



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
06.04.2016 Bulletin 2016/14

(51) Int Cl.:
E04D 1/34 (2006.01)
E04D 3/362 (2006.01)
E04D 3/363 (2006.01)

(21) Application number: **14186973.5**

(22) Date of filing: **30.09.2014**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

- **Olsen, John Ejrup**
2200 Copenhagen N (DK)
- **Jensen, Eirik S.**
4000 Roskilde (DK)
- **Worm, Benny**
4673 Roedvig Stevns (DK)

(71) Applicant: **Icopal Danmark A/S**
2730 Herlev (DK)

(74) Representative: **Plougmann Vingtoft a/s**
Rued Langgaards Vej 8
2300 Copenhagen S (DK)

(72) Inventors:
• **Pedersen, Bjarne**
4000 Roskilde (DK)

(54) **Roofing system**

(57) The invention provides a roofing system comprising a plurality of elongate supporting rafters, each supporting element having a top surface and two opposed side surfaces, and a plurality of elongate top roofing elements, each top roofing element having a first longitudinal edge portion with first engagement means capable of directly or indirectly engaging the two opposed side surfaces of one of the supporting rafters, and a sec-

ond longitudinal edge portion with second engagement means capable of engaging the first longitudinal edge of another one of the top roofing elements. Such roofing system is suitable for use with FASTLOCK® and FAST-LOCK UNI® top roofing elements. The invention also provides a tool for use when assembling a plurality of two or more top roofing elements.

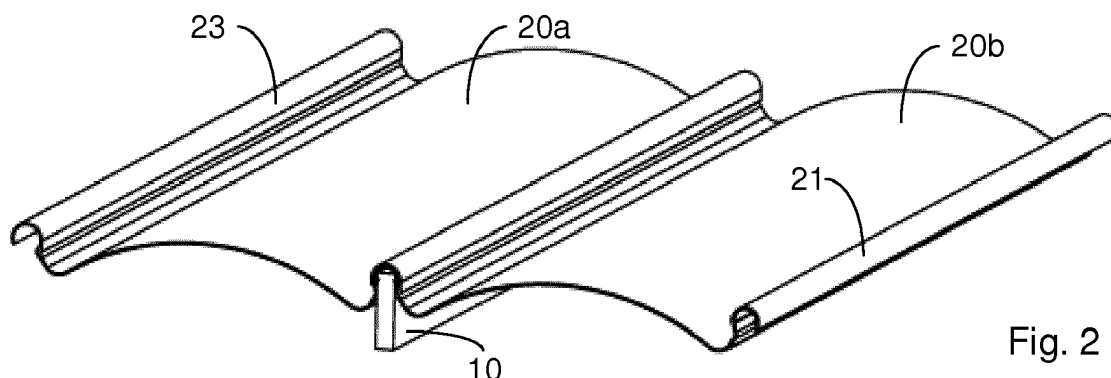


Fig. 2

Description**FIELD OF THE INVENTION**

[0001] This invention relates to roofing systems, and in particular to roofing systems comprising at least a first roofing element and a second roofing element, each roofing element having a first longitudinal edge and a second longitudinal edge opposite the first longitudinal edge, the first longitudinal edge having first coupling means configured to engage with a fixed structure so as to fasten the first longitudinal edge to the fixed structure, and the second longitudinal edge having second coupling means configured to engage with the first coupling means of the first longitudinal edge of a like roofing element so as to fasten the second longitudinal edge to the first longitudinal edge.

BACKGROUND OF THE INVENTION

[0002] Typical roof constructions have three main structural components: 1) wall plates, 2) rafters and 3) battens where a pair of parallel, horizontally extending load-bearing beam-like wall plates supporting a plurality of elongate rafters extending transversally to the wall plates and thus defining the fundamental shape of the roof which can be flat, sloping, curved, A-shaped or other. The rafters support a plurality of roofing battens or laths which provide fixing points for roofing materials such as shingles or tiles. The roofing systems FASTLOCK® and FASTLOCK UNI® produced and sold by the applicant use such roof construction and is disclosed in Danish design application MA 1999 00615 and Danish design registration MR 2000 00189.

