(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 916 299 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
01.12.2021 Bulletin 2021/48

(51) Int Cl.:
F21V 21/04 *(2006.01)* ***F21S 8/02*** *(2006.01)*

(21) Application number: **21176228.1**

(22) Date of filing: **27.05.2021**

(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
Designated Validation States:
KH MA MD TN

(30) Priority: **29.05.2020 DK PA202000637**

(71) Applicant: **Daxtor A/S**
8600 Silkeborg (DK)

(72) Inventor: **Dahl, Torben**
8600 Silkeborg (DK)

(74) Representative: **Larsen & Birkeholm A/S**
Banegårdspladsen 1
1570 Copenhagen V (DK)

(54) **DOWNLIGHT RECESSED CEILING SPOTLIGHTS**

(57) The invention relates to a downlight fixture, comprising: a support member coupled to a flange and having an upper region spaced from the flange to a lower region closer to the flange than the upper region. The support member comprises one or more side surfaces and a recess, a tab is moveably coupled to the support member such that at feast a part of said tab is moveable between a first position, where a part of the tab is protruding beyond the support member's side surface and a second position where the tab is positioned in the recess without any part extending beyond the support members side surface. A screw that extends substantially between the upper region of the support member and the lower region of the support member, said screw and said tab being threadedly connected such that rotation of the screw initially causes the at least part of said tab to move from its first position to its second position and further the tab to move towards or away from the flange. Said screw is in releasable engagement with said support member and that said releasable engagement is adapted such that the screw is maintained in the position where it extends substantially between the upper region of the support member and the lower region of the support member as long as turning of the screw causes the tab to move unobstructed towards the upper region of said support member and releasing the screw when the tab meets an obstruction.

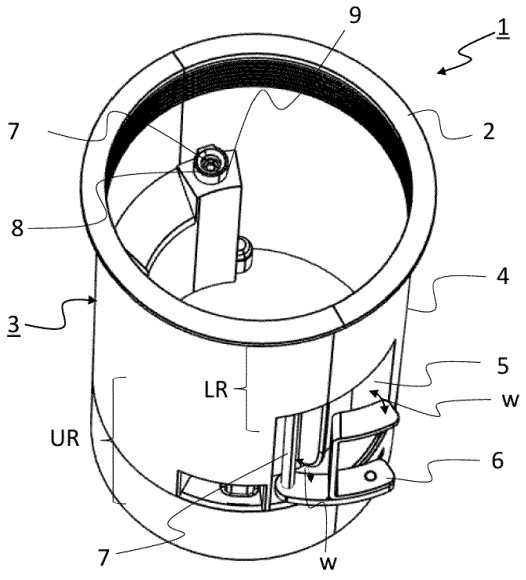

Fig. 2

EP 3 916 299 A1

Description

[0001] This invention relates to a downlight fixture, comprising: a flange; a support member coupled to the flange and having an upper region spaced and a lower region closer to the flange than the upper region, said support member comprises one or more side surfaces and a recess; a tab moveably coupled to the support member such that at least a part of said tab is moveable between a first position, where a part of the tab is protruding beyond the support member's side surface and a second position where the tap is positioned in the recess without any part extending beyond the support members side surface; a tab is moveably coupled to the support member such that at least a part of said tab is moveable between a first position, where a part of the tab is protruding beyond the support member's side surface and a second position where the tap is positioned in the recess without any part extending beyond the support members side surface; a screw that extends substantially between the upper region of the support member and the lower region of the support member, said screw and said tab being threadedly connected such that rotation of the screw initially causes the at least part of said tab to move from its first position to its second position and further the tab to move towards or away from the flange.

[0002] There are various types of downlight fixtures available. Downlights are very popular for multiple reasons including aesthetics, options available for lighting arrangements, as well as amount of light output.

[0003] The downlight fixtures heretofore known suffer from several disadvantages which include being difficult to use, being difficult to install, being unduly complex, being limited in application and being difficult to remove.

