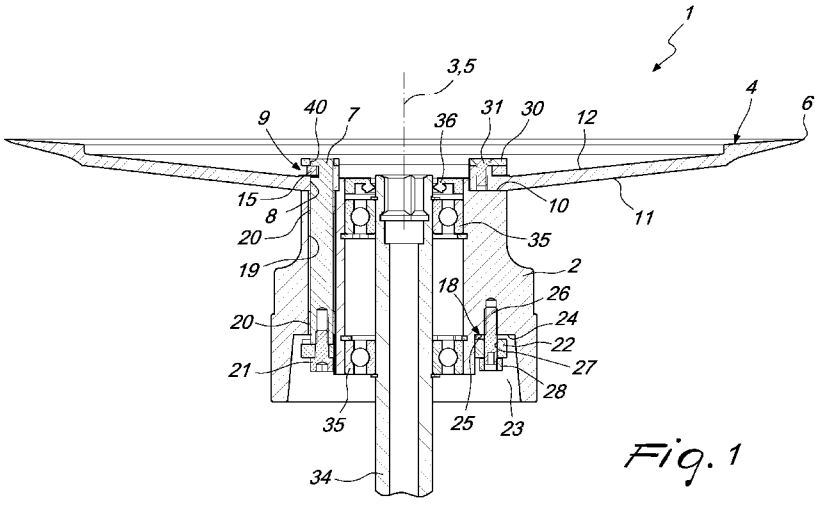

Fig. 1

(57) **Abstract**: A cutting assembly (1) with removable blade for slicing machines or the like, which comprises: – a supporting element (2), which is extended around a main axis (3) and can be actuated with a rotary motion about the main axis (3); – a blade (4), which can be associated coaxially and detachably with the supporting element (2); – at least two centering pins (7), which are associated with the supporting element (2); the centering pins (7) are angularly spaced from each other around the main axis (3) and are parallel to the main axis (3); – at least two holes (8), which pass through the blade (4) and can be engaged by the centering pins (7); – a locking element (9), which is associated with the blade (4) proximate to the holes (8) and can move from a locking position, in which it is engaged with the centering pins (7) inserted in the holes (8), to a release position, in which it is disengaged from the centering pins (7), and vice versa. The supporting element (2) defines a resting contact surface (10), which is substantially perpendicular to the main axis (3), for a first face (11) of the blade (4), and the centering pins (7) protrude, with one of their ends, from the second face (12) of the blade (4), which is opposite with respect to the first face (11). The centering pins (7) have a shoulder (13) which is directed toward the resting contact surface (10) and the locking element (9), in the locking position, is wedged between the shoulder (13) and the second face (12) of the blade (4) to lock the blade (4) against the resting contact surface (10).

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CUTTING ASSEMBLY WITH REMOVABLE BLADE FOR SLICING MACHINES OR THE LIKE

The present invention relates to a cutting assembly with removable blade for slicing machines or the like.

As is known, slicing machines are provided with a cutting assembly which comprises a supporting element, constituted by a pulley, which can be actuated with a rotary motion about its own axis, and a blade, generally with a circular profile, which is associated coaxially with the pulley so as to be jointly connected thereto in the rotation about its own axis.

In machines of the professional type, the blade can be associated with the pulley in a removable manner so that it can be removed from the pulley during interventions for maintenance and/or for cleaning the machine.

In these types of slicing machine, the removable assembly between the pulley and the blade is provided by means of a conical coupling. More precisely, the pulley has a frustum-like end with which a frustum-like seat mates which is defined in a hub element which is fixed, by means of screws, to the center of the blade. The pulley has, on the smaller end face of the frustum-like portion, which constitutes the axial end of the pulley to be assembled with the blade, centering pins which lie parallel to the axis of the pulley and are mutually spaced around the axis of the pulley. The centering pins can be inserted in holes which pass correspondingly through the frustum-like portion fixed to the blade. The centering pins have, on their portion that is designed to protrude from the face of the blade to be directed away from the pulley, a transverse slot and, proximate to the holes, the frustum-like portion fixed on the blade has a locking ring which, when the blade is engaged with the centering pins, is located around the centering pins at the transverse slots of the centering pins. The locking ring has, on its inner lateral surface, mutually spaced recesses whose number is equal to the number of the centering pins and of the holes. The locking ring, which is coaxial to the blade, can rotate about the axis of the blade in relation to the

blade so as to engage, with its portions comprised between two adjacent recesses, with the transverse slots of the centering pins so as to tighten the conical coupling that exists between the blade and the pulley, or so as to arrange the recesses at the centering pins and at the holes in order to allow the extraction of the blade from the centering pins and therefore the removal of the blade from the pulley.

Usually, the operation for removing the blade from the pulley and the subsequent reassembly of the blade on the pulley are performed by means of an adapted tool, which engages the blade, locking it before removing it from the pulley, and releases it only after it has been correctly coupled to the pulley so as to protect the operator from the risk of injuries.

The coupling system between the blade and the pulley currently in use in slicing machines of the known type has drawbacks.

The main of these drawbacks is the difficulty in obtaining, by means of the above mentioned conical coupling, the perfect arrangement, on a plane at right angles to the axis of rotation, of the cutting edge of the blade for precise operation of the slicing machine.

The correct arrangement of the blade, in slicing machines of the known type, can be obtained only with great difficulty and by means of extremely precise processes which affect considerably the production costs of the machines.

The aim of the present invention is to solve the problem described above, by providing a cutting assembly with removable blade for slicing machines or the like which, despite maintaining the practicality of cutting assemblies of the known type regarding the disassembly and reassembly of the blade, can be produced in a considerably easier manner and with distinctly lower costs.

Within this aim, an object of the invention is to provide a cutting assembly that offers the greatest assurances of safety and reliability in use.