SUMMARY OF THE INVENTION

[0003] The invention provides a roofing system comprising a plurality of elongate supporting rafters, each supporting element having a top surface and two opposed side surfaces, and a plurality of elongate top roofing elements, each top roofing element having a first longitudinal edge portion with first engagement means capable of directly or indirectly engaging the two opposed side surfaces of one of the supporting rafters, and a second longitudinal edge portion with second engagement means capable of engaging the first longitudinal edge of another one of the top roofing elements.

[0004] Such roofing system is suitable for use with FASTLOCK® and FASTLOCK UNI® top roofing elements and have only two main structural components and thus offering a simpler construction which is less labour consuming to mount. In addition, the final result has a light and attractive appearance.

[0005] The invention also provides a tool for use when assembling a plurality of two or more top roofing elements.

BRIEF DESCRIPTION OF THE DRAWINGS**[0006]**

Figure 1 is an end view of a roofing system in a first embodiment of the invention;
 Figure 2 is a perspective view of the roofing system in figure 1;
 Figure 3 is an enlarged end view of a portion of the roofing system in figures 1 and 2;
 Figure 4 is an end view of a roofing system in a second embodiment of the invention;
 Figure 5 is a perspective view of an intermediate engagement element used in the roofing system in figure 4;
 Figure 6 is a perspective view of the roofing system in figure 4;
 Figure 7 is an enlarged end view of a portion of the roofing system in figures 4-6;
 Figure 8 is a perspective view of a tool for use when assembling a pair of roofing elements of a roofing system according to the invention;
 Figure 9 is an end view of the tool in figure 8;
 Figure 10 a perspective view of the tool in figures 8-9 during use for assembling a pair of roofing elements; and
 Figure 11 is an end view corresponding to figure 10.

DETAILED DESCRIPTION OF THE INVENTION

[0007] In figures 1-3 is shown a roofing system with an elongate rafter 10 preferably with a rectangular cross section and having a top surface and two opposed side surfaces with an optional longitudinal groove 11 in each side surface.

[0008] Figures 1-3 also show two identical FASTLOCK® or FASTLOCK UNI® elongate top roofing elements, a first roofing element 20a and a second roofing element 20b, preferably made of a weatherproof and elastic material e.g. by extrusion. Each top roofing element 20a, 20b has a first longitudinal curved edge portion 21 forming a longitudinally extending bead with a neck portion where the concave side of the curved edge portion 21 defines a downwardly open longitudinal channel with a pair of inwardly protruding ridges 22. As shown in figures 2 and 3 the first longitudinal curved edge portion 21 is mounted over the top surface of the elongate rafter 10 so that the elongate rafter 10 is received in the channel defined by the first curved edge portion 21, and each of the ridges 22 engages directly with one of the opposed side surfaces of the elongate rafter 10 and possibly with the grooves 11. The first top roofing element 20a is retained in place on the rafter 10 by friction due to the dimensions and elastic properties of the top roofing element 20, and possibly also by positive engagement of the ridges 22 and the optional grooves 11.

[0009] Each top roofing element 20a, 20b also has a second longitudinal curved edge portion 23 forming a

longitudinally extending bead opposite the first longitudinal edge portion 21 where the concave side of the curved edge portion 23 defines a downwardly open longitudinal channel, and figures 1-3 show that the second longitudinal curved edge portion 23 of one top roofing element 20 is mounted over the first longitudinal curved edge portion 21 of another top roofing element 20 where the first longitudinal curved edge portion 21 is received in the channel defined by the second curved edge portion 23, and the second longitudinal curved edge portion 23 snaps behind the first longitudinal curved edge portion 21 into engagement with the neck portion of the first longitudinal edge portion 21, whereby the second roofing element 20b is retained by positive engagement. The dimensions and elastic properties of the second longitudinal edge portion 21 further add to retaining the first top roofing element 20a in place on the rafter 10 so that both top roofing elements 20a and 20b are secured against being torn off e.g. by strong winds.

[0010] In figures 4-7 is shown a roofing system with an elongate rafter 12 preferably with a rectangular cross section and having a top surface and two opposed side surfaces. The elongate has a width (the shorter of the two dimensions shown) which is smaller than the width of the rafter 10 in figures 1-3.

