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

(11) **EP 3 885 632 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
29.09.2021 Bulletin 2021/39

(51) Int Cl.:
F16M 13/02 *(2006.01)*

(21) Application number: **21382244.8**

(22) Date of filing: **25.03.2021**

(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: **27.03.2020 ES 202030553**

(71) Applicant: **ITS Partner Outsourcing Business Solutions, S.L**
08173 Sant Cugat del Vallés Barcelona (ES)

(72) Inventor: **LAVADO GARCIA, Luciano**
20014 SAN SEBASTIAN (GIPUZKOA) (ES)

(74) Representative: **Plasseraud IP**
66, rue de la Chaussée d'Antin
75440 Paris Cedex 09 (FR)

(54) **DEVICE FOR CLAMPING ELECTRONIC ELEMENTS ON INSTALLATION MASTS**

(57) The present invention relates to a device for clamping electronic devices on installation masts for such electronic devices (1), such as TV signal amplifiers, comprising at least one magnet (3) able to be fixed to a rear portion of an electronic device (1) to be clamped on an installation mast (2) made of ferromagnetic material of a cylindrical configuration by means of the magnet (3), the magnet (3) configured forming a concave channel (4) with respect to the mast (2) in the clamping position of the electronic device (1) on the installation mast (2).

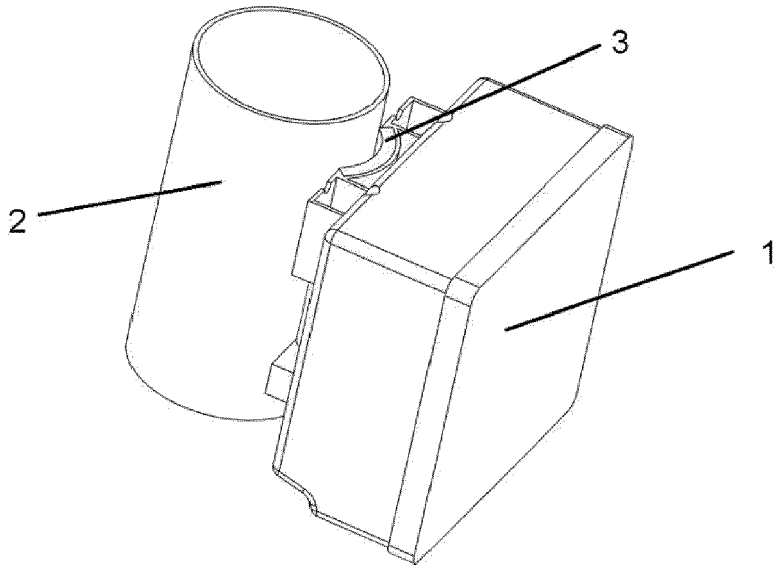

FIG. 2

EP 3 885 632 A1

Description

Technical field

[0001] The present invention is related to the clamping of electronic devices on installation masts for such electronic devices, particularly on masts made of ferromagnetic material of a cylindrical configuration, such as, for example, the clamping of a TV signal amplifier on the mast of the corresponding antenna, proposing a device that enables the assembly and disassembly of said clampings to be carried out with ease and reducing the risk of accidents for the operators who perform the work.

State of the art

[0002] In order to achieve optimal operation, the installation of TV signal amplifiers must be made as close as possible to the corresponding antenna, so said amplifiers are conventionally installed on the antenna supporting mast, which implies carrying out works at great heights, with risks that affect the safety of the operators despite the safety measures that may be taken.

[0003] The conventional ways of establishing the aforementioned clampings are usually with plastic flanges or brackets that are closed with nuts and bolts, solutions that have a complicated and dangerous assembly, since the operators who carry them out have to use both hands for the installation manipulations while holding on at the same time, which, at a great height level and only with support on the mast on which the work is carried out, is difficult and entails a great safety risk for the operators.

[0004] Given the aforementioned drawbacks, the need to develop a clamping device that enables securely clamping electronic devices that are installed on cylindrical masts made of ferromagnetic material at heights or other dangerous locations is evident, in order to facilitate the installation manipulations of such devices and reduce the risks of accidents of the operators.

Object of the invention

[0005] According to the present invention, a magnetic clamping device is proposed to keep electronic devices installed on masts made of ferromagnetic material of a cylindrical configuration in a clamping position, with an embodiment that enables safety to be improved and the installation process to be facilitated.