[0004] Downlight fixtures are usually designed with a circular support member (but it may well be, for example, square) which is inserted into a hole in a ceiling designed for that purpose. The support member is designed for this with a flange facing the ceiling when the support member is inserted into the hole. The support member is attached to the ceiling structure by means of the flange, which engages firmly with the one side of the ceiling/ceiling structure, and a "unfoldable tab" that engages with the other side. Usually, there are two tabs on a support member.

[0005] The tab is with a thread attached to a screw that essentially runs between a lower region of the support member (the part that is facing the room when the support member is mounted in the ceiling of the room) and the upper region (the part that faces the ceiling when the support member is mounted). When the support member is to be inserted into the ceiling structure, the tab is rotated into a dedicated recess in the support member. The recess is so large (deep) that the tab can lie in it while the support member is inserted into the hole.

[0006] After the support part is inserted into the hole in the ceiling structure (until the flange rests on the ceiling), the screw is then turned to the right, which turns the tab (due to friction in the threads) to the right until it reaches a suitable stop in an "unfolded position" where a part of it protrudes beyond the surface of the support member, preferably approximately perpendicular to the surface (periphery) of the insert part.

[0007] A continued turning of the screw will then - due to the threaded connection - force the tab towards the lower region of the support member, while at the same time maintaining it "unfolded". The tab will then move (while continuously screwing the screw) until it is prevented from this by the upper side of the ceiling structure, thereby attaching the support member to the ceiling structure. When the support member shall be removed from the ceiling structure, this is done by turning the screw in the opposite direction, usually to the left.

[0008] However, experience has shown that this can be insufficient, as the tab does not always settle back into the recess when the screws are turned in the opposite direction. This may be due to insulation material crumbling around the tab, but also insects and other things have shown - over time - to be able to prevent tabs from "pulling back". This obstruction of tabs from pulling back causes them to continue to prevent the support member from being pulled out of the ceiling, which is why in practice you often have to destroy support members in order to extract them from ceilings.

[0009] It is an object of the invention to provide a fixture capable of eliminating one or more of these disadvantages.

SUMMARY OF THE INVENTION

[0010] According to a first aspect disclosed herein, said screw is in releasable engagement with said support member and said releasable engagement is adapted such that the screw is maintained in the position where it extends substantially between the upper region of the support member and the lower region of the support member as long as turning of the screw causes the tab to move unobstructed towards the upper region of said support member and releasing the screw when the tab meets an obstruction. By placing the screw in releasable engagement that only retains the screw with limited force - sufficient for the screws not to fall out because of small impacts or gravity, but at the same time allow the screws to be removed with an increased force - is achieved that the insert part can be inserted into the ceiling as a single unit with mounted screws and tabs. At the same time, they can easily be extracted since the necessary increased force, can be achieved by continuing to turn a screw, thereby forcing the tab against the bottom of the support member or other sufficient resistance (e.g. from the insulation), forcing the screw the other way and out of the engagement. Once a screw is released from the releasable engagement with the support member, continuous turning will force the screw backwards and all the way out thereby releasing both the screw and tab from

the support member. When all screws and tabs are thus released from a support member, this can easily be pulled out of a ceiling.

[0011] Embodiments are recited in the dependent claims.

[0012] Reference throughout this specification to features, advantages, or similar language does not imply that all the features and advantages that may be realized with the present invention should be or are in any single embodiment of the invention. Rather, language referring to the features and advantages is understood to mean that a specific feature, advantage, or characteristic described in connection with an embodiment is included in at least one embodiment of the present invention. Thus, discussion of the features and advantages, and similar language, throughout this specification may, but do not necessarily, refer to the same embodiment.

[0013] Furthermore, the described features, advantages, and characteristics of the invention may be combined in any suitable manner in one or more embodiments. One skilled in the relevant art will recognize that the invention can be practiced without one or more of the specific features or advantages of a particular embodiment. In other instances, additional features and advantages may be recognized in certain embodiments that may not be present in all embodiments of the invention.

Brief description of the figures

[0014]

Figure 1 shows, in sideview, a downlight fixture
Figure 2 shows in perspective, a downlight fixture;

[0015] The present invention will now be described in more detail in the following.

