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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
26 November 2009 (26.11.2009)

PCT

(10) International Publication Number
WO 2009/142500 A1

(51) International Patent Classification:
F16B 5/06 (2006.01) *A44B 17/00* (2006.01)

(21) International Application Number:
PCT/NL2009/050284

(22) International Filing Date:
22 May 2009 (22.05.2009)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:
1035465 23 May 2008 (23.05.2008) NL
2002222 18 November 2008 (18.11.2008) NL

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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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (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, SE, SI, SK, TR),

[Continued on next page]

(54) Title: FASTENING DEVICE

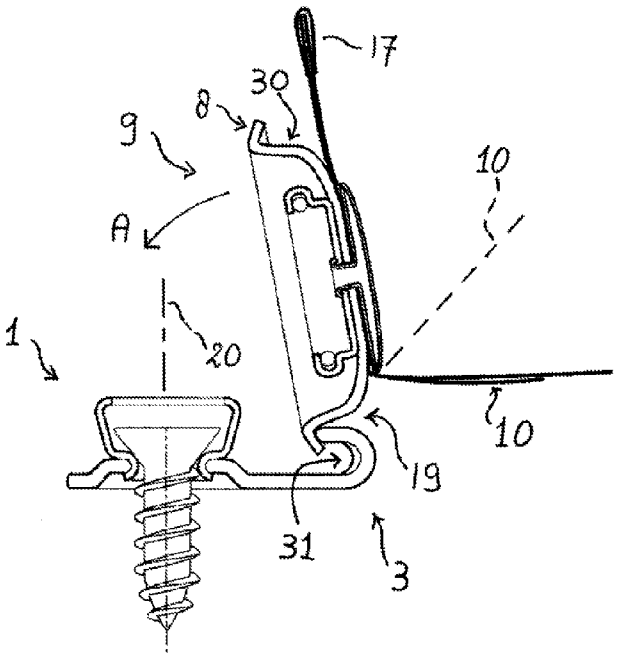


Fig. 4

(57) Abstract: The invention relates to a fastening device of locking press button type. It comprises a first element (1) which in use is present at a substrate and a second element (9) which, to fasten an object (10) to the substrate, can be releasably fastened to the first element by way of a to a snapping part (2) of the first element snapping snapping part (11) of it and wherein the elements (1, 9) remote from their snapping part (2, 11 respectively) have a hooking part (3, 8 respectively) such that the elements (1, 9) first have to be mutually engaged making a mutual angle by the hooking parts (3, 8) and then are pivoted onto each other to subsequently be fixed snapped to each other.

WO 2009/142500 A1

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

Published:

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

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

Title: Fastening device

The invention relates to a fastening device (hereafter "device") to firm and easily releasable fasten an object to a substrate, such as a foil, comprising a first element which in the state of use is mounted to the substrate and a second element, wherein those two elements are designed such that they can be releasably mounted to each other, particularly without the use of a tool. The object to be fastened is fastened to the substrate by mutually mounting of the first and second element, for which the second element can be mounted to said object in an earlier stage, or e.g. the object will be caught or clamped between the mutually fastened first and second elements. The first and/or second element can have button or knot shaped parts for mutual fastening.

A prior art device of this type is e.g. used to under tension fasten a sheeting/covering sheet to a ship deck or to a car or caravan. In that case the First element is provided with a projection onto which the second element can releasably be fastened. The projections, which inevitably are permanently present at e.g. the ship deck, cause inconvenience and injuries.

Further related devices are known from WO2005015032 (Partnership Twello B.V.), DE-A-3248611, DE-A1-19962001 and US-A-3,818,550. A push button with hooking edge for a shoe fastener is e.g. disclosed in DE324436 (Wilhelm Brase, 1920), GB182800 (Isodore Menville, 1923) and FR5639 (Achille F. Raymond, 1906). Technical background is provided by US2606353, US2441573 and US2328016.

The object of the invention is versatile and relates to a device with one or more of the following: will not easily release unintentionally, preferably merely if a part of it fails; can be fastened and/or released with a single hand; can be fastened and/or released in a single smooth movement; fastening takes place by pushing the First and second element onto each other; operates by making use of resilient into each other engaging or in/at each other snapping parts which are e.g. exposed to the fastening forces; can be made from a minimum number of parts; can be made such that the second element is mounted to the object permanently/without risk for loss; by mutually fastening of

the first and second element stress can be created within the object; is insensitive for contamination; offers the advantages of a standard press-button or snap button; has de tendency to during use orient one or both elements in the optimum position of use; offers a mechanical locking e.g. such that the during normal use in the object created increase of stress does not cause mutual release of the elements; offers a mechanical locking which does not or hardly hinders during mutually releasing the elements and/or allows that by manually pulling in the right direction at the object the elements are mutually released; is designed such that in many orientations of the first and/or second element these can be mutually hooked and/or fastened; offers a levering action and/or displacement during mutually fastening of the two elements.

For that the invention is characterised by the accompanying independent claim(s). The dependent claims relate to preferred further developments.

Preferably care is taken such that both elements have a hooking part which can be brought into hooking engagement while the elements mutually make an angle and subsequently allow that, while the hooking engagement is maintained, the elements are pivoted towards each other to be mutually fastened wherein by the pivoting movement a displacement is created which can e.g. be used to stress the object. For that preferably the one element has a hooking part all around while the other element only has a local hooking part. The hooking part of the First and/or second element preferably keeps a substantially fixed distance to a point (e.g. central point), such that the hooking part follows e.g. a circle shape of part of it.

Preferably the hooking part of the one element is outward and of the other element inward directed, e.g. curved.