[0006] The device object of the invention comprises a magnet able to be fixed to a rear portion of an electronic device to be clamped on an installation mast made of ferromagnetic material of a cylindrical configuration by means of the magnet. In this way, it is possible to temporarily clamp the devices to be clamped on the mounting masts, by means of a simple support, taking advantage of the magnetic attraction, which can be easily done with one hand without complicated manipulations, to then carry out, in the mounting place and position, the definitive clamping, which is also easier, since the device to be installed does not have to be held with the hands.

[0007] According to the invention, the magnet is configured forming a concave channel with respect to the mast in the clamping position of the electronic device on the installation mast, in which the magnet is fixed to the rear portion of the electronic device.

[0008] In this way, a clamping device on masts is obtained, which can be used effectively in relation to masts with a diameter greater than the diameter of the curvature of the magnet of the device and in relation to masts with a diameter smaller than the diameter of the curvature of the magnet, that is to say, of the curvature of the concave channel of the magnet, since in relation to masts with a diameter greater than the diameter of the curvature of the magnet, two vertical lines of contact are established between the magnetic clamping magnet and the mast on which clamping has to be established, which determines a greater clamping force than with a single line of contact between the magnet channel and the mast.

[0009] In addition, the two vertical lines of contact between the magnet and the mast are established on the sides of the magnet, which determines a greater stability of the clamping, since the tendency to rotate to the sides is prevented.

[0010] Furthermore, with the curved magnet, the curvature of the mast on which clamping is established enters the curvature of the magnet between the two vertical lines of contact, approaching the surface of the magnet, so that the magnetic force of attraction is stronger, better securing the clamping.

[0011] The greater force of magnetic attraction and security of the clamping does not, however, hinder the separation disassembly with respect to the mast on which a device with this curved magnet solution is clamped, since by performing a side rotation of the device with the magnet incorporated, sliding over the lines of contact between the magnet and the mast, the contact of the clamping comes to two points that make the magnetic attraction very low, the separation being easily carried out. In addition, with the simple rotation, thanks to the curvature of the curved magnet, the surface of the mast that is between the two lines of contact, the mast moves away from the magnet, reducing the magnetic force of attraction and facilitating the separation.

[0012] Moreover, in relation to masts with a diameter smaller than the diameter of the curvature of the curved magnet of the clamping device, between the curved magnet of the device and the mast on which clamping is established, only one vertical line of contact is determined, but in this case the side portions of the magnet approach the mast from the vertical line of contact, the magnetic attraction being greater as the magnetic field is in the radial direction, unlike in the event that the magnets were arranged flat, in which the magnetic field is transverse and therefore the clamping is thus stronger than with a flat magnet.

[0013] In this case, the curved magnet embraces the side portions of the clamping towards the mast, which prevents the assembly made up of the device being clamped and the magnet from accidentally rotating to the sides with the danger of detachment of the clamping, since the sides of the magnet act as stops preventing said circumstance. This advantage would not ensue if the magnet were flat since it could easily rotate both sideways and around the clamping mast, which would imply an instability of the clamping that would not ensue with the concave magnet object of the invention.

[0014] The most favourable case will be when the curvature of the magnet channel coincides with the curvature of the mast, in this way the clamping will be the most effective possible, further enabling the electronic elements to be released with the rotation.

[0015] Therefore, a versatile device is obtained which is valid for masts of any curvature.

[0016] In the mounting arrangement on the application device to be clamped, the curved magnet is incorporated in a socket in the form of a guide, wherein the magnet is introduced by means of a simple insertion by sliding, being retained in the frontal direction (direction of action of the magnetic field) due to the correspondence between the shape of the sides of the magnet and the shape of the socket, without the need for accessory retention elements, thus being very easy to safely incorporate the magnet in the application device to be clamped. In addition, this configuration enables the magnet to be changed to easily install another magnet with the curved surface of the channel in correspondence with the curvature of the mast, if necessary.

[0017] Therefore, the clamping device object of the invention has very advantageous features for the application function for which it is intended, acquiring a life of its own and a preferential character with respect to the conventional solutions used for the same function.

Description of the figures

[0018]

Figure 1 shows a perspective view of a device that is intended to be clamped on a mast, incorporating a magnetic clamping device on the rear portion according to the invention.

Figure 2 is a perspective view of the device of the preceding figure arranged in the clamping position on a mounting mast.

Figure 3 is a detailed profile view of a clamping established with the device of the invention on a mast with a diameter greater than the diameter of the curvature of the curved magnet of the clamping device.

