

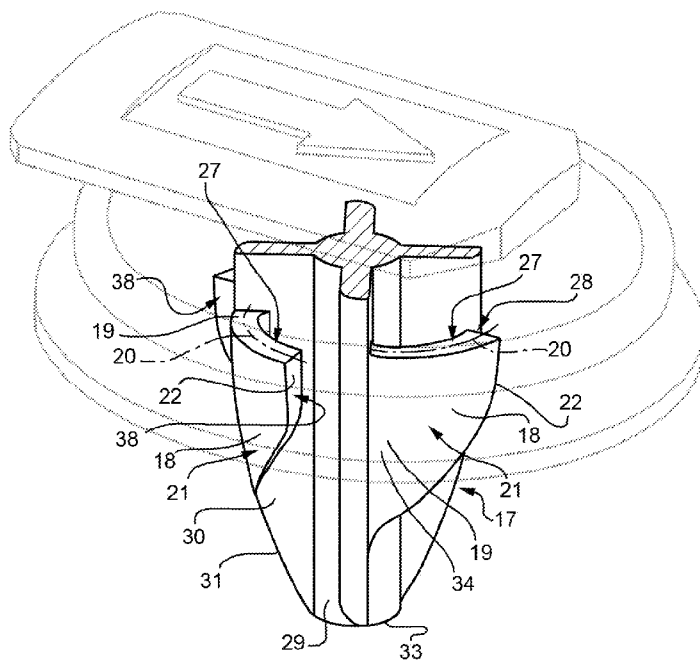


- (51) International Patent Classification:
F16B 21/08 (2006.01)
- (21) International Application Number:
PCT/US2011/028341
- (22) International Filing Date:
14 March 2011 (14.03.2011)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
TO2010U 000041 15 March 2010 (15.03.2010) IT
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- (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, 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, IS, JP, KE, KG, KM, 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, PE, PG, PH, PL, PT, RO, RS, RU, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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,

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(54) Title: PRESS-ON FASTENING CLIP

FIG. 2



(57) Abstract: A press fit connecting fastener (1) extends along an axis (5) and is provided with a head (11) and an intermediate flange, which are connected to each other and axially define a space (14) adapted to be engaged by a portion of a first panel (2); the fastener is further provided with a shank (17), which extends axially and overhangingly from the flange (8) in an opposite direction to the head (11), and has an axial stem (29), which carries at least four fins; the fins are elastically deformable towards the axial stem (29) when the shank (17) is axially press fitted into a through hole (23) of a second panel (3); in axial view, the fins (18) overhangingly extend along respective curved directions (20).

WO 2011/115906 A1



SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, **Published:**
GW, ML, MR, NE, SN, TD, TG).

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

PRESS-ON FASTENING CLIP

TECHNICAL FIELD

The present invention relates to a press fit
5 connecting fastener for coupling two plate-shaped
members. In particular, the present invention relates to
a press fit connecting fastener for coupling an internal
finishing panel to a door plate or to a bodywork plate
in a motor vehicle.

10 BACKGROUND ART

In the automotive field, the fasteners used for
coupling internal finishing panels to plates generally
have a head, which engages a seat of the finishing
panel, and a shank which is provided with two
15 elastically deformable fins, and which is press fitted
into a hole of the plate, so as to snap such fins beyond
the edge of the hole.

The plate hole is generally circular, with edge of
appropriate diameter to elastically deform the fins when
20 inserting the shank and to then hold the fins themselves
once they snap into their undeformed condition.

This known solution requires the relative position
of the circular holes in the plate to be accurate and
perfectly equal to that of the corresponding fasteners
25 on the finishing panel in order to centre and insert the
fasteners into the respective holes without exerting
excessive force.

In order to obviate possible inaccuracy problems in

the position of the holes and/or fasteners, making elongated holes, i.e. slots, with rectilinear, parallel edges is advantageous, which allow a certain tolerance margin along the direction in which such edges are
5 elongated and thus compensate for centering errors with respect to the positions defined on the plate in the step of designing.

However, by using slots instead of circular holes with the fasteners of known type, the finishing panel
10 may not be certainly locked in a firm manner. In particular, the stability of the panel depends on the orientation of the fastener about its axis with respect to the elongated edges of the slot. Indeed, if the two elastic fins are at the ends of the slot, they cannot
15 engage the slot edge or can only engage an insufficient area thereof, following the insertion of the fastener, whereby the fastener shank may easily be removed, thus leaving part of the finishing panel free.