[0011] Figures 4 and 5-7 also show the same first and second FASTLOCK® or FASTLOCK UNI® elongate top roofing elements 20a and 20b as in figures 1-3. Since the rafter 12 is narrower than the rafter 10 in figures 1-3 then the first longitudinal curved edge portion 21 of the top roofing element 20a cannot engage directly with the rafter 12 with sufficient retention. Figure 5 shows an intermediate engagement element 30 to be placed on the rafter 12 and to be received together with the rafter 12 in the longitudinal channel defined by the first longitudinal curved edge portion 21 of the top roofing element 20a. The intermediate engagement element 30 has an inverted U-shape making it suitable for being placed on top of a rafter 12 as best shown in figure 7. The intermediate engagement element 30 is preferably made of stainless spring steel or the like, and it has inwardly pointing tips 31 which will engage with the opposed side surfaces of the rafter 12 and retain the intermediate engagement element 30. On both of its sides the intermediate engagement element 30 has outwardly pointing tips 32 which will engage with the ridges 22 on the sides of the longitudinal channel defined by the first curved edge portion 21, which is thereby in indirect engagement with the rafter 12. The second roofing element 20b is mounted and retained as explained above in connection with figures 1-3. Depending on the retention strength required the number of intermediate engagement elements 30 per unit length can be varied accordingly.

[0012] Traditionally, assembling of the first and second longitudinal curved edge portions 21 and 23 of two elongate top roofing elements 20a and 20b is done manually whereby the second curved edge portion 23 is pressed by hand or using a suitable impact tool such as a rubber

hammer. This has to be done along the full length of the top roofing elements.

[0013] In figures 8 and 9 is shown a tool 40 for use in this task. The tool 40 has a substantially C-shaped cross section and a longitudinal channel 41 dimensioned to accommodate the second longitudinal bead 23, and a longitudinal extending lateral opening 42 dimensioned to accommodate the longitudinal neck and with a width narrower than the second longitudinal bead 23.

[0014] In use the operation can be as follows. First, an end portion of the second curved edge portion 23 is pressed e.g. by hand to snap over an end portion of the first curved edge portion 21. Next, the tool 40 is brought in a position where the thus assembled end portions 21 and 23 are received in the longitudinal channel 41 as shown in figures 10 and 11, and the tool 40 is pushed e.g. by hand in a sliding movement in the direction of the arrow along the length of the top roofing elements 20a and 20b whereby the top roofing elements are assembled.

Claims

1. A roofing system comprising

- a plurality of elongate supporting rafters, each supporting element having a top surface and two opposed side surfaces, and
- a plurality of elongate top roofing elements, each top roofing element having a first longitudinal edge portion with first engagement means capable of directly or indirectly engaging the two opposed side surfaces of one of the supporting rafters, and a second longitudinal edge portion with second engagement means capable of engaging the first longitudinal edge of another one of the top roofing elements.

2. A roofing system according to claim 1 further comprising an intermediate engagement element between the first engagement means and the supporting rafter.

3. A roofing system according to claim 2 wherein the intermediate engaging element is capable of engaging the two opposed side surfaces of one of the supporting rafters.

4. A roofing system according to any one of the preceding claims wherein the first engagement means are configured to engage with the opposed side surfaces of one of the supporting rafters over a length in the longitudinal direction.

5. A roofing system according to any one of the preceding claims wherein at least one of the first and second engagement means engage by positive en-

gagement.

6. A roofing system according to any one of the preceding claims wherein at least one of the first and second engagement means engage by friction. 5

7. A roofing system according to any one of the preceding claims wherein a pair of supporting beams support the supporting rafters at respective ends of the supporting rafters. 10