Figure 4 is a perspective detailed view of the mounting of the curved magnet in a clamping device according to the invention.

Figure 5 is a detailed profile view of a clamping established with the device of the invention on a mast with a diameter smaller than the diameter of the curvature of the curved magnet of the clamping device.

Figure 6 is a perspective view of the device in a rotated position with respect to the mast for separation thereof, wherein the arrows indicate the rotation movement of the device and the points of contact between the mast and the device are indicated in bold for a better understanding.

Detailed description of the invention

[0019] The object of the invention relates to a device for clamping electronic devices, such as a TV signal amplifier, on mounting masts (2), such as a mast (2) supporting an antenna, particularly in the event of masts (2) made of ferromagnetic material of a cylindrical configuration.

[0020] The clamping device comprises a magnet (3) curved in a transverse direction, which is arranged at the rear portion of the electronic device (1) to be clamped, with the channel (4) of the curvature in the longitudinal direction according to the clamping position of the electronic device (1) on the mounting mast (2); the magnet (3) being provided in particular formed by a part configured according to a cross-sectional profile in the shape of a circular trapezoid, as a side part of a hollow cylinder.

[0021] According to an envisaged mounting embodiment, the curved magnet (3) is incorporated in the electronic device (1) being housed in a socket (5) in the form of a guide that reciprocally corresponds to the configuration of the magnet (3), as can be seen in Figure 1, so that the magnet (3) is introduced in said socket (5) by means of longitudinal insertion by sliding, being retained in the frontal direction by the correspondence between the inclined side shape presented by the side edges of the magnet (3) and the reciprocal inclined shape of the sides of the socket (5), without the need for additional means, such as screws or the like, to secure retention.

[0022] In the mounting housing in the socket (5), it is further envisaged that the magnet (3) is left with the edges (6) that correspond to the concave portion on the sides thereof protruding frontally from the socket (5), as seen in Figure 4.

[0023] Thus, the clamping device can be used to clamp an electronic device (1) on a mast (2) made of ferromagnetic material with a diameter greater than the diameter of the transverse curvature of the curved magnet (3), as can be seen in Figure 3, in the arrangement of which the magnet (3) rests on the mast (2) with the edges (6) of the concave portion of the sides establishing two longitudinal lines of contact, between which the curvature of the mast (2) is introduced in the curvature of the magnet (3), reducing the distance between both of them, which improves the magnetic attraction and, therefore, the clamping force.

[0024] However, the clamping device can further be used to clamp an electronic device (1) on masts (2) made of ferromagnetic material with a diameter smaller than

the diameter of the transverse curvature of the curved magnet (3) incorporated in said application devices (1), as seen in Figure 5, in the arrangement of which the magnet (3) rests on the mast (2) in a single longitudinal line of contact, but in this case the side portions of the magnet (3) approach the mast (2) reducing the separation between both of them. This increases the intensity of the magnetic attraction, in this case radial, as can be seen in Figure 5, by means of the arrows representing the magnetic field and, therefore, the clamping force is increased.

[0025] In addition, the approaching of the side portions of the magnet (3) towards the mast (2) causes the very side edges of the magnet (3) to become stops on the sides of the clamping, to prevent the unforeseen rotation on its axis of the assembly formed by the electronic device (1) and the magnet (3) to the sides and with it the danger that the electronic device (1) may accidentally detach from the clamping.

[0026] When it is necessary to remove the electronic device (1) from the mast (2) for maintenance or replacement work, the device object of the invention advantageously enables the rotation of the electronic device (1) so that, as can be seen in Figure 6, performing a side rotation of the device (1) as indicated by the arrows, the clamping contact comes to be in two points (indicated in bold in Figure 6) instead of one line as in Figure 3 or 2 lines as in Figure 5 of contact of the magnet (3) with the mast (2). In this way, the magnetic attraction is reduced in such a way that the device (1) is easy to separate from the mast (2), being able to be carried out by the operator with only one hand.

Claims

1. A device for clamping electronic devices on installation masts for such electronic devices (1), such as TV signal amplifiers, comprising at least one magnet (3) able to be fixed to a rear portion of an electronic device (1) to be clamped on an installation mast (2) made of ferromagnetic material of a cylindrical configuration by means of the magnet (3), the magnet (3) is configured forming a concave channel (4) with respect to the mast (2) in the clamping position of the electronic device (1) on the installation mast (2).