This aim and these and other objects which will become better

apparent hereinafter are achieved by a cutting assembly with removable blade for slicing machines or the like, comprising:

– a supporting element, which is extended around a main axis and can be actuated with a rotary motion about said main axis;

– a blade, which can be associated coaxially and detachably with said supporting element;

– at least two centering pins, which are associated with said supporting element, said centering pins being angularly spaced from each other around said main axis and being oriented parallel to said main axis;

– at least two holes, which pass through said blade and can be engaged by said centering pins;

– a locking element, which is associated with said blade proximate to said holes and can move from a locking position, in which it is engaged with said centering pins inserted in said holes, to a release position, in which it is disengaged from said centering pins, and vice versa;

characterized in that said supporting element defines a resting contact surface, which is substantially perpendicular to said main axis, for a first face of said blade, said centering pins protruding, with one of their ends, from the second face of said blade, which is opposite with respect to said first face, and having a shoulder which is directed toward said resting contact surface; said locking element, in said locking position, being wedged between said shoulder and said second face of the blade to lock said blade against said resting contact surface.

Further characteristics and advantages of the invention will become better apparent from the description of a preferred but not exclusive embodiment of the cutting assembly according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a sectional view of the cutting assembly according to the invention, taken along a plane which passes through the main axis, with the locking element in the locking position;

Figure 2 is a sectional view, similar to Figure 1, of the cutting assembly according to the invention, with the locking element in the release position;

Figure 3 is a sectional view of the supporting element, taken along a plane which passes through the main axis;

Figure 4 is a front elevation view of the cutting assembly;

Figure 5 is a sectional view of the blade, taken along the line V-V shown in Figure 4;

Figure 6 is an enlarged-scale sectional view of Figure 5, taken along the line VI-VI, with the locking element in the locking position;

Figure 7 is an enlarged-scale sectional view of Figure 6, taken along the line VII-VII;

Figure 8 is an enlarged-scale sectional view of Figure 5, taken like Figure 6, with the locking element in the release position;

Figure 9 is an enlarged-scale sectional view of Figure 8, taken along the line IX-IX.

With reference to the figures, the cutting assembly according to the invention, generally designated by the reference numeral 1, comprises a supporting element 2, which is extended around a main axis 3 and can be actuated with a rotary motion about the main axis 3. The supporting element 2 can be constituted, as in cutting assemblies of the known type, by a pulley which is designed to be connected to an electric actuator motor by way of transmission means which are per se known and are not illustrated for the sake of simplicity.

The cutting assembly 1 comprises, moreover, a blade 4, with an axis 5, which can be associated coaxially and detachably with the supporting element 2. In the illustrated embodiment, the blade 4 has a circular plan shape, which is slightly hollow on its face designed to be directed toward the product to be cut, but its shape may vary according to requirements and to the type of slicing machine that it must equip. In the illustrated

embodiment, in which the blade 4 has a circular plan shape, the perimeter of this circular conformation constitutes the cutting edge 6 of the blade 4.

The cutting assembly 1 comprises at least two centering pins 7, which are associated with the supporting element 2. In the illustrated embodiment three centering pins 7 are provided, which are angularly spaced from each other in a regular manner around the main axis 3, but the number of centering pins 7 may vary according to requirements. The centering pins 7 are oriented parallel to the main axis 3.

The blade 4 has, in the same number as the centering pins 7, holes 8 which pass through the blade 4 and are oriented parallel to its axis 5. The holes 8 are arranged so as to correspond to the arrangement of the centering pins 7 and each one can be engaged, in a removable manner, by a corresponding centering pin 7.

The cutting assembly 1 according to the invention also comprises a locking element 9, which is associated with the blade 4 proximate to the holes 8 and can move from a locking position, in which it is engaged with the centering pins 7 inserted in the holes 8, to a release position, in which it is disengaged from the centering pins 7, and vice versa.

According to the invention, the supporting element 2 defines a resting contact surface 10, which is substantially perpendicular to the main axis 3, for a first face 11 of the blade 4. The centering pins 7 protrude, with one of their ends, from the second face 12 of the blade 4, which is opposite with respect to the first face 11, and each one has a shoulder 13 which is directed toward the resting contact surface 10. The locking element 9, in the locking position, is wedged between the shoulder 13 and the second face 12 of the blade 4 so as to lock the blade 4 against the resting contact surface 10.

Conveniently, the shoulder 13, in each one of the centering pins 7, is defined by a transverse slot 14, which is provided, proximate to the axial end of each centering pin 7 that is designed to protrude from the second face 12 of the blade 4, on the side of the lateral surface of each centering pin 7

that is directed away from the main axis 3.

The locking element 9 comprises a locking ring 15, which is connected coaxially to the second face 12 of the blade 4 and can rotate about its axis 5 with respect to the blade 4.

The locking ring 15 is designed to be arranged around the centering pins 7 and has, along its internal perimeter, recesses 16 which are angularly mutually spaced around the axis 5 of the blade 4. The number of the recesses 16 corresponds to the number of the centering pins 7 and the locking ring 15 can rotate about its own axis, which coincides with the axis 5, with respect to the blade 4 so as to pass from the locking position, in which the recesses 16 are angularly offset with respect to the centering pins 7 and the locking ring 15 is arranged so that one of its portions 17, located between two contiguous recesses 16, is at a transverse slot 14 of the corresponding centering pin 7, to the release position, in which it is arranged with the recesses 16 at the centering pins 7 in order to allow the disengagement of the blade 4 from the centering pins 7 or allow the coupling of the blade 4 with the centering pins 7.

Conveniently, the centering pins 7 can move, with the corresponding shoulder 13, away from the resting contact surface 10 in contrast with elastic means 18.

More precisely, each centering pin 7 has a substantially cylindrical shape and is inserted coaxially inside passages 19 which pass thorough the body of the supporting element 2 and are oriented parallel to the main axis 3. Sliding bushes 20 are interposed between the lateral walls of the passages 19 and the centering pins 7 and facilitate the axial sliding of the centering pins 7 with respect to the body of the supporting element 2. The axial end of the centering pins 7, which is opposite with respect to the axial end that can be inserted in the holes 8 of the blade 4, is fixed, by means of screws 21, to a traction ring 22 which is coaxial to the supporting element 2 and is arranged in a receptacle 23 defined on the opposite side of the supporting

element 2 with respect to the side that must carry the blade 4. The bottom of the receptacle 23 defines an axial abutment 24 which is directed away from the resting contact surface 10. The above mentioned elastic means 18 are preferably constituted by springs 25, which are interposed between the axial abutment 24 and the traction ring 22. The possibility of axial sliding of the traction ring 22 and therefore of the centering pins 7 in relation to the supporting element 2 through the action of the springs 25 is delimited by studs 26 which are screwed into the body of the supporting element 2 and pass with play through through holes 27 defined in the traction ring 22. A nut 28 is screwed onto the end of the studs 26 which is opposite with respect to the end screwed into the body of the supporting element 2 and defines a stop abutment for the traction ring 22.