Detailed description of the invention

Definitions

[0016] A person skilled in the art can design screws, threads, recesses and tabs such that they work together whether they are assembled with a screw with left-hand thread or right-hand thread. Therefore, the examples of the invention disclosed in this application comprising a screw with a right-hand thread should not be interpreted as limiting in the sense that a right-hand thread is a necessity for the functionality of the invention.

[0017] Prior to discussing the present invention in further details, the following terms and conventions will first be defined:

It should be noted that embodiments and features described in the context of one of the aspects of the present invention also apply to the other aspects of the invention.

The invention will now be described in further details in the following non-limiting examples.

[0018] In figure 1 is shown an embodiment of a downlight fixture according to the invention.

[0019] The fixture comprises a flange 2 and a support member 3 coupled to the flange and having a longitudinal axis L. The support member has an upper region UR spaced from the flange and a lower region LR closer to the flange than the upper region. The support member comprises one or more side surfaces 4 and a recess 5. The recess 5 is mutually adapted to a tab 6 such that the tab 6 can lie inside it without any part of it protruding beyond the perimeter defined by the side surfaces 4. As indicated with arrow W, the tab 6 is moveably coupled to the support member 6 such that at least a part of said tab is moveable between a first position, where a part of the tab is protruding beyond the support member's side surface 4 and a second position where the tap is positioned in the recess 5 without any part extending beyond the support members side surface.

[0020] In the shown embodiments, the tab is attached to a screw member 7 functionally coupled to the tab such that the tab is biased towards or away from the flange when the screw is rotated. The screw 7 operationally extends substantially between the upper region of the support member and the lower region of the support member. The screw 7 and the tab 5 are threadedly connected such that rotation of the screw initially causes the at least part of said tab to move in or out of the recess 5 and further, the tab to move towards or away from the flange. The screw is held in a guide in the upper region in such a way that the position of the screw is essentially maintained as long as turning/rotation of the screw causes the tab to move unobstructed between the upper region and the lower region.

[0021] When the support member is mounted in a ceiling the upper region is first inserted into an opening (hole) until the flange 2 engages firmly with the underside of the ceiling. The screw 7 is then turned which initially turns the tab (due to friction in the threads) until it reaches a suitable stop in an "unfolded position/first position" where a part of it protrudes beyond the surface of the support member, preferably approximately perpendicular to the surface (periphery) of the support member 3. Continued turning of the screw 7 will then - due to the threaded connection - force the tab towards the lower region LR of the support member, while at the same time maintaining it "unfolded". The tab will then move (while continuously rotating the screw) until it is prevented from this by the ceiling structure, thereby attaching the support member to the ceiling structure. This process is repeated with all screw / tab connections.

[0022] When a support member is to be removed from a ceiling, this is done by turning the screw in the opposite (opposite the direction used to install) direction. In this, the tab - due to frictional resistance in the thread - will be affected in the direction towards the recess and normally

it will rotate fully into the second position being in the recess, after which the support member can be removed from the ceiling. In practice, however, it has been found that impurities - such as dead insects, insulating material or the like - can be stored around the tab so that the tab does not turn into recess. This means that the tab still prevents the removal of the support member from the ceiling and therefore, in the prior art, it is often necessary to simply destroy it to enable removal.

[0023] This is prevented by the invention as the coupling between the screw and the support member will be released when the screw is rotated while the tab encounters resistance in its movement towards the upper region UR of the support member. Thereafter, continued turning of the screw will release it completely from the tab, after which the tab will be free from its attachment to the support member and thus no longer prevent the removal of the support member.

[0024] The releasable engagement is in the embodiment shown in figure 2 achieved by use of a ring-shaped snap coupling element 8 provided with a bead on the inside. The ring-shaped snap coupling element 8 is in this embodiment located in an opening and in the same opening, but below the ring is the screw head 7 located. When the screw head is mounted in engagement the screw head is "snapped" in behind the bead (the bead is not shown in the figures). Snap couplings are well known features for a skilled person and accordingly, all other types of snap-couplings that appear to be expedient to a person skilled in the art are also conceivable, for example a frictional based snap-coupling.

