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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
24 December 2014 (24.12.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/202032 A1

(51) International Patent Classification:
F16M 13/02 (2006.01) *A61B 6/00* (2006.01)

(21) International Application Number:
PCT/CZ2014/000065

(22) International Filing Date:
12 June 2014 (12.06.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PV2013-468 18 June 2013 (18.06.2013) CZ

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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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, 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, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

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

[Continued on next page]

(54) Title: ARM OF CEILING HOLDER

(57) Abstract: The arm of a ceiling holder, especially the arm (1) of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes a supporting part (2) connected with the pendant accessories and/or other supporting parts of the ceiling holder, where the supporting part (2) comprises of a composite skeleton (5).

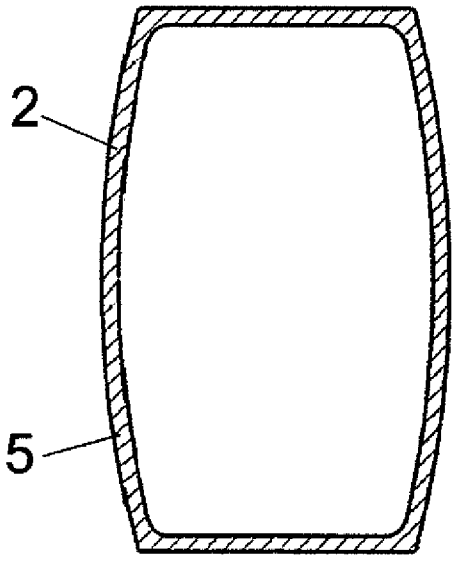

Fig.1

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— *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))*

Arm of ceiling holder

Technical Field

The present invention relates to an arm of a ceiling holder, especially to the arm of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes a supporting part and end pieces used for connection with the pendant accessories and/or other supporting parts of the ceiling holder.

State of the Art

A wide range of the arm structures of ceiling holders is known from the art and they are used for attaching of the pendant accessories, such as medical devices, tools, and equipment in the operating theatres or examination rooms. The arms contain the supporting part made from a metal material.

The main disadvantage of the arms, which include metal supporting part, is increased weight that causes deteriorated manoeuvring with the arms. Higher weight goes hand in hand with higher rating of the handling and balancing structural components, which again increases total weight of the arm. Higher weight stands for more material and thereby, higher total price of the holder. Higher costs are also associated with necessity of higher rating of the holder fixing component in the ceiling structure.

The aim of the present invention is the structure of the arm of the ceiling holder, structure of which will be far lower when compared to the art, easier to manufacture and cheaper in general.

Principle of the Invention

Said disadvantages are eliminate to a considerable extent and aims of the invention are accomplished by the arm of the ceiling holder, especially the arm of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, comprising of the supporting part connected with the pendant accessories and/or other supporting parts of the ceiling

holder according to the present invention, wherein the substance of the invention lies in that the supporting part consists of a composite skeleton.

In another embodiment, said disadvantages are avoided to a considerable extent and aims of the invention are accomplished by the arm of the ceiling holder, especially the arm of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, comprising of the supporting part connected with the pendant accessories and/or other supporting parts of the ceiling holder according to the present invention, wherein the substance of the invention lies in that the supporting part consists of a core, whereas at least one part of the core is fitted with a composite skeleton.

The benefit of both embodiments is that the arm is very lightweight. At the same time, production of the arm is rather easy. In case the arm includes the core, the core is favourably wrapped in the material of the composite skeleton. This permits optimization of the arm properties with respect to its overall dimensions. The structure permits simplified production of the arms with a wide range of lengths, without extra demands for the production equipment. The composite skeleton favourably consists of carbon fibres in a binder.

Considering said optimization of the arm embodiment and considering to its properties and production costs, it is favourable for the composite skeleton to have a variable thickness. Most favourably, the composite skeleton is embodied so that its thickness is smallest roughly in the centre of the supporting part, more favourably the supporting part is thinnest in the centre between the arm parts behind which it is connected to another supporting parts of the holder and that arm part where ballast is fixed.