Advantageously, the locking ring 15 has, starting from the recesses 16, portions 29 which are inclined with respect to the axis 5 of the blade 4 and are adapted to increase progressively the thickness of the portions 17 of the locking ring 15 that are interposed between the shoulder 13 of each centering pin 7 and the second face 12 of the blade 4 during the transition of the locking ring 15 from the release position to the locking position. In practice, the inclined portions 29 have the effect of increasing progressively the tightening of the blade 4 against the resting contact surface 10, exerting a traction on the centering pins 7 and therefore increasing the load of the springs 25.

The locking ring 15 is interposed between a fixed ring 30 and the second face 12 of the blade 4. The fixed ring 30 is coaxial to the locking ring 15 and to the blade 4, and is connected, for example by means of screws 31, integrally to the second face 12 of the blade 4.

The fixed ring 30 and the locking ring 15 have, on their outer profile, safety notches 32, 33, which are mutually aligned when the locking ring 15 is in the locking position and are angularly mutually offset around the axis 5 of the blade 4 when the locking ring 15 is in the release position. The safety

notches 32, 33 have the function of allowing the engagement and disengagement, in safety conditions, of a tool of a known type or of a tool that is the subject of a co-pending patent application in the name of the same Applicant, in order to assemble the blade 4 on the supporting element 2 or disassemble the blade 4 from the supporting element 2. In practice, tools of this kind are provided with a rotating element which is provided with teeth which can be inserted in the safety notches 32, 33 and can be engaged, in rotation about the main axis 3, with the locking ring 15 so as to actuate its rotation for its transition from the locking position to the release position or vice versa, simultaneously retaining the fixed ring 30 so as to constrain the blade 4 to the tool until the locking ring 15 is brought to the release position.

The supporting element 2 is supported, so that it can rotate about the main axis 3, by a shaft 34, which is partially accommodated coaxially inside the supporting element 2, by means of the interposition of bearings 35. The space between the shaft 34 and the supporting element 2 that accommodates the bearings 35 is closed, at its axial end directed toward the blade 4, by a gasket 36.

Conveniently, means 37 are provided for delimiting the rotation of the locking ring 15 with respect to the blade 4 in its transition from the locking position to the release position and vice versa. The delimitation means 37, in the illustrated embodiment, are constituted by a pin 38 which is fixed to the fixed ring 30 and protrudes in the direction of the locking ring 15. The pin 38, which is oriented parallel to the axis 5 of the blade 4, engages with a recess 39 which is extended along an arc of preset extent about the axis 5, on the external perimeter of the locking ring 15.

For the sake of completeness in description, it should be noted that the fixed ring 30 has, at the holes 8 of the blade 4 designed to be occupied by centering pins 7, holes 40.

Assembly and disassembly of the blade in the cutting assembly

according to the invention is performed as follows.

The blade 4, preferably with the aid of a suitable tool of the type described in summary above, is arranged coaxially to the supporting element 2 with the holes 8 aligned with the centering pins 7. In this condition, the blade 4 is retained by the tool with the locking ring 15 in the release position. The blade 4 is then moved axially toward the supporting element 2 so that the centering pins 7 enter the holes 8 of the blade 4 and protrude with their axial end from the second face 12 of the blade 4. In this manner, the blade 4 rests with its first face 11 against the resting contact surface 10 and the centering pins 7 are arranged with the transverse slot 14 at the locking ring 15. At this point, preferably by means of the above mentioned tool, the locking ring 15 is rotated about its own axis, i.e., about the axis 5 of the blade 4, with respect to the blade 4, in order to bring it into the locking position. This rotation of the locking ring 15 engages the inclined positions 29 against the shoulders 13 defined by the transverse slots 14 of the centering pins 7, loading progressively the springs 25 and therefore increasing the tightening of the first face 11 of the blade 4 against the resting contact surface 10.

At this point, the blade 4 is correctly associated with the supporting element 2 and the tool can be removed from the blade 4, which remains stably engaged with the supporting element 2 and arranged with its cutting edge on a plane which is perpendicular to the main axis 3.

In practice it has been found that the cutting assembly according to the invention fully achieves the intended aim and objects, since the particular mating between the blade and the supporting element ensures higher precision in the arrangement of the blade with its cutting edge on a plane which is perpendicular to the rotation axis of the blade, achieving a higher cutting quality and reducing the production costs of the cutting assembly with respect to cutting assemblies of the known type.

A further advantage of the cutting assembly according to the

invention is that it can use, for the disassembly and reassembly of the blade, tools of a known type.

The cutting assembly thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims. All the details may further be replaced with other technically equivalent elements.

In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Application No. MI2011A001118 from which this application claims priority are incorporated herein by reference.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

CLAIMS

1. A cutting assembly (1) with removable blade for slicing machines or the like, comprising:

– a supporting element (2), which is extended around a main axis (3) and can be actuated with a rotary motion about said main axis (3);

– a blade (4), which can be associated coaxially and detachably with said supporting element (2);

– at least two centering pins (7), which are associated with said supporting element (2), said centering pins (7) being angularly spaced from each other around said main axis (3) and being oriented parallel to said main axis (3);

– at least two holes (8), which pass through said blade (4) and can be engaged by said centering pins (7);

– a locking element (9), which is associated with said blade (4) proximate to said at least two holes (8) and can move from a locking position, in which it is engaged with said centering pins (7) inserted in said holes (8), to a release position, in which it is disengaged from said centering pins (7), and vice versa;

characterized in that said supporting element (2) defines a resting contact surface (10), which is substantially perpendicular to said main axis (3), for a first face (11) of said blade (4), said centering pins (7) protruding, with one of their ends, from the second face (12) of said blade (4), which is opposite with respect to said first face (11), and having a shoulder (13) which is directed toward said resting contact surface (10); said locking element (9), in said locking position, being wedged between said shoulder (13) and said second face (12) of the blade (4) to lock said blade (4) against said resting contact surface (10).

2. The cutting assembly (1) according to claim 1, characterized in that said shoulder (13) is defined by a transverse slot (14), which is provided on the lateral surface of each one of said centering pins (7), on their side

directed away from said main axis (3).