One or more of the following features are preferred: the hooking part at the one and/or other element is present at the side where the object pulls at the element; the displacement and/or the desired stress in the object is substantially completely created by towards each other pivoting of the elements while they are mutually hooked; the hooking into each

other provides mutually registering of the to each other to be fastened/snapped elements; the hooking part at the one and/or other element has a pressed through/bent part to e.g. make the contact surface between the mutually hooking parts smaller and/or keep parts (which e.g. are opposite) of the mutually hooking parts at mutual distance and/or already provide a reliable hooking action if the elements mutually make an angle of 90 degrees; the free end of the hooking part of the one element keeps a slightly larger distance to a point (e.g. central point) than a therewith co operating limiting edge (e.g. upright edge of the hood/lever disc) at the other element to e.g. in the mutually fastened situation of the elements provide a mounting play; the elements can not be mutually fastened if the hooking parts do not hookingly co operate mutually.

To easily mutually fasten and release the elements while ensuring of proper locking against unintentional release one or more of the following is preferred: the hooking part of the one and/or other element narrows, preferably in the direction from outward to inward of the element, wherein preferably the hooking part is sideways limited by a substantially the radial following line; the hooking part is provided by a circle arc part covering an angle of 20 or 15 or 10 degrees at the most.

The invention is further illustrated by way of presently the most preferred, non-limiting embodiments, referring to the accompanying drawing, showing in:

Fig. 1 the two elements in perspective obliquely from above;

Fig. 2 the two elements in sectional side view, mutually fastened to stress a sheet;

Fig. 3 the view of fig. 2 in exploded position;

Fig. 4 a view according to fig. 2 with the two elements making an angle of approximately 90 degrees and mutually hooked;

Fig. 5 one of the elements in top view;

Fig. 6 in perspective the different subsequent stages during fastening of a sheet with the system according to the invention;

Fig. 7 an enlargement of step 2 of fig. 6;

Fig. 8 in perspective an alternative for the element of fig. 5.

The same reference numbers are applied to refer the same parts.

The device of fig. 1 comprises a First element 1 which can be mounted onto a substrate, e.g. glued , screwed, nailed or riveted. The substrate is preferably rigid, e.g. a ship deck or window frame. The central knot shaped part 2 has a radial symmetry in top view and is designed as the male part of a typical snap button. At a radial distance of the knot shaped part the element 1 has a hooking part 3 with a hooking edge which is oriented inward of the element 1. The hooking part 3 is part of a shaped lip 16 such that a in side view U of V shaped part is provided. The hooking part 3 and the knot shaped part 2 are mutually permanently fixated.

The knot shaped part 2 has a from the ground plate 4 in upward direction widening outer wall 5 such as typical with a snapping closing snap button (undercut shape). A mechanical mounting means, in this embodiment a screw 6 projects co axially/concentrically through the knot shaped part 2 and with that the first element 1 can be mounted onto the substrate.

The second element 9 of the device of fig. 1 has also a radial symmetry in top view and has the female part 11 (not visible in fig. 1) of a typical snap button. Of the second element 9 in fig. 1 merely the hat shaped part 7 is shown with at its lower side the hooking part 8 to co operate with the hooking part 3 in a hooking manner. Within the hat shaped part 7 comes co axially/concentrically the female part 11 of a typical snap button and at its top comes a cover 12.

Fig. 2 shows the elements 1 and 9 releasably mutually snapped wherein at the second element 9 a sheet (sheet, leather or foil product) is permanently fixated (with 17 the free edge seam of the sheet 10 is indicated). Fig. 3 shows the parts of fig. 2 in exploded view. The element 9 is mounted to the sheet 10 by penetrating the steel 13 of the cover 12 through the sheet and placing the hat 7 and female snapping part 11 onto said steel 13 and after that deform the free end of the steel 13 such that it permanently hooks to the snapping part 11 and hat

7 and sheet 10 are caught and clamped between cover 12 and snapping part 11, a mounting which is typical with a snap button.

The in fig. 2 and 3 illustrated parts are all of metal, such as steel or messing, however one or more of them could be made of non-metal, such as polymer material. Metal, such as stainless steel or aluminium, is preferred due to easy deformability, easy mass production and sustainability.

Snapping part 11 has an almost closed ring of resilient material, such as spring steel which in fig. 2 engages the upright wall of snapping part 2 and from that situation can only be regulatory removed by being forced into a larger diameter due to the upward widening shape of the snapping part 2.

The hooking part 8 extends from its base obliquely upwards in the direction of its free end, such that if the elements 1 and 9 are mutually mounted (fig. 2) the contact surface there between is minimal and keeps a distance to the free end 15 of the shaped lip 16. An alternative trajectory of the hooking part 8 is illustrated by dashed line 18: from its base flat outward.

In fig. 2 the arrow F1 indicates the extreme direction along which the sheet 10 can extend from the element 9 without having the risk that element 9 automatically snaps loose from element 1 (without causing permanent deformation or damage to element 1 and/or 9) when stress prevails in sheet 10 at the side of element 9 opposite the seam 17, if the hooking parts 3 and 8 are absent (thus when one can speak of a typical snap button). Arrow F2 indicates for the same considerations a direction along which the sheet 10 can extend from element 9 without the risk that element 9 automatically snaps loose from element 1, if the hooking parts 3 and 8 are present and as fig. 2 shows co operate. Arrow F2 could even make an angle of 90 degrees with arrow F1. Particularly if the sheet 10 extends according to arrow F2, the co operation between hooking parts 3 and 8 contributes to keeping the elements 1 and 9 snapped together. If to the contrary the sheet 10 is at the to the edge seam facing side of the element 9 according to the direction of arrow P2

(which extends under an angle obliquely upward as arrow F2) stressed, element 9 will already snap loose at a substantial lower stress in the sheet 10 (in the way as with a typical snap button) from element 1 due to absence of hooking part 3 at that side.