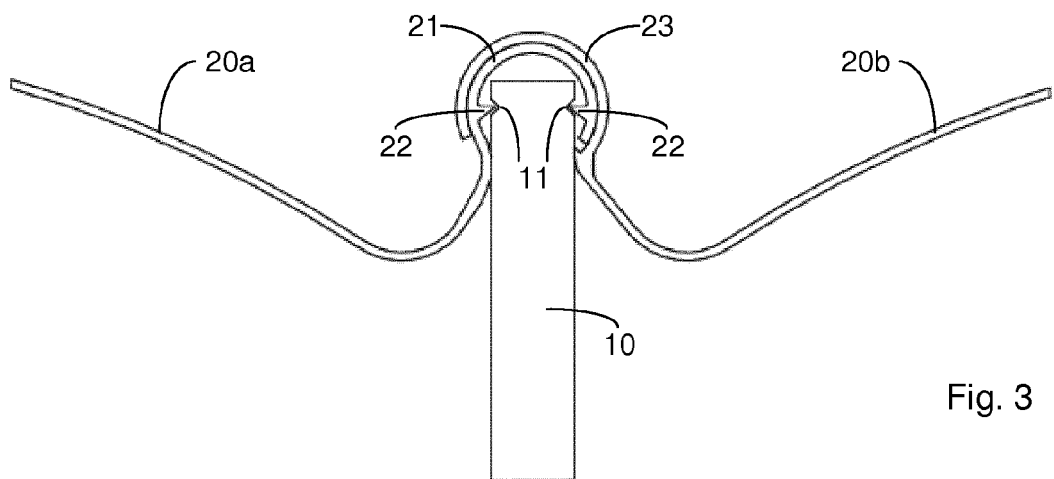
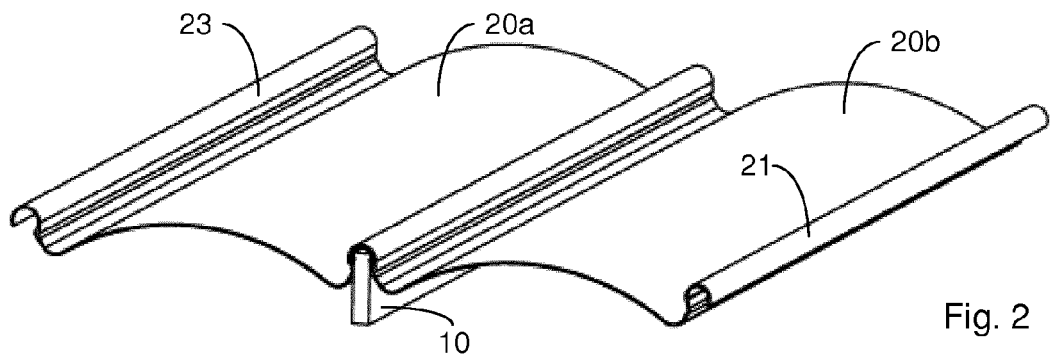
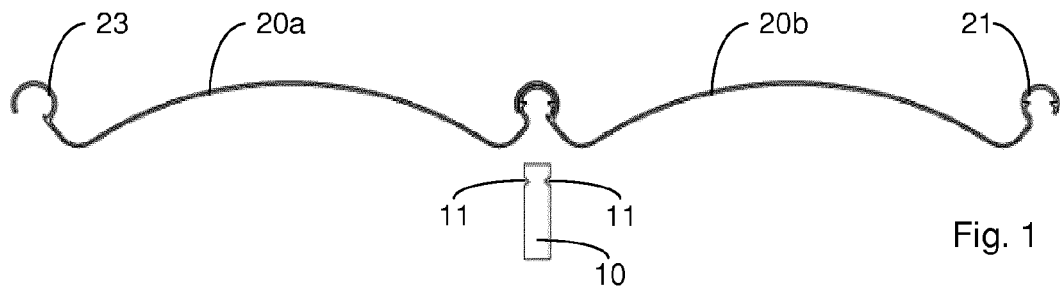
8. A roofing system according to any one of the preceding claims wherein
the first longitudinal edge portion forms a first longitudinal bead configured for overlaying the top surface of a supporting rafter and, and 15
the second longitudinal edge portion forms a second longitudinal bead configured for overlaying the first longitudinal edge portion and snap behind the first longitudinal bead, whereby a longitudinal neck narrower than the second longitudinal bead is defined. 20