If the core is included in the supporting part of the arm of the ceiling holder, it is favourable when the core is made from a metal. Most favourably and considering total weight, the core is made from an aluminium-based alloy.

It is further favourable for the supporting part to include at least one inner divider used for its reinforcement and for guiding of mechanisms inside the arm cavity. The inner divider is favourably an integral part of the composite skeleton. In another embodiment, the inner divider may be either additionally inserted or fixed, for example glued.

The supporting part has favourably circular shape. This shape is favourable with respect to its strength properties and production simplicity and is favourable with

respect to maintenance of the ceiling holder with respect to its placement in the environment of operating theatres, which means in environments with increased sanitary demands. It may also be favourable for the supporting part to have squared shape, whereas the shape is four-sided or multiply sided.

Most favourably, the supporting part is connected with the pendant accessories and/or other supporting parts of the ceiling holder via at least one end piece. This embodiment permits very easy production and high variability of embodiments of arms of the ceiling holder. The end piece may for example comprise a joint for connection for other parts of the ceiling holder or pendant accessories.

It is favourable considering variability of the structure mentioned above if at least one part of the end piece is metal and/or composite. If the end piece or any part thereof is metal, the most favourable production method is casting.

The end piece is then favourably joined to the supporting part by pressing on and/or with a glue layer.

A great advantage of the arm of the ceiling holder according to the present invention is substantially lower weight compared to embodiments of arms in the art. This brings possibility of substantial lessening of handling and balancing components, thereby further reduction of total weight of the arm. This means substantial saving in material and thereby substantial reduction of total costs for production of the ceiling holder. Reduction of total weight also improves and simplifies manoeuvrability of the arms and allows reduction of requirements for loading capacity of attachment to the ceiling structure.

The structure of the arm of the ceiling holder according to the present invention is in addition highly variable, whereas it allows precise optimization of the arm properties with respect to its use. The structure also permits simplified production of the arms with a wide range of lengths, without extra demands for the production equipment.

Overview of the Figures

The invention will be explained in detail based on the drawing, where Fig. 1 illustrates cross-section view embodiment of the supporting part comprising of the composite skeleton, Fig. 2 illustrates cross-section view embodiment of the supporting part comprising of the composite skeleton with the inner divider

arranged in its cavity, Fig. 3 illustrates cross-section view embodiment of the supporting part with the core and the composite skeleton, Fig. 4 illustrates cross-section view embodiment of the supporting part with the core and composite skeleton, with the inner divider arranged in its cavity, Fig. 5 illustrates view to individual supporting parts of the arm of the ceiling holder, and Fig. 6 illustrates view on the arm of the ceiling holder ready for installation in the holder.

Examples of the Performance of the Invention

Example 1

The arm 1 of a ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes the supporting part 2 connected with the pendant accessories and/or other supporting parts of the ceiling holder.

The supporting part 2 (Fig. 1) comprises of the composite skeleton 5, whereas it is adapted on its ends for connection with other parts of the ceiling holder and attaching of the pendant accessories.

In addition, the supporting part 2 (Fig. 2) comprises of the inner dividers 7 used for reinforcement of the supporting part and guiding of mechanisms inside the arm 1 cavity. The inner dividers 7 are integral part of the composite skeleton 5.

The supporting part 2 has four-sided shape, whereas round shape may be used in another embodiment.

Example 2

The arm 1 of a ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes the supporting part 2 connected with the pendant accessories and/or other supporting parts of the ceiling holder.

The supporting part 2 (Fig. 3) comprises of the metal core 6 coated with composite skeleton 5, whereas the supporting part 2 adapted on its ends for connection with other parts of the ceiling holder and attaching of the pendant accessories.