Fig. 4 shows the mutual distance of the elements 1, 9 at the start of temporary mounting and simultaneously displacing/tensioning of the sheet 10 to the substrate to which the element 1 is permanently mounted. The elements 1 and 9 make a mutual angle of almost 90 degrees and these elements are only in mutual engagement through the hooking edges. The sheet 10 has a slight tension at the side of the element 9 facing away from the edge seam 17. By the upward extension of the hooking part 8 from its base already in this position the hooking parts 3 and 8 engage stable into each other. By pivoting from the in fig. 4 illustrated position the element 9 in the direction of arrow A around the by the into each other engaging hooking parts 3 and 8 determined pivot point 19 the snapping parts 2 and 11 can be snapped fixed to each other. During said pivoting the connecting point between element 9 and sheet 10 displaces into the direction of the central axis 20 of element 1, such that the tension in sheet 10 increases in the desired manner.

By designing the hooking part 3 as shown in fig. 5 an optimised effect of the invention results. At its to the element 1 connecting base 21 provides the part 3 a circle arc part making an angle between 10 and 20 degrees having as centre point 20 the normal to the paper of the drawing extending central axis of the snapping part 2. From the base 21 the part 3 extends First upward and then inwards to end in a free hooking edge 15. At the hooking edge 15 the part 3 is smallest and at the base 21 the part 3 is widest. There between the width can change continuously or stepwise. E.g. the part 3 is obtained by bending the dashed part 22 around line 21. Part 22 then is the extension of the to the base plate 4 connecting lip 23, wherein the side edges of the continuation 22 are a continuation of the converging straight side edges of the lip 23 while the edge 15 a circle arc part is with centre point 20 and with a length

between 5 and 10 degrees shorter than line 21. Thus without permanent deformation or damage the element can be released from element 1 by pulling at the edge 17 of the sheet such that a obliquely upward directed force component is created which in top view is present in the release area (see arrows B) to the left of line 24 through the centre point 20 and perpendicular to the 0 degree line 25 through the centre point 20 and the hooking part 3. If line 15 was as long as line 21, the release area to the left of line 24 would be made substantially smaller and would be located between lines 26 (see arrows C), causing diminishing of the comfort of use.

Fig. 6 shows in step 1 how with a hand the sheet 10 with at it element 9 is brought to the to the substrate mounted element 1. The hooking part 3 is merely present at the side of the snapping part 2 where the desired tension must be created at maintained in the sheet 10 (the side facing away from the sheet edge 17). In step 2 the elements 1 and 9 are just hooked into each other (according to fig. 4) and another, earlier to a different element 1 snapped element 9 at the sheet 10 is visible. In step 3 the element 9 is pivoted around point 19 (see fig. 4) by which the tension in sheet 10 rises. In step 4 pivoting is completed and the snapping parts 2, 11 are pressed into each other and step 5 shows the end situation. After that sheet 10 can be released again by grasping edge 17 and pull it up. Elements 9 are released one after the other, starting closest to the location where the edge 17 is pulled at, such that sheet 10 so to speak is zipped loose from the elements 1.

The element 1 of fig. 8 can be fastened to the substrate by snapping, temporary or permanent, for which at the lower side of the base plate 4 there are a hooking edge 27 and at a distance from it a resilient hooking edge 28. The hooking part 3 is now a from the base plate cut part with preferably substantially the same shape and dimension as disclosed with reference to fig. 5.

Thus the element 9 can in each turned position of the hat 7 be snapped to element 1 wherein the hooking parts 3 and 8

mutually engage and provide for permanent locking against releasing forces that, viewed from above, are active in a broader or narrower locking area at the to the hooking edge 3 facing side of the snapping part 2 (between lines 29 according to arrows D in fig. 5). This locking area covers e.g. an area between 20 and 60 degrees or between 30 and 50 degrees symmetrically relative to line 25).

Thus if elements 1, 9 are mutually fastened the hooking parts 3, 8 can be substantially unlimited turned around line 20. The hooking part 8 at the second element merges with an upright wall 30 at its side facing away from its free edge. If elements 1, 9 are mutually fastened the upright wall 30 of the hat 7 extends to above the hooking part 3 at the First element 1 and the free end of the hooking part 3 is located opposite upright wall 30 of the hat 7, possibly leaving there between a narrow gap of 0, 1, 2 or 3 millimetre at the most en the free edge of the hooking part 8 keeps a distance to the upright wall 31 of the hooking part 3 of 1, 2 of 3 millimetre at the most.

Preferably the one snapping part (2) has a part which fits tightly concentrically/co axially in a part of the other snapping part (11).

It will be appreciated that also equivalent parts belong to the invention, such as another type snapping part 2 or 11.

Also other embodiments belong to the invention, e.g. based on one or more separate measurements of the in here disclosed embodiment, possibly combined with one or more separate measurements of one or more other in here disclosed embodiments. Each in the drawing disclosed part referred to by a reference number or the functional equivalent of the genus of it can independently or in combination with one or more other such parts (or functional equivalents or genus of it) be applied in another combination such that another to the invention belonging embodiment is obtained.

The lower side of base 4 could be provided with additional friction, e.g. by providing a friction coating, to additionally avoid pivoting of base 4 around axis 20.

CLAIMS

1. Fastening device, comprising a first element (1) which in the position of use is present at a substrate and a second element (9) which, to fasten an object (10) to the substrate, can be releasably fastened to the first element by way of a to a snapping part (2) of the first element (1) snappig snapping part (11) of it and wherein the elements (1, 9) remote from their snapping part (2, 11 respectively) have a hooking part (3, 8 respectively) such that the elements (1, 9) at first have to be mutually engaged under a mutual angle by the hooking parts (3, 8) and then are pivoted onto each other to subsequently be mutually snapped fixed to each other.