DISCLOSURE OF INVENTION

20 It is the object of the present invention to provide a press fit connecting fastener, which allows to simply and cost-effectively solve the above-described problems, and which preferably ensures a firm connection when inserted into either a circular hole or a slot.

25 According to the present invention, a press fit connecting fastener is provided as defined in claim 1.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described with reference

to the accompanying drawings which illustrate a non-limitative embodiment thereof, in which:

- figure 1 shows a perspective view of a preferred embodiment of the press fit connecting fastener according to the present invention;

- figure 2 is similar to figure 1 and shows the fastener with parts removed for clarity; and

- figure 3 shows an enlarged, section view of the fastener in figures 1 and 2 while it is coupled to a panel.

BEST MODE FOR CARRYING OUT THE INVENTION

In figure 1, numeral 1 indicates a fastener defining a press fit connecting member for fastening a plate-shaped member or panel 2 (partially shown in figure 1) and a plate-shaped member or panel 3 (partially shown in figure 3). Panels 2 and 3 may be defined, for example, by an internal finishing panel of a motor vehicle and by a plate of a side or door of the motor vehicle, respectively.

Fastener 1 extends along a rectilinear axis 5 and comprises a body 6 made of plastic material and a sealing member 7, which is fixed to a flange 8 defined by an intermediate portion of body 6, and is made of an elastically deformable material which is more flexible or softer than that of body 6. Member 7 comprises a lip 9, which is arranged along the external edge of member 7 and, in use, is axially pressed against a surface 10 of panel 3 (fig. 3) to exert a sealing action along a

closed annular line. For example, member 7 is coupled by co-molding to body 6. Alternatively, body 6 and member 7 may be integrally made of a material having an appropriate flexibility to ensure both the sealing
5 against surface 10, and the coupling to panel 3, which will be described hereinafter in greater detail.

At an axial end thereof, body 6 comprises a head 11 defined by a plate connected to flange 8 by means of an axial stem (not shown in the accompanying figures),
10 which extends through a through hole 13 (partially shown) of panel 2. Head 11 faces and is axially spaced from flange 8 and/or member 7, so as to define a void 14, having such an axial dimension to be engaged by a portion of panel 2 and keep it in a fixed position. The
15 shape and size of head 11 is such to allow it to be bayonet-coupled to panel 2, by means of a first movement with which head 11 is axially inserted into hole 13, and a second movement with which it is slid along panel 2. For example, the second movement is a translatory motion
20 indicated by an arrow drawn on head 11, or a rotary motion with respect to axis 5.

The plate defined by head 11 preferably has an asymmetrical shape with respect to axis 5: for example, it has a substantially rectangular shape and the
25 position of axis 5 is offset to the centre, towards one of the two smaller sides of the rectangle.

With reference to figure 2, body 6 comprises a shank 17, which axially and overhangingly extends from

flange 8 in an opposite direction to the position of head 11. Shank 17 comprises at least four fins 18 which, in an axial, section view with section planes orthogonal to axis 5, overhangingly extend from respective jointing zones 19 along respective curved directions 20 having concavity facing axis 5. Fins 18 are elastically flexible towards axis 5. In particular, the jointing zones 19 define respective virtual hinges about which the fins 18 bend.

10 Fins 18 are radially defined outwards by surfaces 21, the distance of which from axis 5 increases, along the respective directions 20 from jointing zones 19 towards end edges 22 of fins 18, when the fins 18 are undeformed. When shank 17 is axially press fitted into a through hole 23 of panel 3, the edge 24 of hole 23 contacts the surfaces 21 and causes fins 18 to bend, whereby the diameter of shank 17 is reduced until the fins 18 snap again into the undeformed condition once hole 23 has been axially passed.

20 As shown in figure 3, the hole is defined by a slot, whereby edge 24 comprises two parallel, rectilinear portions 25 joined to each other by two semi-circular portions 26. Alternatively, hole 23 is a circular hole (dashed line) having a diameter substantially equal to the distance between the portions 25.

Again with reference to figure 2, fins 18 have respective faces 27, which axially face member 7 and

flange 8, are orthogonal to axis 5, and rest in use against a surface of panel 3, from the opposite side with respect to surface 10, when they snap into undeformed condition. In other words, lip 9 and faces 27
5 define a space 28 therebetween, in which panel 3 remains axially forced in a fixed position.

Conveniently, the fins 18 are equally spaced from one another about axis 5.