[0025] The advantage of the ring solution is that the ring can be mounted in an opening such that it sits on the upper side of the screw head while the screw can be operated through the center opening of the ring. As explained, the rings snap-coupling-function can be achieved by providing the ring with a bead on the inside such that the screw head can and will be pressed past (snap) the bead when the tab meets an obstruction on its way towards the upper region of the support member

[0026] I another aspect of the disclosure, the ring 8 is frictionally attached to the opening such that the ring can be pressed into and out of the frictional engagement with the opening. The center opening in the ring is made such that the screw head cannot pass through the ring, however it still has to be made such that a screwdriver can engage the screw through the center opening. The frictional engagement between the ring and the opening is adapted such that it will be released when the screw is rotated while the tab encounters resistance in its movement towards the upper region UR of the support member.

[0027] The releasable engagement between the screw and the support member can be made as a frictional engagement between the screw head and a recess formed in the support member and it may be made as a snap coupling comprising a bead formed on the inside of the recess, which bead and recess are adapted to the screw head such that the screw head, due to elasticity of the material, can pass the bead when pressed into the recess.

[0028] The releasable engagement between the screw and the support member in the downlight fixture may in aspects of the disclosure be made as a snap coupling between the front end of the screw and the support member

[0029] The releasable engagement between the screw and the support member in the downlight fixture may in aspects of the disclosure be made as a snap coupling comprising a bead formed on the inside of a recess in the support member, which bead and recess are mutually adapted to the front end of the screw such that the front end of the screw due to elasticity of the material, can pass the bead when pressed into the recess. Normally, the bead and recess are mutually adapted to the front end such that the bead snap into a depression formed in the front end of the screw when the screw head is inserted into the recess.

[0030] A releasable engagement may in other aspects of the disclosure be made with a screw comprising a bead formed on the front end of the screw and a thereto mutually adapted indentation formed in an opening in the support member. Usually, such mutual adaptation is made by providing an indentation on an inner side of the opening such that the bead will snap into the indentation/depression when the screw's front end is inserted into the opening.

Claims

1. A downlight fixture, comprising:

- a support member coupled to a flange and having an upper region spaced from the flange and a lower region closer to the flange than the upper region, said support member comprises one or more side surfaces and a recess;
- a tab moveably coupled to the support member such that at least a part of said tab is moveable between a first position, where a part of the tab is protruding beyond the support member's side surface and a second position where the tap is positioned in the recess without any part extending beyond the support members side surface;
- a screw that extends substantially between the upper region of the support member and the lower region of the support member, said screw and said tab being threadedly connected such that rotation of the screw initially causes the at least part of said tab to move from its first position to its second position and further the tab to move towards or away from the flange;

characterized in that,

- said screw is in releasable engagement with said support member and that said releasable

engagement is adapted such that the screw is maintained in the position where it extends substantially between the upper region of the support member and the lower region of the support member as long as turning of the screw causes the tab to move unobstructed towards the upper region of said support member and releasing the screw when the tab meets an obstruction.

2. A downlight fixture according to claim 1, **characterized in that,** said releasable engagement being an engagement between the screw and an opening formed in the support member.

3. A downlight fixture according to claim 2, **characterized in that,** said screw being a screw with a screw head and said releasable engagement being an engagement between the screw head and the opening formed in the support member.

4. A downlight fixture according to claim 3, **characterized in that,** said releasable engagement being a snap coupling comprising a bead formed on the inside of the opening, which bead and opening are mutually adapted and also mutually adapted to the screw head such that the screw head, due to elasticity of the material, can pass the bead when pressed into the opening.

5. A downlight fixture according to any the claims 1-4, **characterized in that,** said releasable engagement being a snap coupling between the front end of the screw and the support member.

6. A downlight fixture according to any of the claims 1-3 **characterized in that,** said releasable engagement comprising a ring-shaped snap coupling element provided with a bead on the inside, said ring ring-shaped snap coupling element being located in the opening and adapted such that the screw's head can pass the bead.