2. Device according to claim 1, wherein:
- the hooking part (3) is limited to a single location and from its base (21) to its free edge (15) decreases in width;
- the hooking part (8) extends completely around;
- the hooking part (8) is part of a hat shaped part (7);
- the hooking part (8) extends obliquely upward to its free edge;
- the hooking part (8) merges with an upright wall (30) at its side facing away from its free edge; such that:
if the elements (1, 9) are mutually fastened, the hooking parts (3, 8) can be mutually turned unlimited in the plane of the fastener without the elements (1, 9) becoming disengaged and said wall (30) extends to above the hooking part (3) at the first element (1) and the free end of the hooking part (3) is present opposite said wall (30) with a small gap.

3. Device according to claim 1 or 2, wherein a hooking part (3, 8) is designed:
to minimise the mutual contact surface; and/or
to mutually hook in an ultimate mutual pivoted position of the elements (1, 9).

4. Device according to claim 1, 2 or 3, wherein the hooking part (3) is limited to a single location while the hooking part (8) extends completely around.

5. Device according to any of claims 1-4, wherein the hooking part (3) has a U or V shape, between the legs of which the hooking part (8) is housed; and/or from its base (21) to its free edge (15) decreases in width.

6. Device according to any of claims 1-5, wherein one or both hooking parts(3, 8) viewed from above have a circle arc shape of part of it; and/or are substantially co axially/ concentrically if elements (1, 9) are fixed to each other.

7. Device according to any of claims 1-6, having one or more of the following:
- the hooking part (3) at the first element (1) provides a retaining action in the directions upward, downward and away from the fastening means (2) and no retaining action in the direction towards the fastening means (2);
- the hooking parts (3, 8) are co axial/concentrical with the fastening means (2, 11);
- the hooking part (8) is part of a hat shaped part (7);
- the hooking part (8) extends obliquely upward to its free edge;
- the one snapping part (11) comprises a resilient part and/or the other snapping part (2) a narrowing part;
- the hooking parts (3, 8) are present outside the snapping parts (2, 11);
- if the elements (1, 9) are mutually fastened, the hooking parts (3, 8) can be mutually turned substantially unlimited
- the one snapping part (2) has a part that tightly fits concentrically/co axially into a part of the other snapping part (11);
- the hooking part (8) at the second element (9) merges with an upright wall (30) at its side facing away from its free edge and: if elements (1, 9) are mutually fastened said wall (30)

extends to above the hooking part (3) at the first element (1); and/or the free end of the hooking part (3) is present opposite said wall (30), possibly with a small gap of 0, 1, 2 or 3 millimetre at the most there between;

- if the elements (1, 9) are mutually fastened, the free edge of the hooking part (8) keeps a distance to the upright wall (31) of the hooking part (3) of 1, 2 or 3 millimetre at the most.

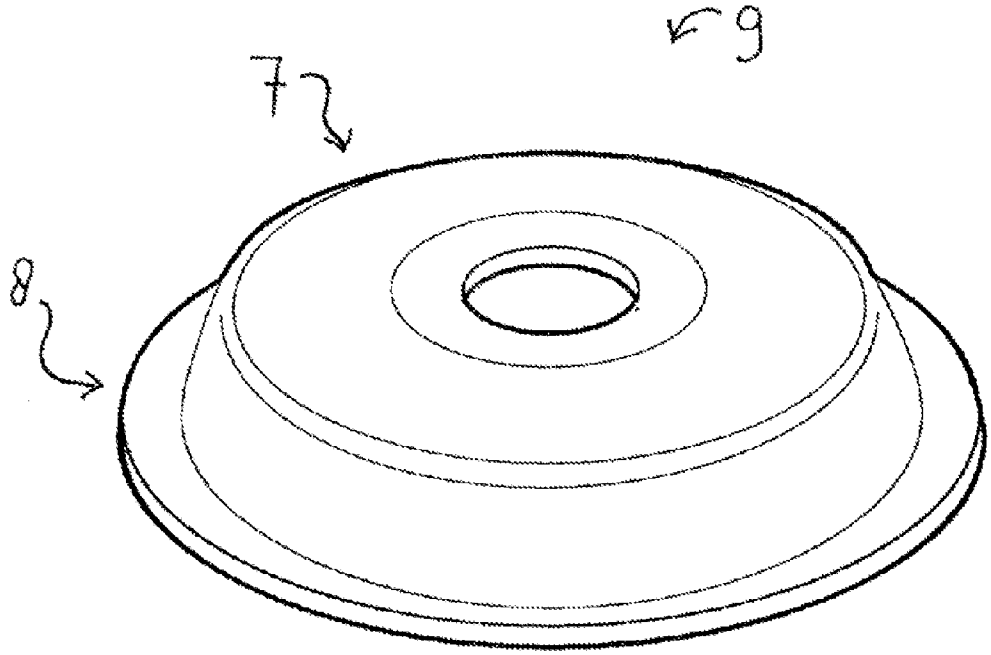
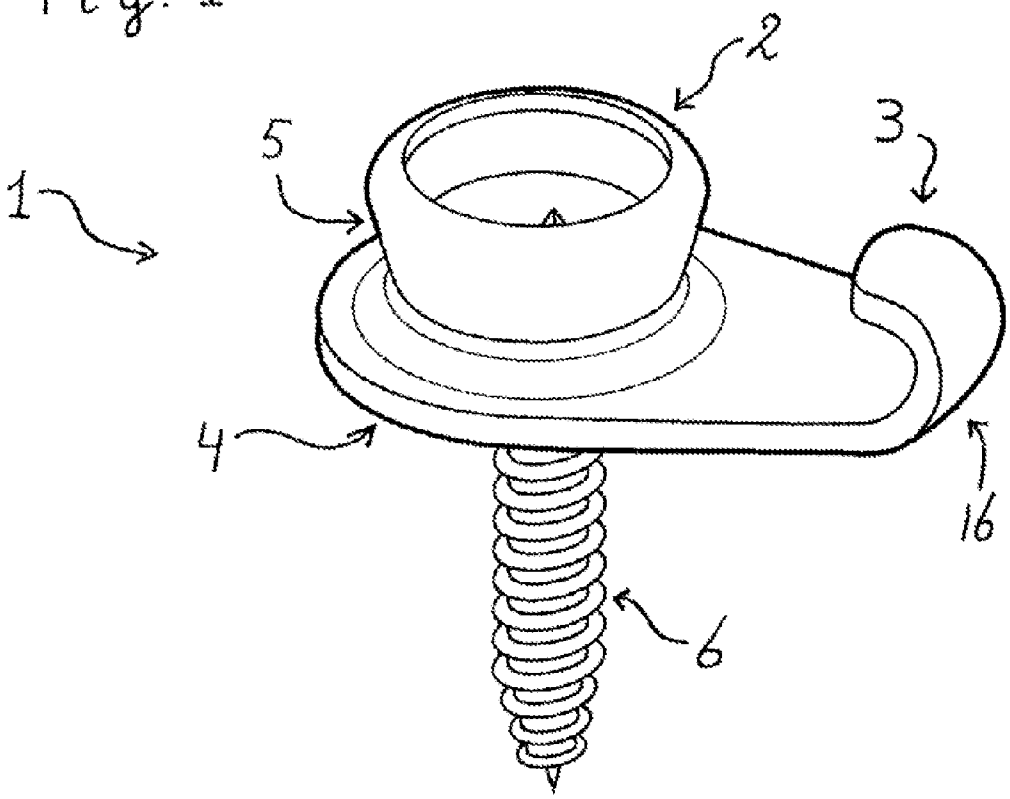