Shank 17 comprises a cylindrical axial stem 29, the
10 external surface of which is joined to the jointing zones 19 by means of respective arms defined by flat ribs 30 parallel to axis 5. The ribs 30 are preferably equally spaced from one another about axis 5 and are radial.

15 Edges 31 of the ribs 30 and surfaces 21 of the fins 18 has substantially the same generatrix with convex curved profile, substantially nosecone-shaped, which progressively converge towards a free end or tip 33 of stem 29. Edges 31 exactly end at tip 33. The jointing
20 zones 19 instead are arranged only along an intermediate portion 34 of edges 31.

With reference to figure 3, the fins 18 are radially delimited inwards by surfaces 36, which are cylindrical with generatrices substantially parallel to
25 axis 5. At the jointing zones 19, the surfaces 36 are jointed to the respective ribs 30. Except for the jointing zone 19, the radial length of faces 27 gradually increases towards the edges 22 (fig. 3).

With reference to figure 2, edges 22 are defined by faces 38 which are transversal to the surfaces 21 and 36 and delimit the fins 18 in a tangential direction. The radial dimension of the faces 38 is gradually reduced axially towards tip 33, since surfaces 21 converge towards surfaces 36.

At the same time, the size of fins 18 along the respective directions 20 is maximum along faces 27. Such a dimension, toward tip 33, is gradually reduced to cancel out, whereby the edges 22 approach edges 31 of the ribs 30, up to join with edges 31. In particular, edges 22 have a convex profile, except for the zone in which the edges 31 are joined.

With reference to figure 3, once fastener 1 has been fixed to panel 2 according to the above-described bayonet mode, shank 17 is axially inserted into hole 23. By pressing fastener 1, edge 24 contacts the surfaces 21 of at least two fins 18, and forces such fins to gradually bend towards axis 5 and enter into respective receiving zones 40 (fig. 3) tangentially defined by the ribs 30. The elastic deformation increases until the fins 18 are inscribed in a circumference having a diameter equal to the distance between portions 25, i.e. double the radius of portions 26. Hole 23 is calibrated so as to have a distance between portions 25 which is either greater than or substantially equal to the maximum external diameter of ribs 30, so as to elastically bend fins 18, without deforming the ribs 30.

By axially forcing the lip 9 against surface 10, panel 3 is axially engaged into space 28 and the fins 18 snap outwards in undeformed condition beyond edge 24.

Due to the number of fins 18 and to the curved
5 directions 20 in which the fins 18 extend, at least two of them always engage edge 24 to axially hold fastener 1, and therefore fix panel 2, regardless of the orientation of fastener 1 about its axis 5. At the same time, fastener 1 is also adapted to engage a circular
10 hole instead of a slot: in this case, all fins 18 will engage the edge of the hole of panel 3.

Faces 27 move on a plane orthogonal to axis 5 when the fins 18 snap into undeformed position, whereby firmly engage the edge 24 and the surface of panel 3
15 about hole 23. Furthermore, due to the shape of fins 18, the receiving zones 40 confer a certain tolerance in centering fastener 1 in the direction orthogonal to axis 5 and to the middle line of slot 23 (with this regard, see the distance of edges 31 from portions 25 in fig.
20 3).

The nosecone-shape of surfaces 21 and the other shape features of fins 18 then facilitate the insertion into hole 23 and the deformation of fins 18 towards the interior of receiving zones 40.

25 From the above, it is apparent that changes and variations may be made to the described fastener 1 without departing from the scope of protection of the present invention, as defined in the appended claims.

In particular, the number of fins 18 could be greater and/or the thickness of fins 18 could be different from that shown.

Ribs 30 could be oriented in a different manner
5 from that shown; and/or the jointing zones 19 of fins 18 could define other joints from those seen in the figures; and/or fins 18 could overhangingly extend directly from the axial stem 29, or extend in pairs in opposite directions from the same rib; and/or ribs 30
10 could be replaced by arms of different shape.

CLAIMS

1.- A press fit connecting fastener extending along an axis (5) and comprising:

- a head (11) adapted to be coupled to a portion of
5 a first panel (2);

- an intermediate flange (8) connected to said head (11);

- a shank (17) axially extending from said flange (8) in an opposite direction with respect to said head (11) and comprising an axial stem (29) and retaining
10 members (18), which are carried by said axial stem (29) and are elastically deformable towards said axis (29) in order to axially press fitting said shank (17) in a through hole (23) of a second panel (3);

15 characterized in that said retaining members comprise at least four elastic fins (18) which, in an axial view, overhangingly extend along respective curved directions (20).