7. A downlight fixture according to any of the claims 1-3 or 6, **characterized in that,** said releasable engagement comprising a ring-shaped snap coupling element being frictionally attached inside the opening provided in the support member, said ring-shaped snap coupling element maintaining said screw in the position where it extends substantially between the upper region of the support member and the lower region of the support member as long as turning of the screw causes the tab to move unobstructed towards the upper region of said support member, said ring being released from its frictional attachment with the opening and thereby releasing the screw, when the tab meets an obstruction.

8. A downlight fixture according to claims 6 or 7, **characterized in that,** said ring ring-shaped snap coupling element is partly covering the screw head.

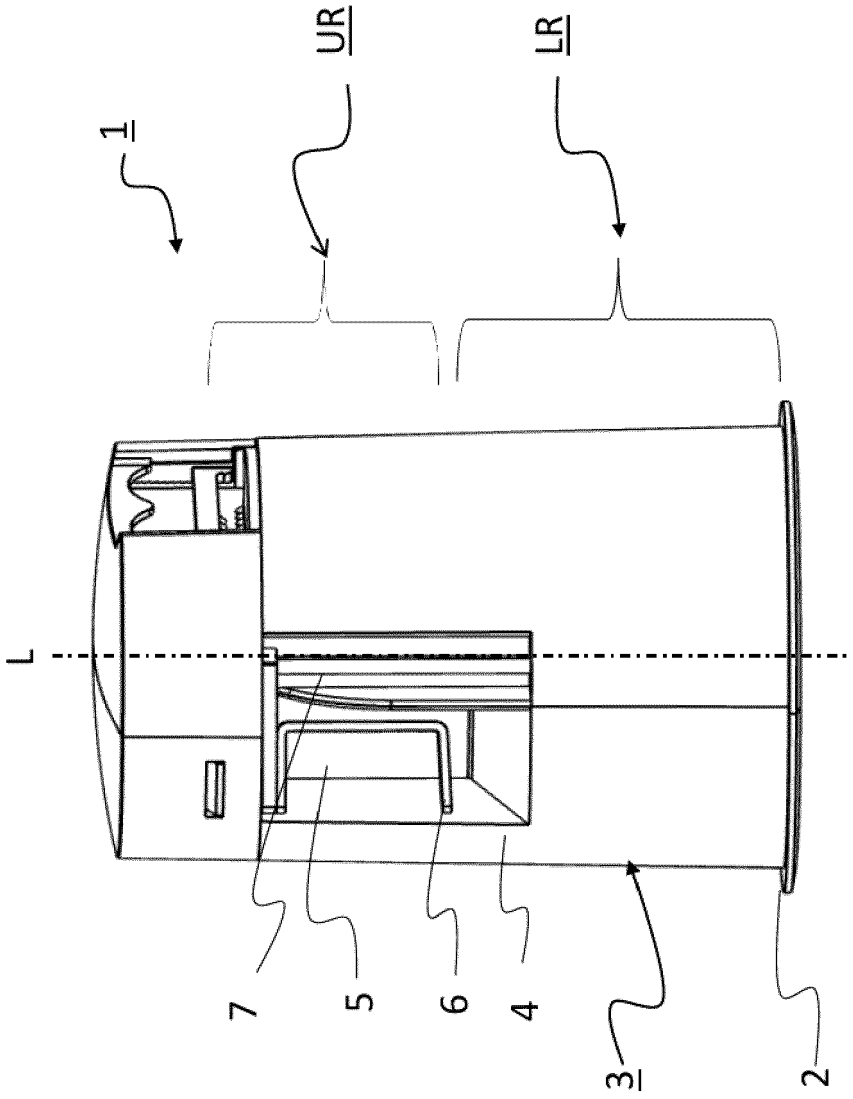

Fig. 1

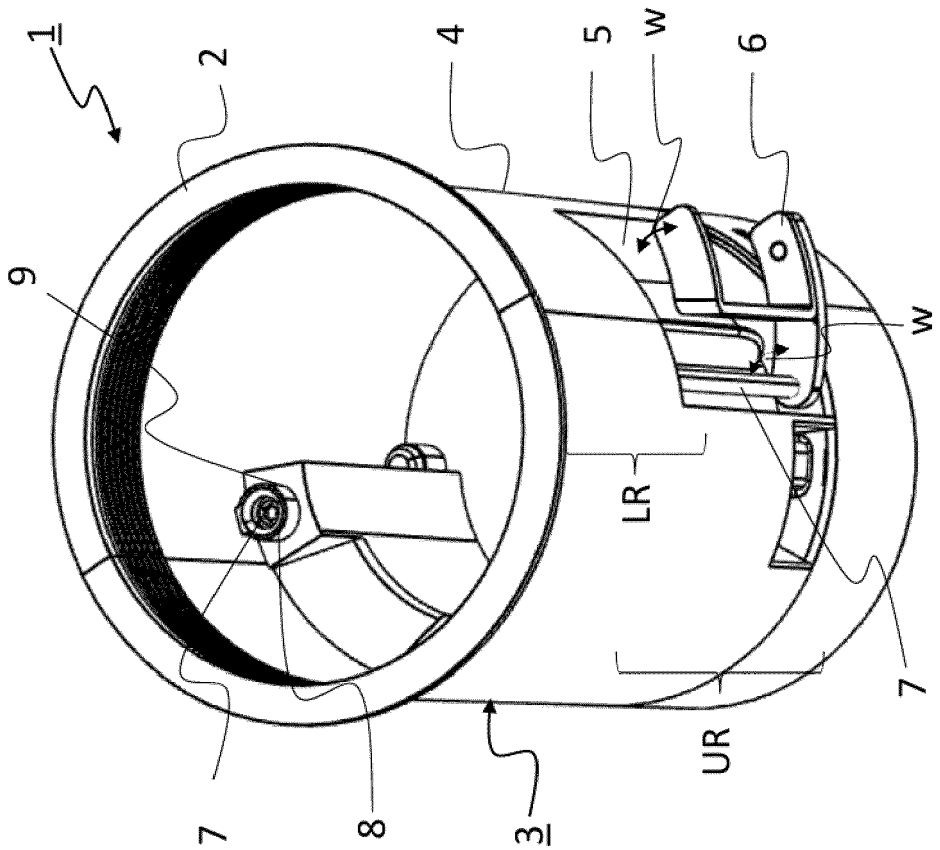

Fig. 2

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 17 6228

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	WO 2010/104347 A2 (KEOSUNG ELECTRONIC CO LTD) 16 September 2010 (2010-09-16)	1,2	INV. F21V21/04 F21S8/02