3. The cutting assembly (1) according to claims 1 and 2, characterized in that said locking element (9) comprises a locking ring (15), which is connected coaxially to said second face (12) of the blade (4) and can rotate about its axis (5) with respect to said blade (4); said locking ring (15) being designed to be arranged around said centering pins (7) and having, along its internal perimeter, recesses (16) which are angularly mutually spaced around the axis (5) of the blade (4); said locking ring (15) being rotatable about its own axis (5) with respect to said blade (4) in order to pass from said locking position, in which said recesses (16) are angularly offset with respect to said centering pins (7) and said locking ring (15) is arranged so that one of its portions is located between two contiguous recesses (16) at a transverse slot (14) of a corresponding centering pin (7), to said release position, in which said locking ring (15) is arranged so that said recesses (16) are at said centering pins (7) to disengage said blade (4) from said centering pins (7) or to mate said blade (4) with said centering pins (7).

4. The cutting assembly (1) according to one or more of the preceding claims, characterized in that said centering pins (7) can move with the corresponding shoulder (13) away from said resting contact surface (10) in contrast with elastic means (18).

5. The cutting assembly (1) according to one or more of the preceding claims, characterized in that said centering pins (7) are connected, with their opposite end with respect to the end that can be inserted in said holes (8) of the blade (4), to a traction ring (22), which is accommodated coaxially in said supporting element (2), said elastic means (18) comprising springs (25) which are interposed between said traction ring (22) and an axial abutment (24), which is defined by said supporting element (2) and is directed away from said resting contact surface (10).

6. The cutting assembly (1) according to one or more of the preceding claims, characterized in that said locking ring (15) has, starting from said

recesses (16), portions (29) which are inclined with respect to the axis (5) of the blade (4) and are adapted to increase progressively the thickness of the portions (17) of said locking ring (15) that are interposed between said shoulder (13) of each centering pin (7) and said second face (12) of the blade (4) in the transition of said locking ring (15) from said release position to said locking position.

7. The cutting assembly (1) according to one or more of the preceding claims, characterized in that said locking ring (15) is interposed between said second face (12) of the blade (4) and a fixed ring (30), which is connected integrally to said second face (12) of the blade (4), said fixed ring (30) and said locking ring (15) having, on their outer profile, safety notches (32, 33), which are mutually aligned when said locking ring (15) is in said locking position and are angularly mutually offset around the axis (5) of the blade (4) when said locking ring (15) is in said release position.

8. The cutting assembly (1) according to one or more of the preceding claims, characterized in that said at least two centering pins (7) comprise three centering pins (7) which are regularly mutually spaced around said main axis (3).

9. The cutting assembly (1) according to one or more of the preceding claims, characterized in that it comprises means (37) for delimiting the rotation arc of said locking ring (15) around the axis (5) of the blade (4) in the transition from said locking position to said release position and vice versa.

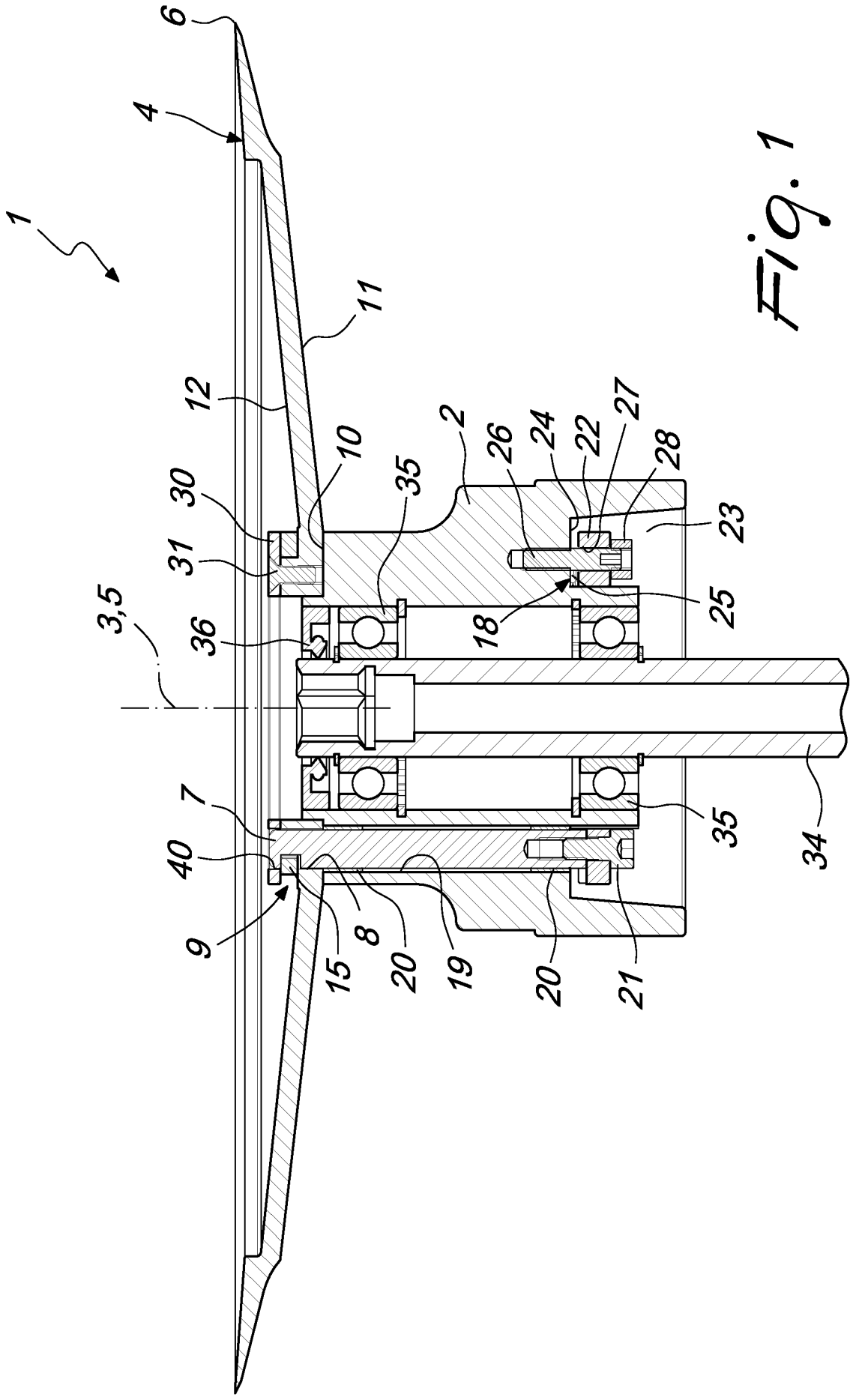
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Fig. 1