2.- A fastener according to claim 1, characterized
20 in that said fins (18) are radially defined by respective convex external surfaces (21) having an increasing distance from the axis (5) along said curved directions (20) starting from respective jointing zones (19) towards respective end edges (22) of said fins (18), when said fins (18) are non-deformed.
25

3.- A fastener according to claim 2, characterized in that said convex external surfaces (21) are substantially ogival in shape.

4.- A fastener according to any one of the preceding claims, characterized in that said fins (18) are axially defined by respective faces (27) facing said flange (8) and orthogonal to said axis (5).

5 5.- A fastener according to claim 4, characterized in that the radial dimension of said faces (27) increases along said curved directions (20) towards respective end edges (22) of said fins (18).

6.- A fastener according to any one of the
10 preceding claims, characterized in that said fins (18) are equally distributed around said axis (5).

7.- A fastener according to any one of the preceding claims, characterized in that said fins (18) are joined to said axial stem (29) by means of
15 respective radial arms.

8.- A fastener according to claim 7, characterized in that said arms (30) are defined by radial ribs (30), having respective edges (31), said fins (18) overhangingly protruding therefrom; the profile of said
20 edges (31) being substantially equal to that defined by convex external surfaces (21) of said fins (18).

9.- A fastener according to claim 8, characterized in that said fins (18) engage only an intermediate axial portion of said ribs (30).

25 10.- A fastener according to any one of the preceding claims, characterized in that said fins (18) are radially defined by cylindrical internal surfaces (36).

11.- A fastener according to any one of the preceding claims, characterized in that the dimension of said fins (18) along the respective curved directions (20) progressively decreases in the axial direction
5 towards a tip (33) of said axial stem (29).