2. The device for clamping electronic devices on installation masts, according to claim 1, **characterised in that** the magnet (3) is configured to contact the mast (2) in the clamping position according to at least one line of contact of the channel (4).

3. The device for clamping electronic devices on installation masts, according to claim 1 or 2, **characterised in that** the magnet (3) is a part configured according to a cross-sectional profile in the shape of a circular trapezoid.

4. The device for clamping electronic devices on installation masts, according to one of claims 1 to 3, **characterised in that** the magnet (3) is able to be fixed to the electronic device (1) by being housed in a socket (5) in the form of a guide.

5. The device for clamping electronic devices on installation masts, according to claim 4, **characterised in that** in the clamping position the magnet (3) is left with the edges (6) that correspond to the concave portion on the sides thereof protruding from the socket (5).

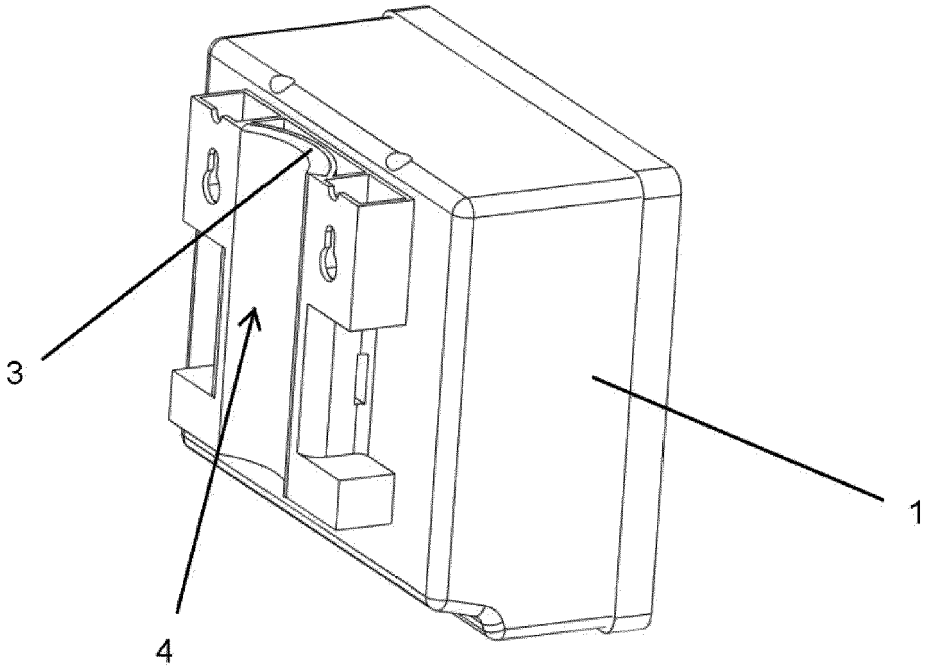

FIG. 1

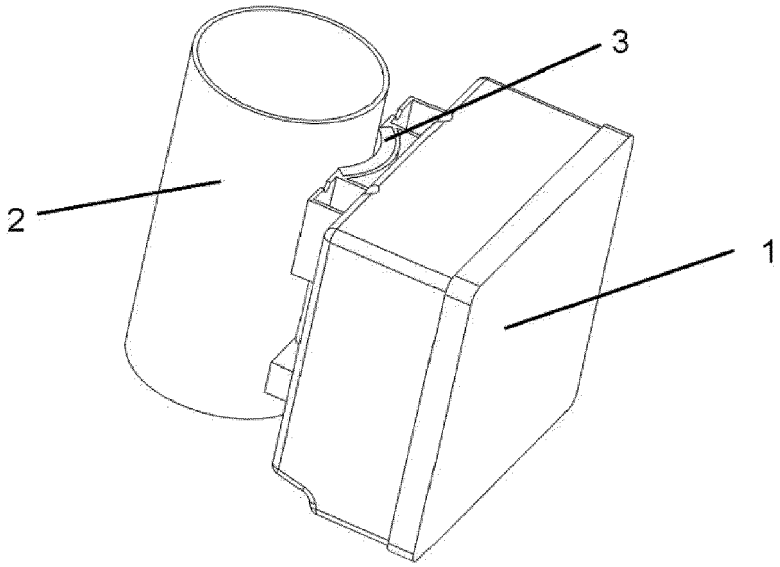

FIG. 2

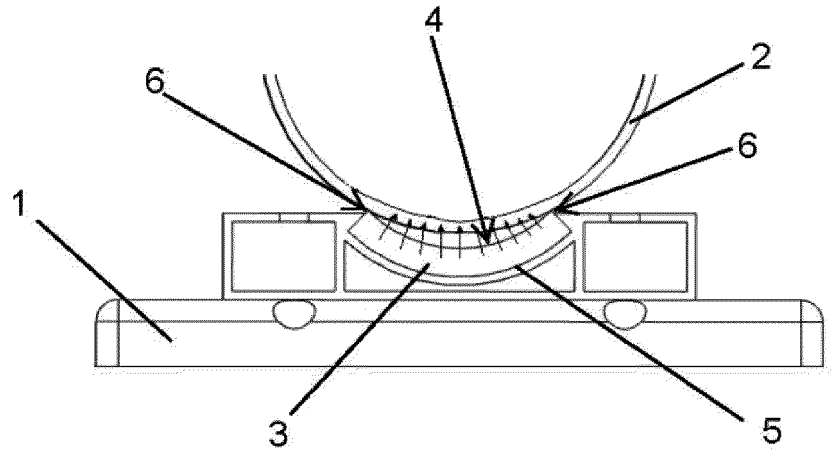

FIG. 3

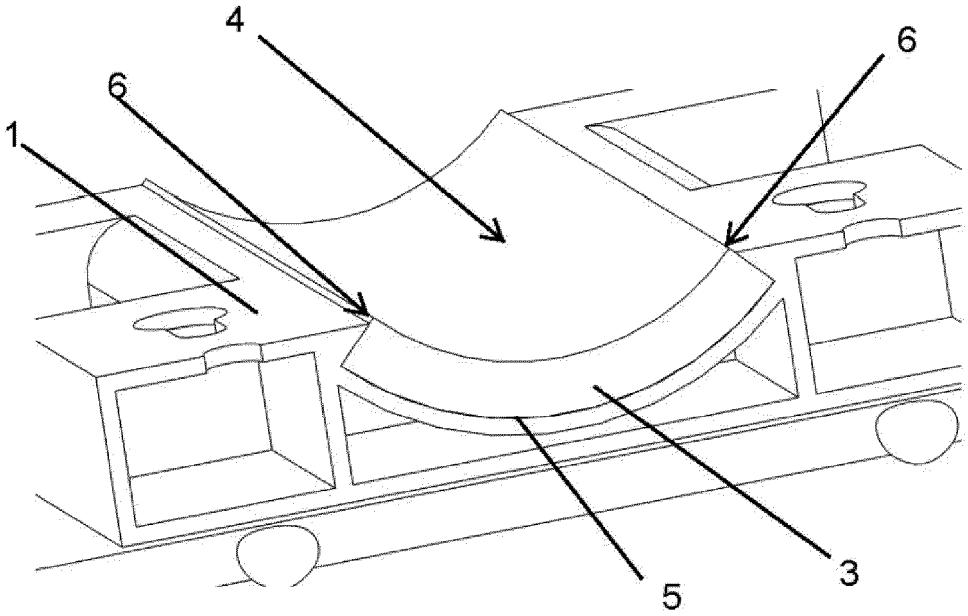

FIG. 4

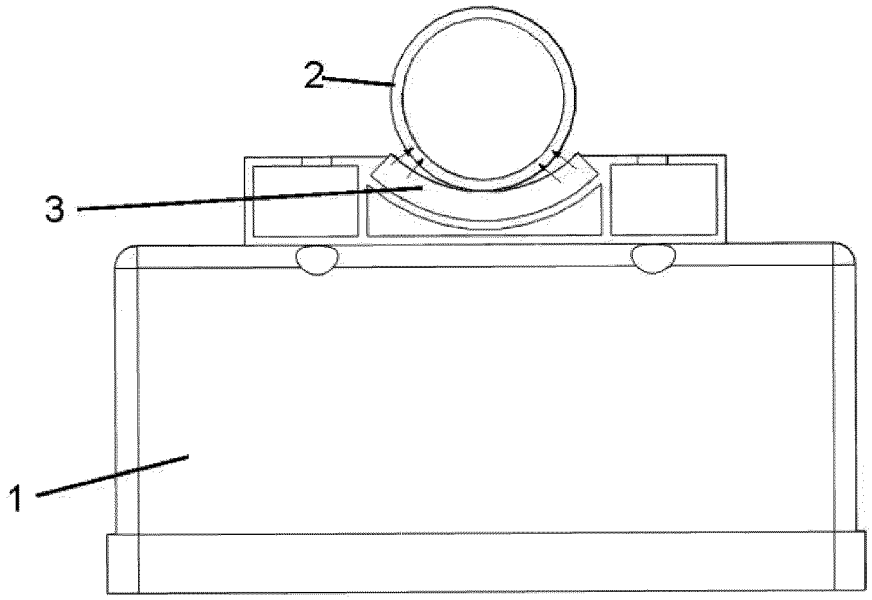

FIG. 5

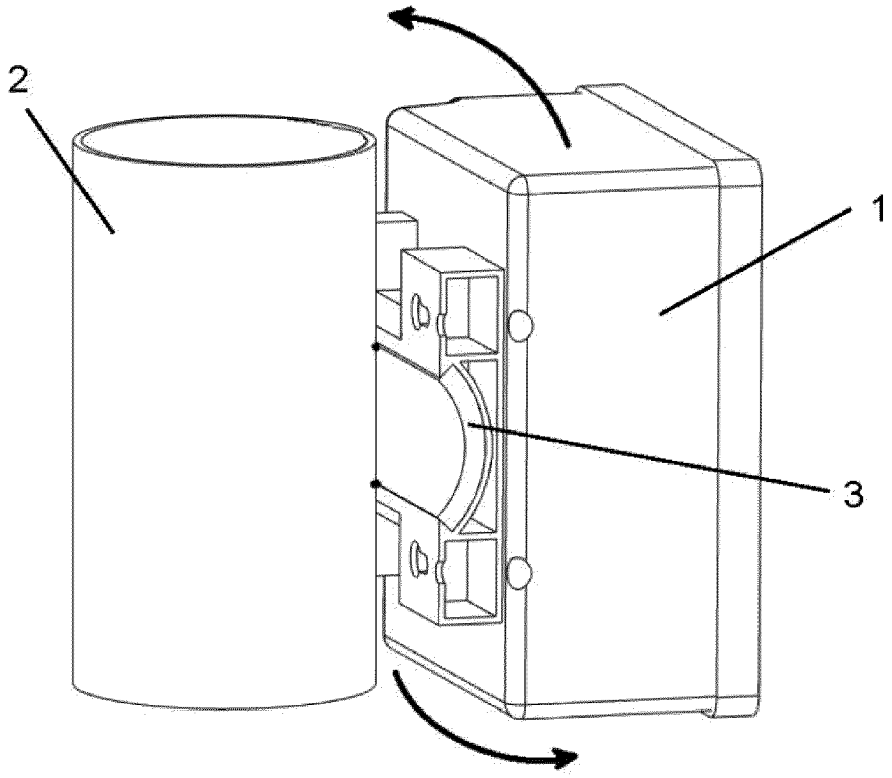

FIG. 6

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 21 38 2244

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 2016/209733 A1 (AKAI YOSHIKO [US] ET AL) 21 July 2016 (2016-07-21) * paragraph [0035]; figure 4 *	1-4	INV. F16M13/02
X	US 2012/074284 A1 (HUANG WEN-HUNG [TW]) 29 March 2012 (2012-03-29) * paragraph [0034] - paragraph [0042]; figures 1-8 *	1,2	
X	DE 20 2016 005415 U1 (SCHMID ANDREAS [DE]) 13 March 2017 (2017-03-13) * paragraph [0012]; figure 1 *	1,2	
A	WO 2014/081612 A1 (SENTRY PROT PRODUCTS [US]; RYAN JAMES P [US]; WAGNER JEFFREY P [US]) 30 May 2014 (2014-05-30) * paragraph [0058] - paragraph [0066]; figures 1-15 *	1-5	

TECHNICAL FIELDS SEARCHED (IPC)
F16M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	13 July 2021	Simens, Mark Phil

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 38 2244

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.

13-07-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016209733 A1	21-07-2016	NONE	
US 2012074284 A1	29-03-2012	TW 201215292 A	01-04-2012
		US 2012074284 A1	29-03-2012
DE 202016005415 U1	13-03-2017	NONE	
WO 2014081612 A1	30-05-2014	CA 2891910 A1	30-05-2014
		EP 2923344 A1	30-09-2015
		ES 2695156 T3	02-01-2019
		WO 2014081612 A1	30-05-2014

EPO FORM P0459

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