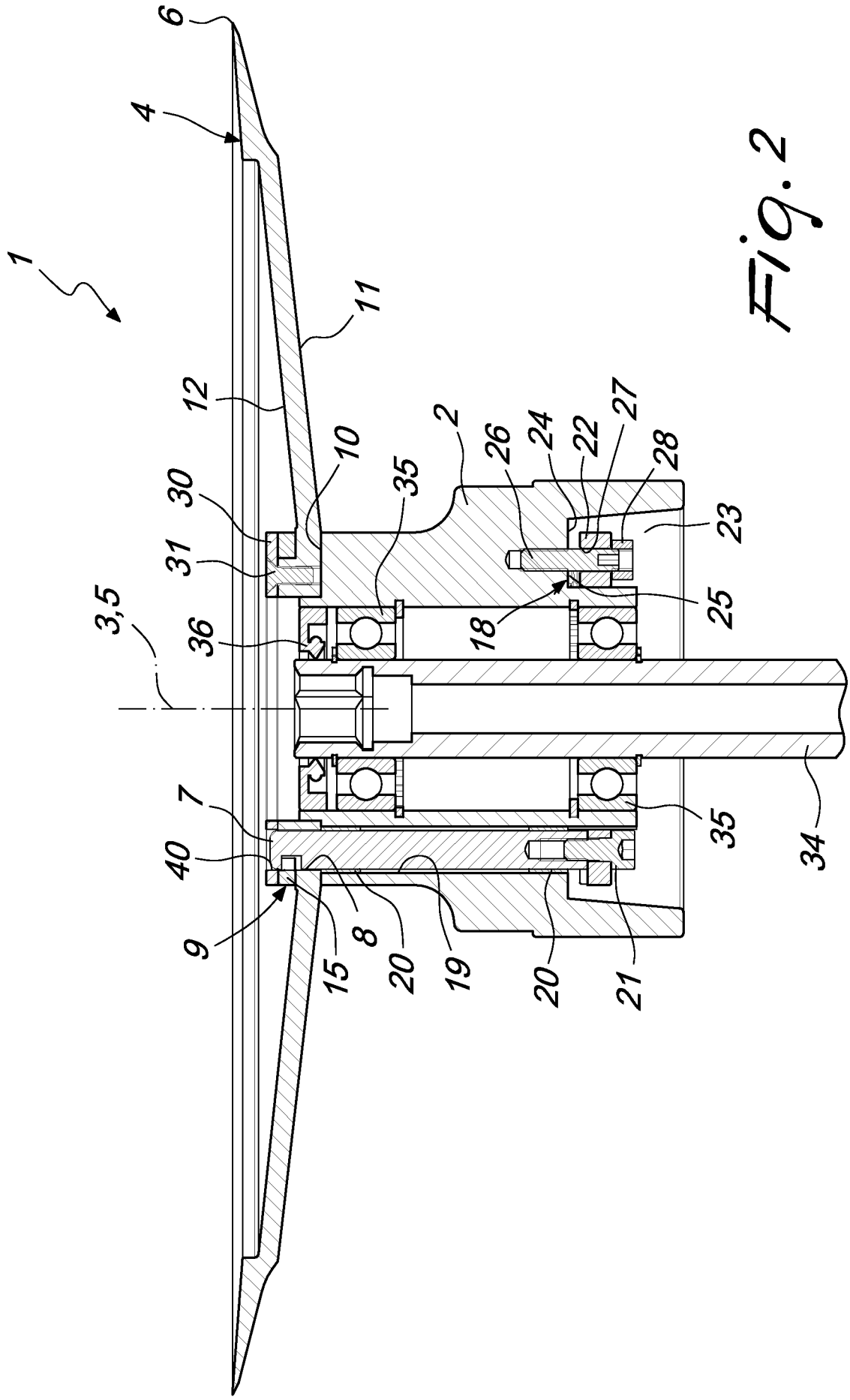
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Fig. 2