Fig. 1



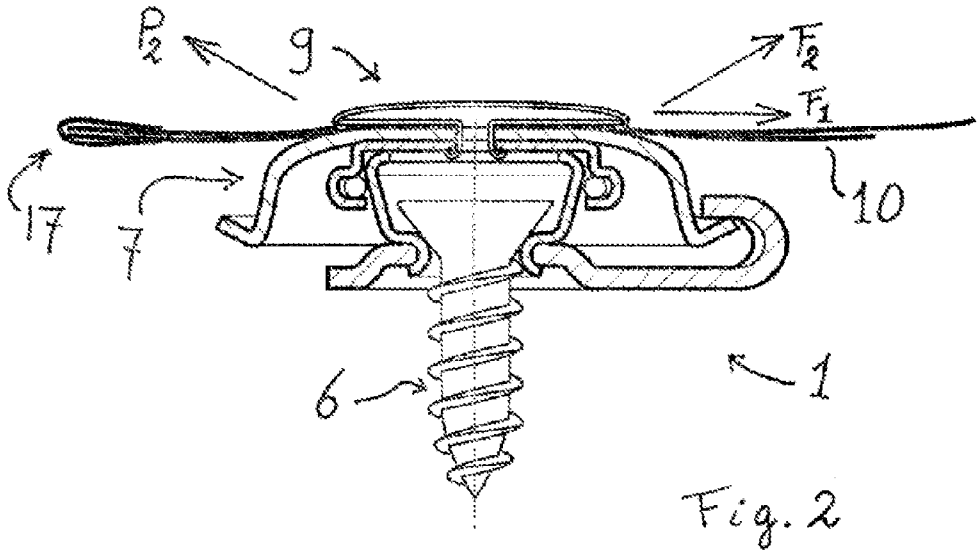
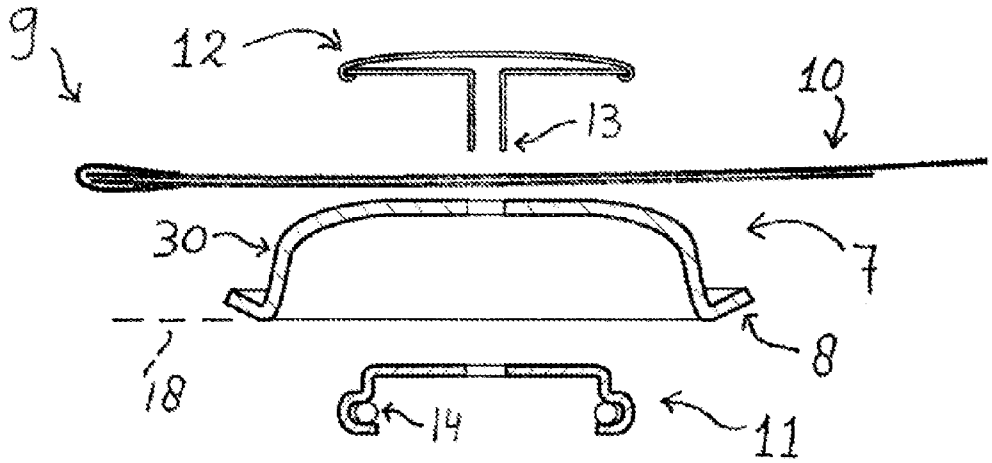