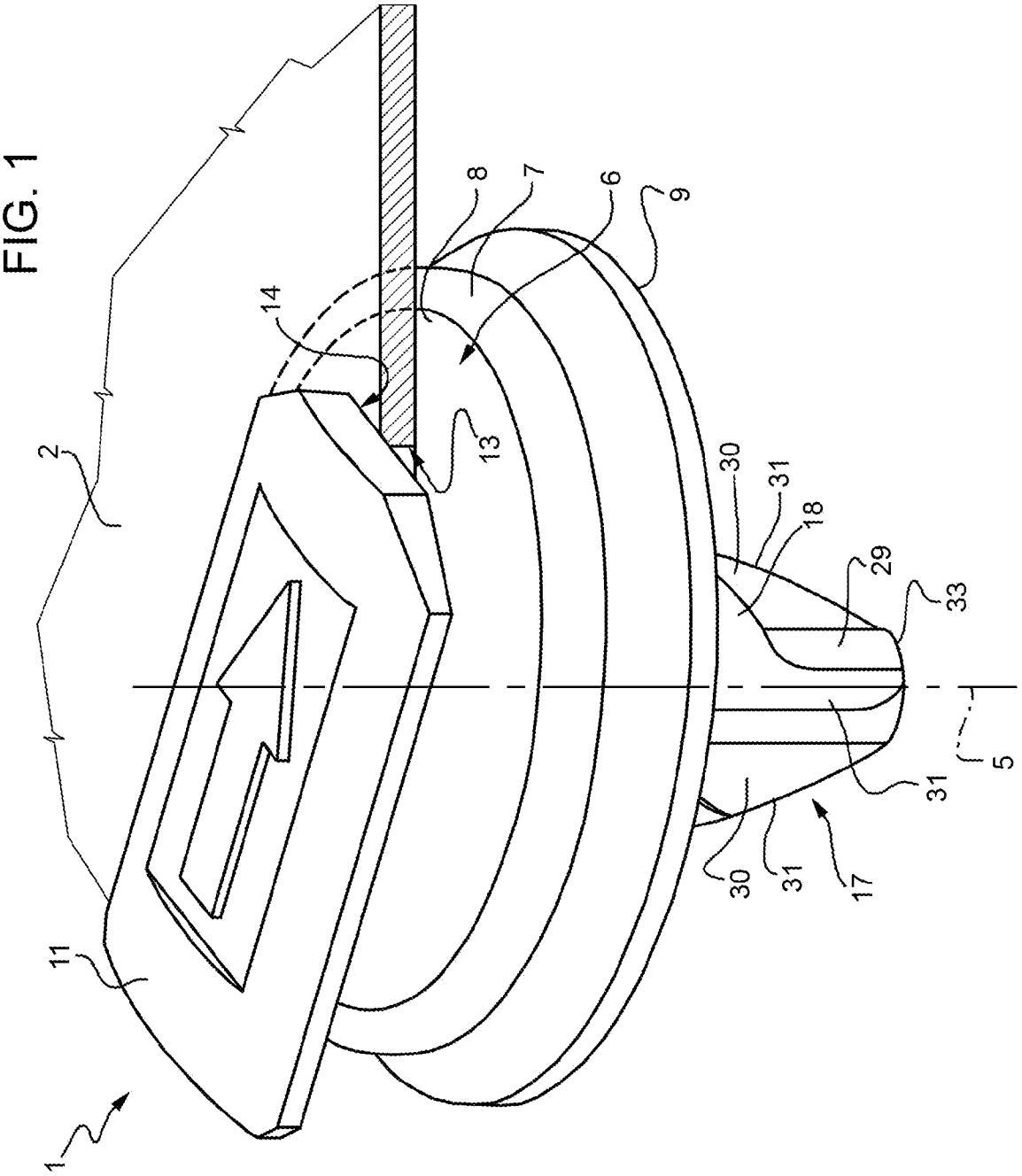


FIG. 2

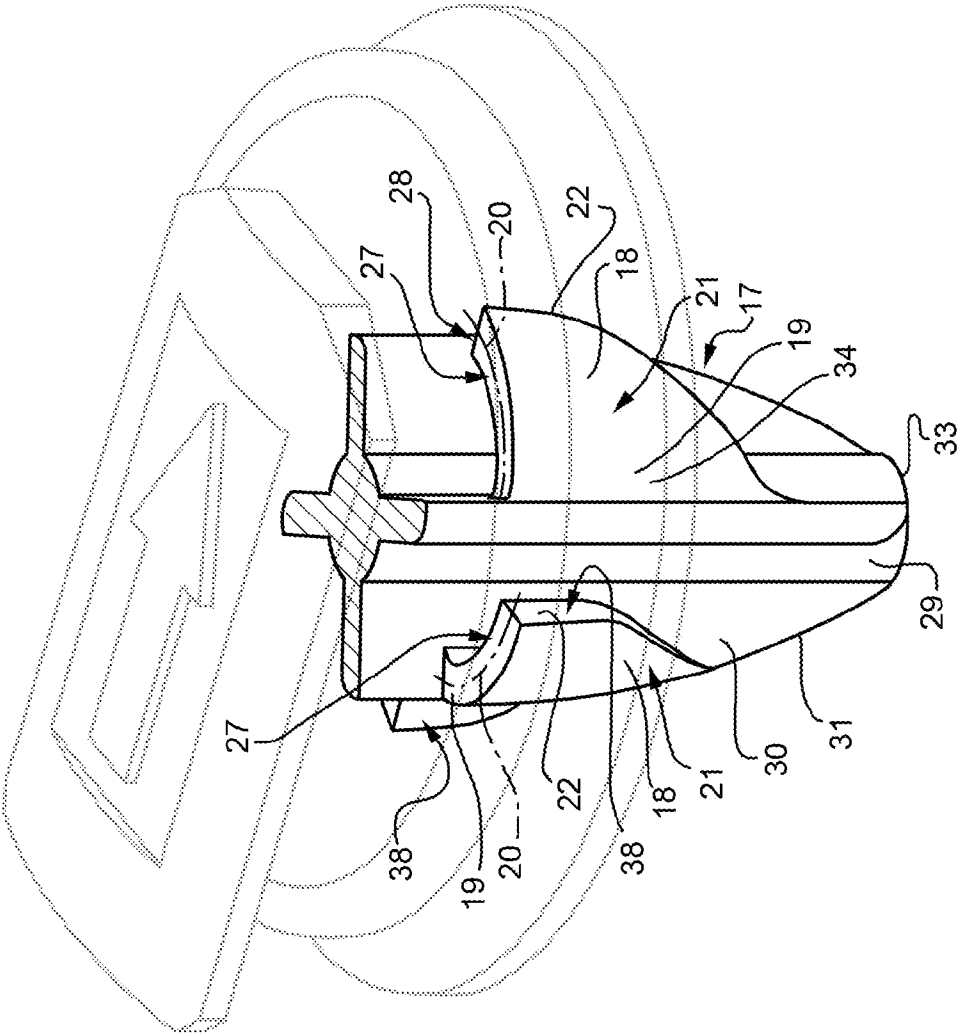
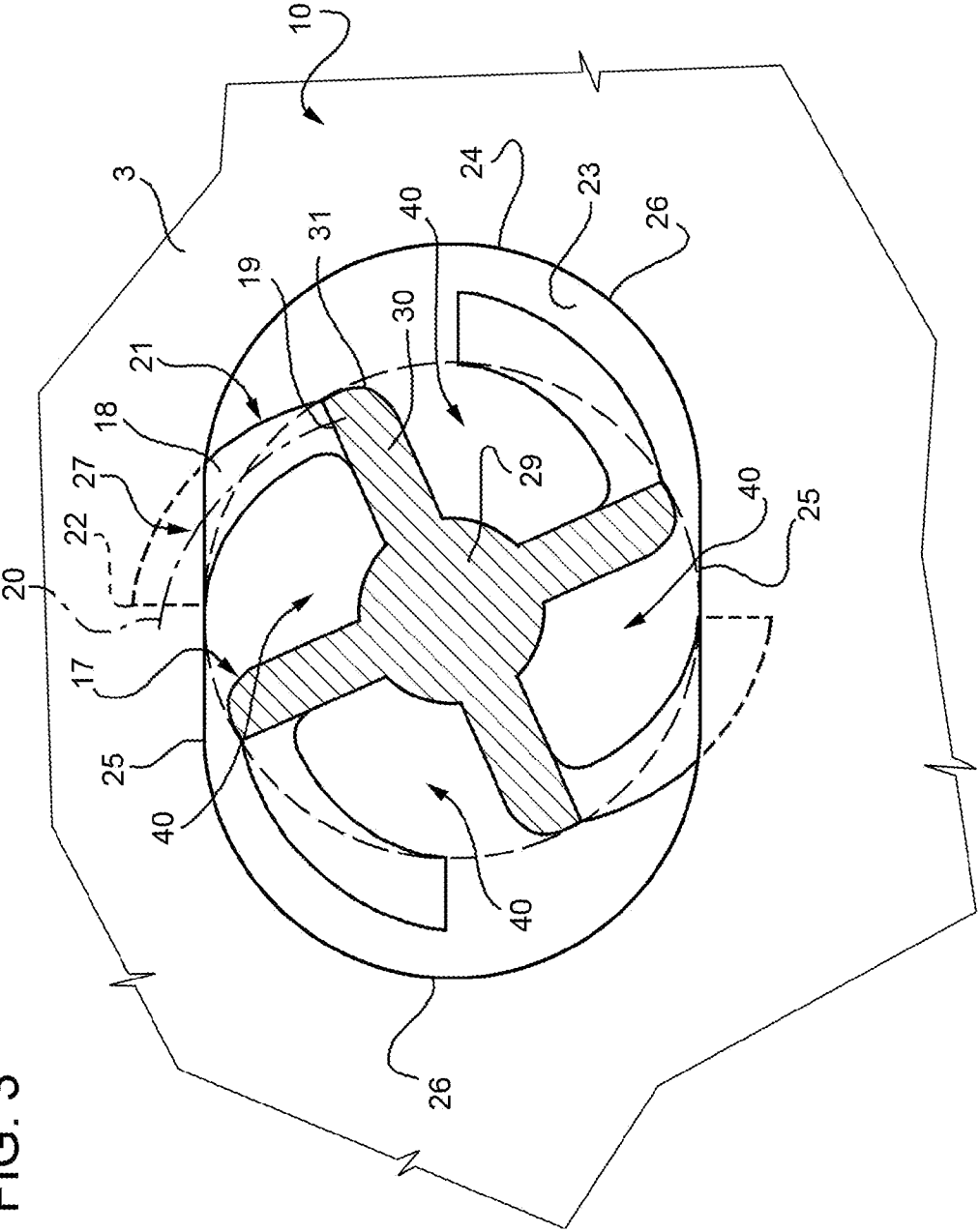


FIG. 3



INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/028341

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16B21/08
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)
F16B

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 practical, 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	US 2009/188086 A1 (OKADA SHIGEO [JP] ET AL) 30 July 2009 (2009-07-30) abstract; figures -----	1-11
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X	WO 2009/008824 A1 (ITW SVERIGE AB [SE]; OESTERGREN KRISTIAN [SE]) 15 January 2009 (2009-01-15) abstract; figures -----	1
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Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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"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

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Date of the actual completion of the international search

15 June 2011

Date of mailing of the international search report

24/06/2011

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2011/028341

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Information on patent family members

International application No

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