Y	* paragraphs [0022], [0144] - [0145] *	3,5	
A		4,6-8	

Y	KR 100 999 995 B1 (KEOSUNG ELECTRONIC CO LTD [KR]) 9 December 2010 (2010-12-09)	1-3,5	
A	* paragraphs [0065] - [0074]; figures 8-9 *	4,6-8	
	* paragraph [0073] *		

Y	US 2002/157844 A1 (LAFLAMME BENOIT [CA] ET AL) 31 October 2002 (2002-10-31)	1-3,5	
	* paragraph [0015]; figures 4-6 *		

Y	DK 2018 00068 U3 (DAXTOR APS [DK]) 2 December 2019 (2019-12-02)	1-3,5	
	* page 6, lines 15-31; figures 1-3 *		

Y	JP H02 36116 U (-) 8 March 1990 (1990-03-08)	1-3,5	
	* figures 1-2 *		

TECHNICAL FIELDS SEARCHED (IPC)

F21V
F21S
H02G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	24 September 2021	Thibaut, Arthur

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 21 17 6228

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.

24-09-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010104347 A2	16-09-2010	NONE	
KR 100999995 B1	09-12-2010	NONE	
US 2002157844 A1	31-10-2002	NONE	
DK 201800068 U3	02-12-2019	NONE	
JP H0236116 U	08-03-1990	NONE	

EPO FORM P0459

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