Fig. 2



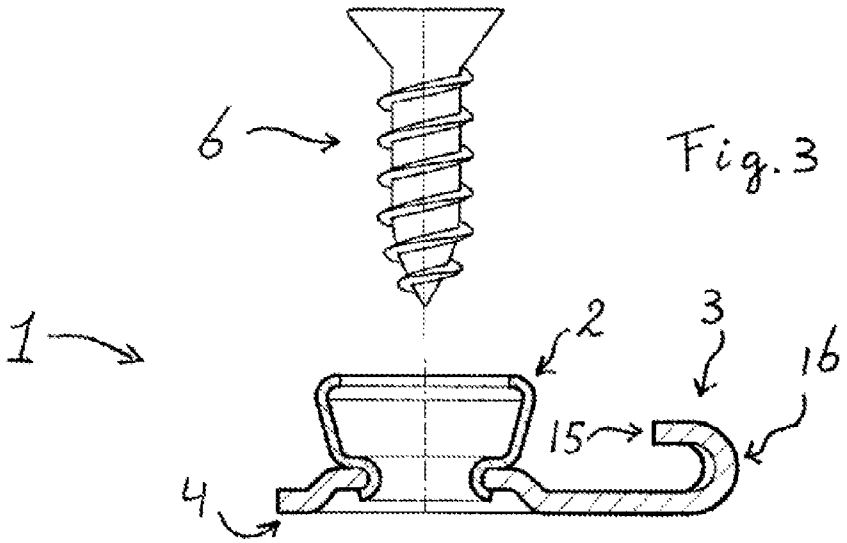


Fig. 3

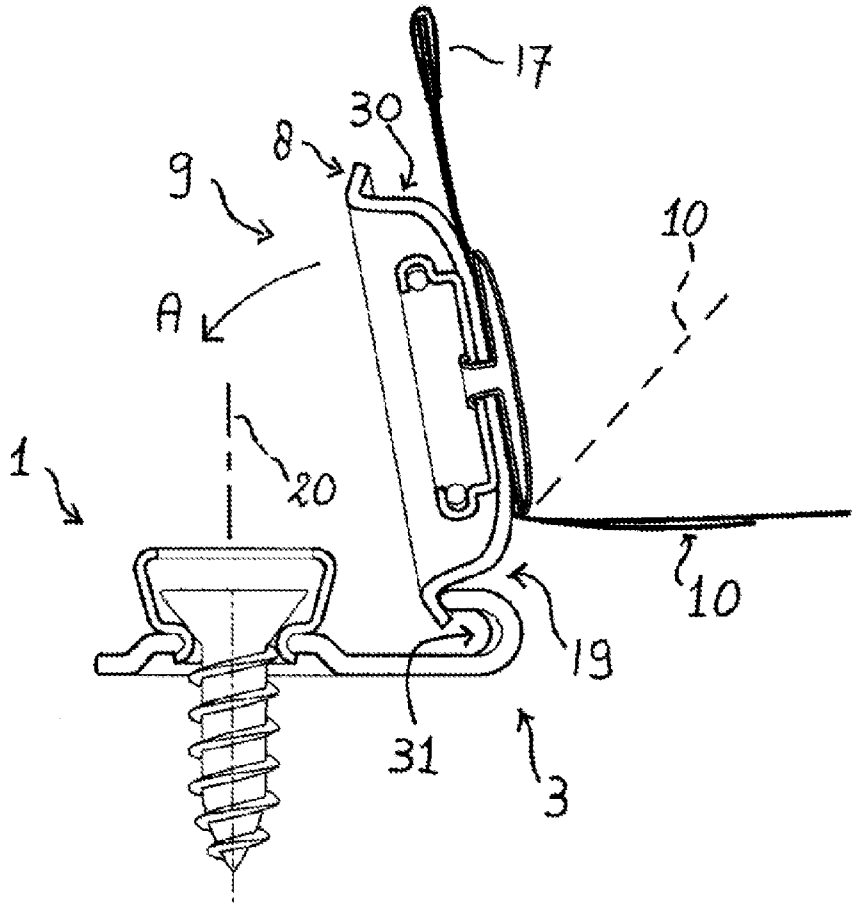


Fig. 4

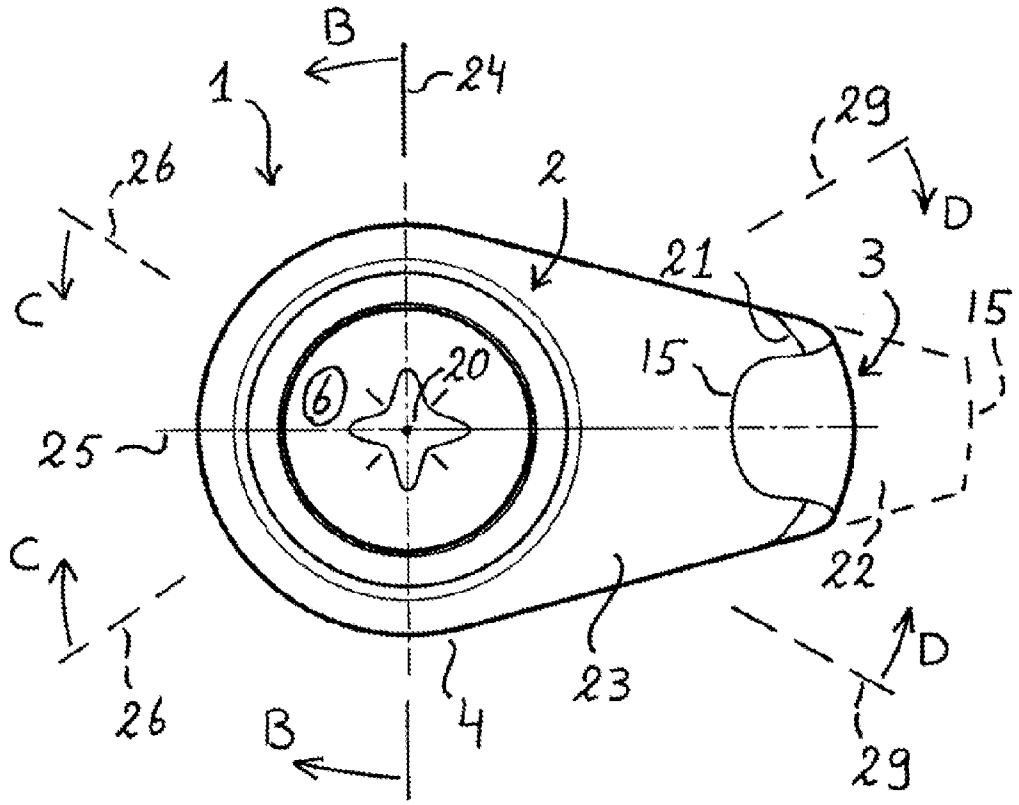


Fig. 5

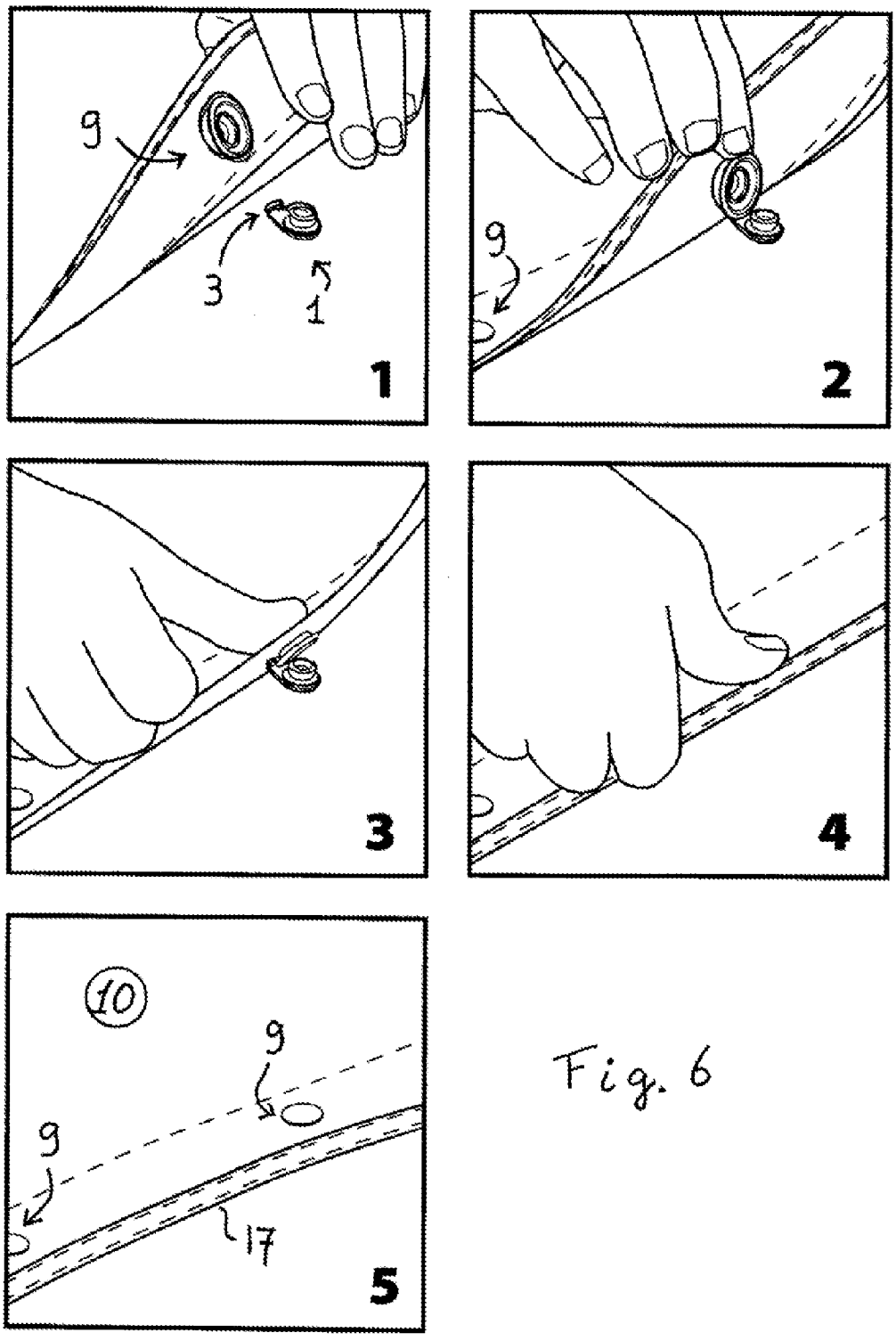


Fig. 6

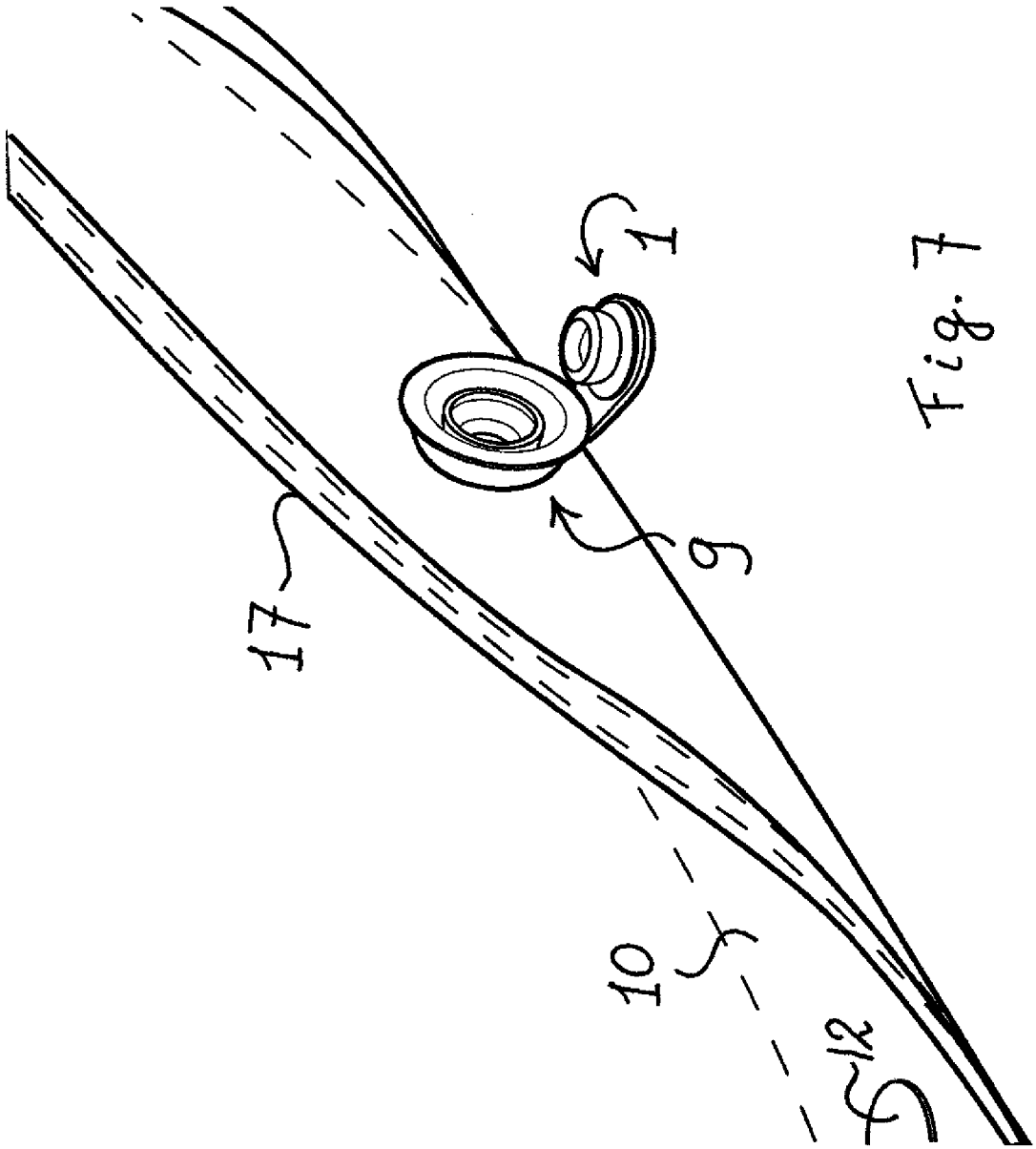


Fig. 7

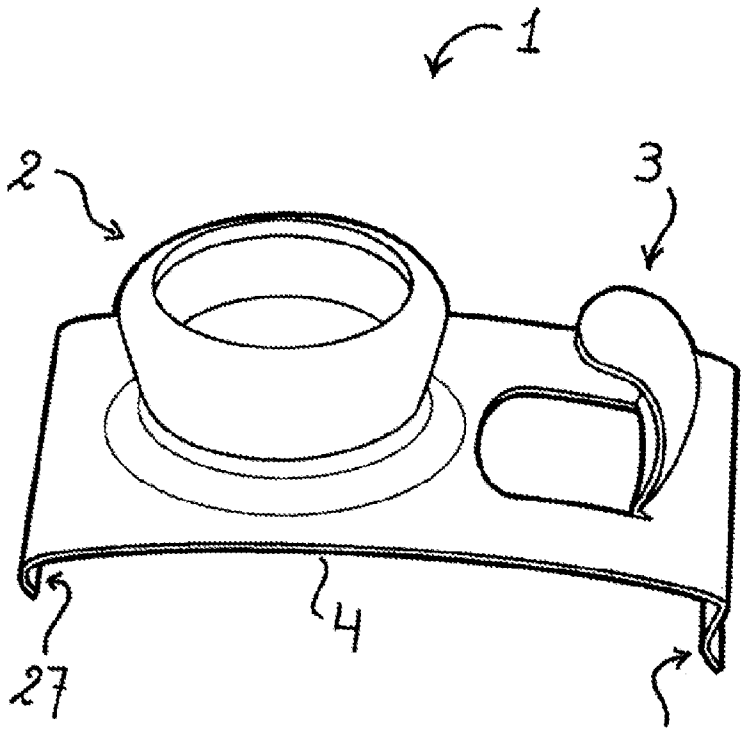


Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2009/050284

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16B5/06 A44B17/00

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)
A44B 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 324 436 C (WILHELM BRASE) 30 August 1920 (1920-08-30) cited in the application the whole document	1-6
X	FR 5 639 E (M. RAYMOND) 1 June 1906 (1906-06-01) cited in the application the whole document	1-6

☐ 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 document 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
14 October 2009	03/11/2009

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	Granger, Hugo

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL2009/050284

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 7
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search reportcovers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 7

The present claim 7 relates to an extremely large number of possible products (actually 16 possible combinations without repetition, which gives 560 possible products). This would require an equally unquantifiable and thus unreasonable amount of experimentation, imposing a severe and undue burden on all those wishing to ascertain the scope of the claim, which is not in compliance with the clarity requirement of Article 6 PCT. The non-compliance with the substantive provisions is to such an extent, that the search was consequently limited to claims 1-6.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/NL2009/050284

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 324436 C	30-08-1920	NONE	
FR 5639 E		NONE	