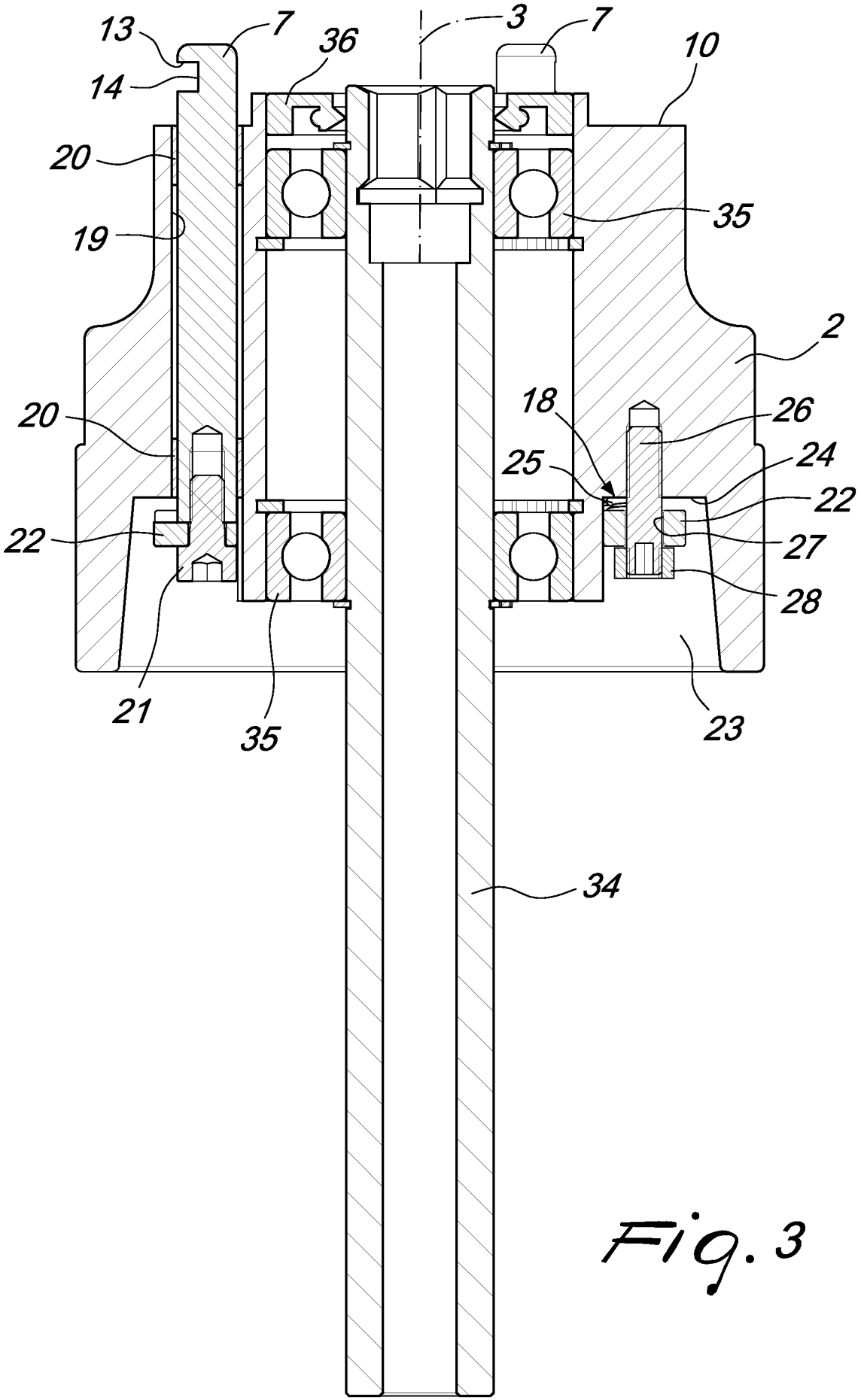

Fig. 3

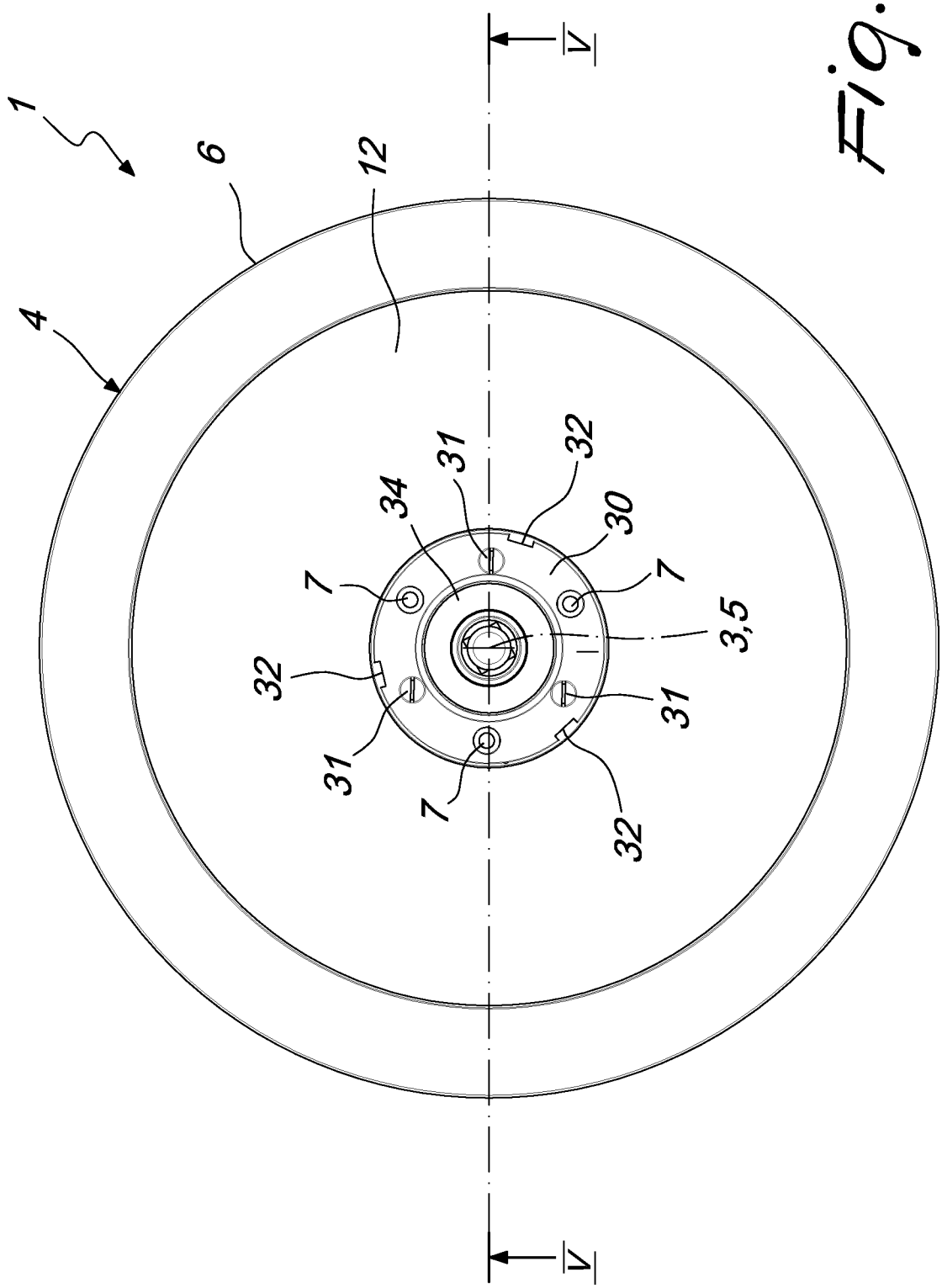

Fig. 4

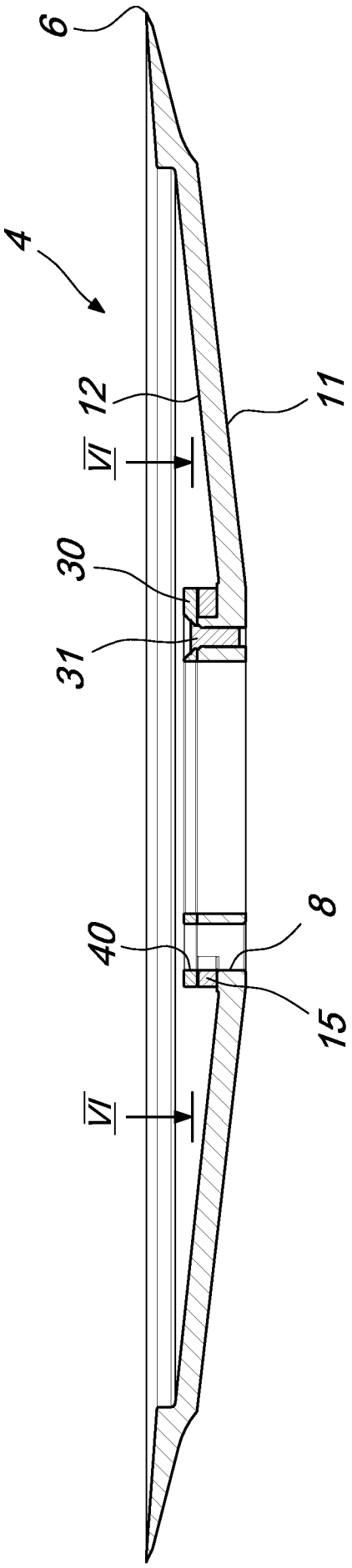

Fig. 5

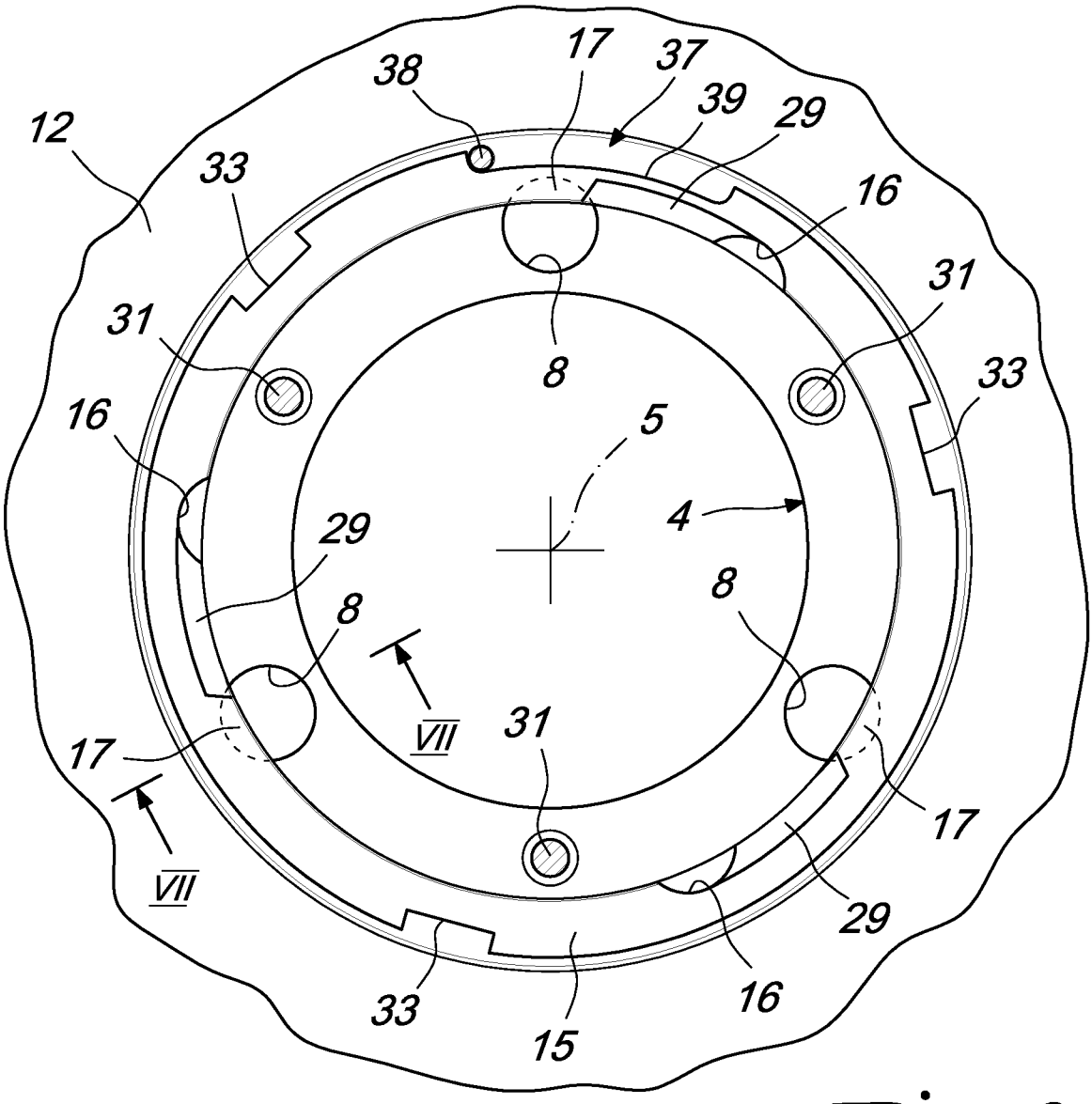
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Fig. 6

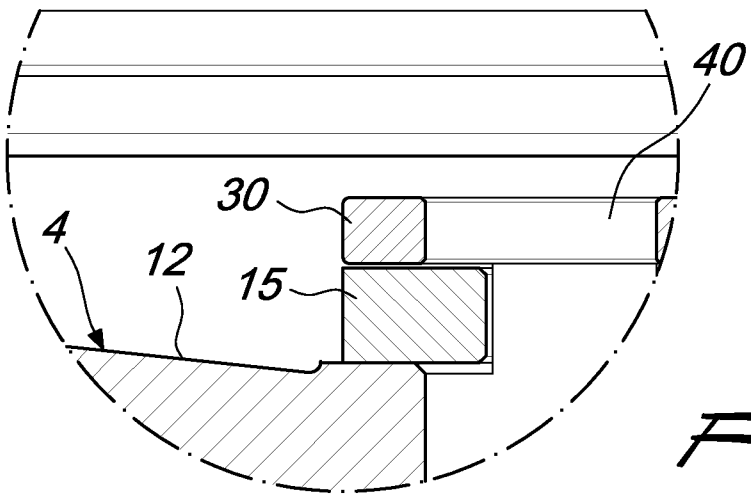
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Fig. 7