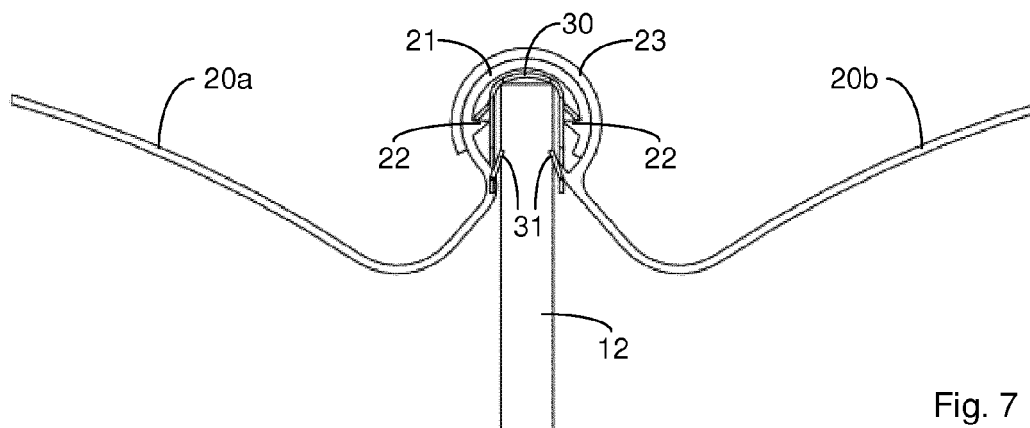
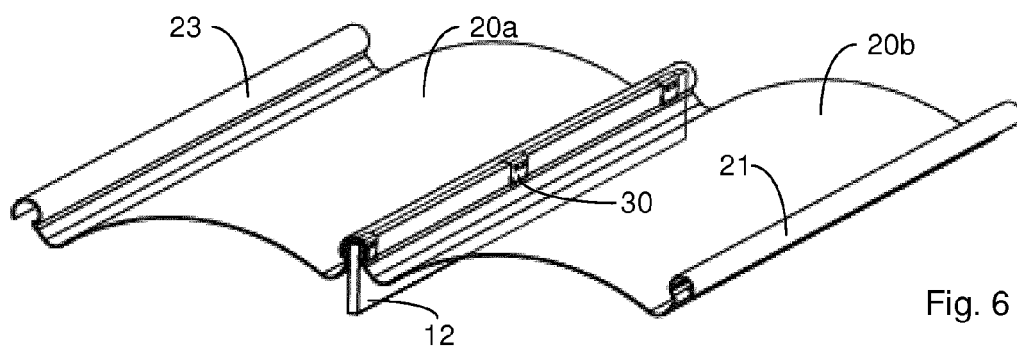
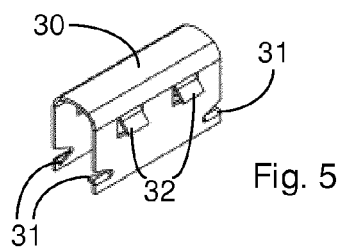
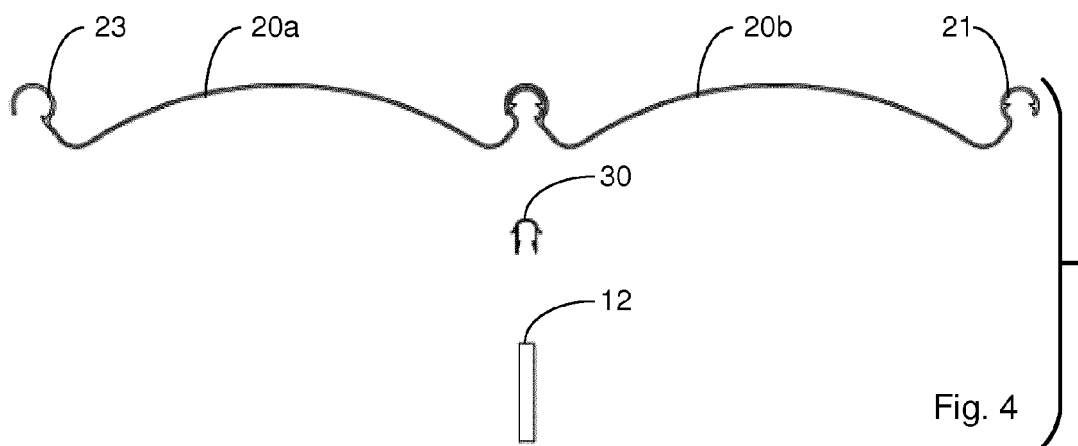
9. A roofing system according to claim 8 further comprising a tool for bringing a second longitudinal edge portion into engagement with a first longitudinal edge portion, 25
the tool having
a substantially C-shaped cross section,
a longitudinal channel dimensioned to accommodate the second longitudinal bead, and 30
a lateral opening dimensioned to accommodate the longitudinal neck and with a width narrower than the second longitudinal bead.

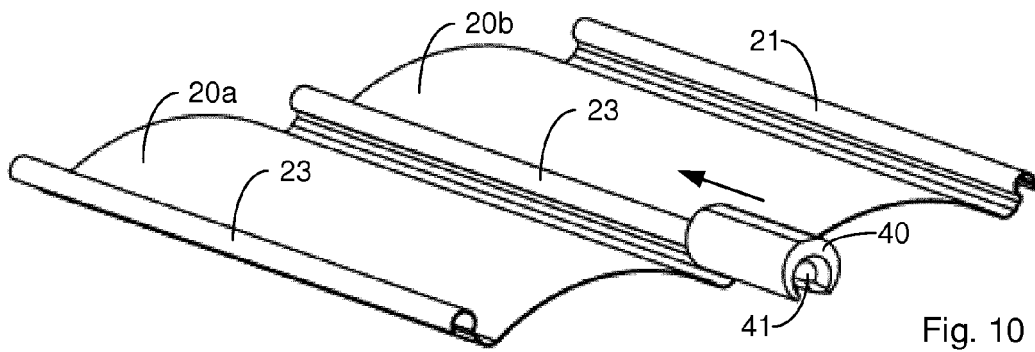
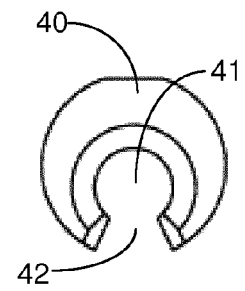
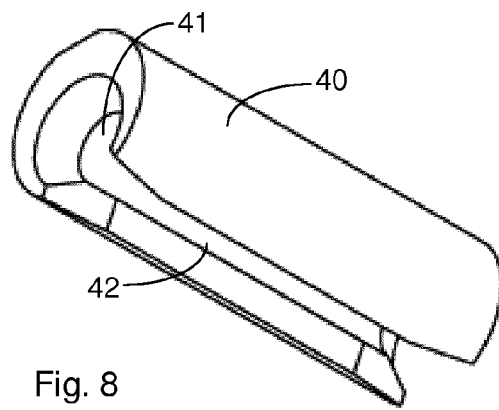
10. A tool for use with a roofing system according to any one of the preceding claims for bringing a second longitudinal edge portion into engagement with a first longitudinal edge portion, 35
the tool having
a substantially C-shaped cross section, 40
a longitudinal channel dimensioned to accommodate the second longitudinal bead, and
a lateral opening dimensioned to accommodate the longitudinal neck and with a width narrower than the second longitudinal bead. 45

50

55









EUROPEAN SEARCH REPORT

Application Number
EP 14 18 6973

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 245 187 A (DAVID MAY) 12 April 1966 (1966-04-12) * figures 1,3,6 *	1-7	INV. E04D1/34 E04D3/362 E04D3/363
A	* column 2, lines 31-35 *	9	
X	WO 2006/005339 A1 (DECRA AS [DK]; FRAHM SOEREN XERXES [DK]; RIEDEL ROBERT BYRIEL [DK]) 19 January 2006 (2006-01-19) * figures 10,11 *	1-8	
A		9	
X	US 4 373 315 A (FARRANT HERBERT H [NZ]) 15 February 1983 (1983-02-15) * figures 1-3 *	1-8	
X	FR 2 180 224 A5 (VILLADSENS FAB AS JENS [DK]) 23 November 1973 (1973-11-23) * figures *	10	TECHNICAL FIELDS SEARCHED (IPC) E04D
X	CH 503 862 A (GRILLO WERKE AG [DE]) 28 February 1971 (1971-02-28) * figures *	10	
X	AU 2012 209 031 A1 (ROOFQUIP 2012 LTD) 20 February 2014 (2014-02-20) * figures *	10	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 March 2015	Examiner Tran, Kim Lien
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 18 6973

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-03-2015

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3245187 A	12-04-1966	NONE	
WO 2006005339 A1	19-01-2006	AU 2005262069 A1 CA 2572876 A1 CN 101023229 A EP 1781866 A1 JP 2008505265 A US 2007251177 A1 WO 2006005339 A1	19-01-2006 19-01-2006 22-08-2007 09-05-2007 21-02-2008 01-11-2007 19-01-2006
US 4373315 A	15-02-1983	AU 535568 B2 AU 5637580 A US 4373315 A	29-03-1984 18-09-1980 15-02-1983
FR 2180224 A5	23-11-1973	NONE	
CH 503862 A	28-02-1971	CH 503862 A DE 6753200 U	28-02-1971 24-04-1969
AU 2012209031 A1	20-02-2014	NONE	

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- DK MA199900615 [0002]
- DK MR200000189 [0002]