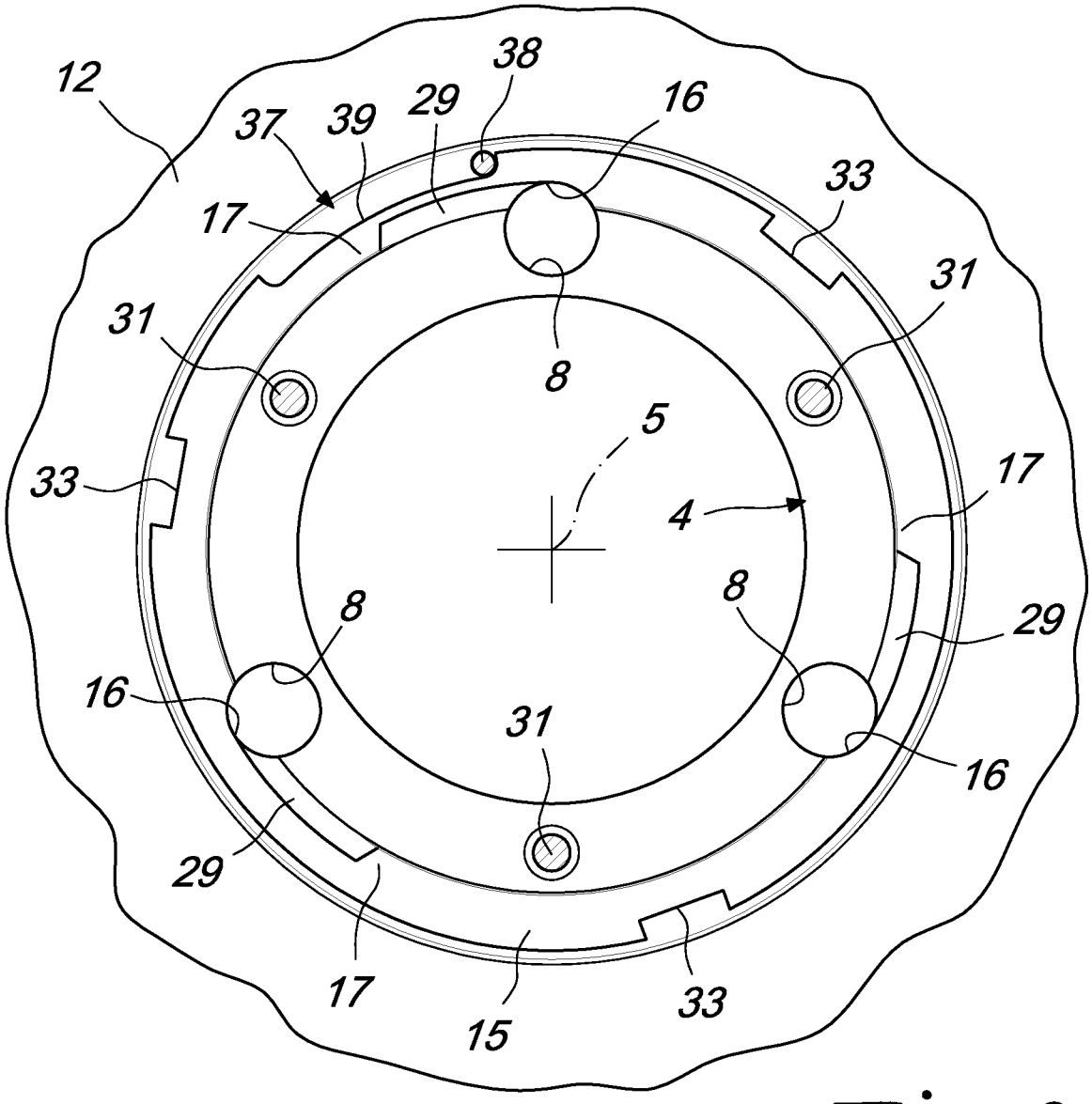
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Fig. 8

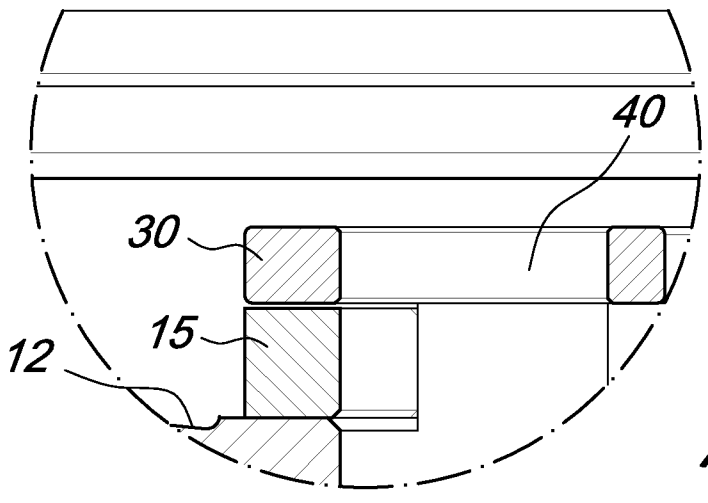
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Fig. 9

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/061321

A. CLASSIFICATION OF SUBJECT MATTER
INV. B26D7/26
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)
B26D

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.
A	WO 2007/103899 A2 (PREMARK FEG LLC [US]; ZHU GUANGSHAN [US]; SHARIFF SHAHRAM [US]) 13 September 2007 (2007-09-13) page 5 - page 6; figures 7-11	1-9
A	US 4 070 941 A (LORENZ HORST) 31 January 1978 (1978-01-31) figures 5-7	1-9
A	DE 197 18 164 A1 (AKE KNEBEL GMBH & CO [DE]) 5 November 1998 (1998-11-05) figures 1,2	1-9

☐ 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	Date of mailing of the international search report
26 July 2012	06/08/2012

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	Wimmer, Martin

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2012/061321

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DE 19718164 A1	05-11-1998	NONE	