The composite skeleton 5 has variable thickness, whereas the thinnest section is roughly in the centre of the supporting part 2 between attaching points thereof.

In addition, the supporting part 2 (Fig. 4) comprises of the inner dividers 7 used for reinforcement of the supporting part and guiding of mechanisms inside the arm 1 cavity. The inner dividers 7 are attached by gluing inside the core 6 cavity.

The supporting part 2 has four-sided shape, whereas round shape may be used in another embodiment.

Example 3

The arm 1 (Fig. 5, Fig. 6) of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment includes the supporting part 2 connected with the pendant accessories and/or other supporting parts of the ceiling holder.

The supporting part 2 (Fig. 1) comprises of the composite skeleton 5, whereas end pieces 3, 4 are used for connection with the pendant accessories and other supporting parts of the ceiling holder. The end pieces 3, 4 are made from composite material or non-ferrous metal alloy, whereas they are connected with the supporting part 2 using glue layer.

In addition, the supporting part 2 (Fig. 2) comprises of the inner dividers 7 used for reinforcement of the supporting part and guiding of mechanisms inside the arm 1 cavity. The inner dividers 7 are integral part of the composite skeleton 5, whereas they are made from composite material or non-ferrous metal alloy.

The supporting part 2 has four-sided shape, whereas round shape may be used in another embodiment.

Example 4

The arm 1 (Fig. 5, Fig. 6) of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment includes the supporting part 2 connected with the pendant accessories and/or other supporting parts of the ceiling holder.

The supporting part 2 (Fig. 3) comprises of the metal core 6 coated with the composite skeleton 5, whereas the supporting 2 has the end pieces 3, 4 for connection with the pendant accessories and other supporting parts of the ceiling holder.

The composite skeleton 5 has variable thickness, whereas the thinnest section is roughly in the centre of the supporting part 2 between attaching points thereof.

In addition, the supporting part 2 (Fig. 4) comprises of the inner dividers 7 used for reinforcement of the supporting part and guiding of mechanisms inside the arm 1 cavity. The inner dividers 7 are attached by gluing inside the core 6 cavity.

The supporting part 2 has four-sided shape, whereas round shape may be used in another embodiment.

The end pieces 3, 4 are made from metal or composite material, whereas they are connected with the supporting part 2 by pressing.

Industrial Application

The arm of the ceiling holder may particularly be used for attaching of pendant accessories in the operating theatres and examination rooms of health care facilities.

List of Reference Marks

1	arm
2	supporting part
3	end piece I
4	end piece II
5	composite skeleton
6	core
7	inner divider

Patent claims

1. An arm of a ceiling holder, especially the arm (1) of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes a supporting part (2) connected with the pendant accessories and/or other supporting parts of the ceiling holder, **characterized by that** the supporting part (2) comprises of a composite skeleton (5).
2. An arm of the ceiling holder, especially the arm (1) of the ceiling holder for attaching of pendant accessories such as medical devices, medical apparatuses, tools and equipment, which includes the supporting part (2) connected with the pendant accessories and/or other supporting parts of the ceiling holder, **characterized by that** the supporting part (2) comprises of a core (6), whereas at least a part of the core (6) is coated with the composite skeleton (5).
3. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the composite skeleton (5) has variable thickness.
4. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the composite skeleton (5) has variable thickness, whereas the thinnest section is roughly in the centre of the supporting part (2).
5. The arm of the ceiling holder according to any one of claims 2 to 4 **characterized by that** the core (6) is made from a metal material.
6. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the supporting part (2) further comprises of at least one inner divider (7).
7. The arm of the ceiling holder according to claim 6 **characterized by that** the inner divider (7) is an integral part of the composite skeleton (5).
8. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the supporting part (2) has either circular or squared shape.
9. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the supporting part (2) is connected with

the pendant accessories and/or other supporting parts of the ceiling holder via at least one end piece (3, 4).

10. The arm of the ceiling holder according to claim 9 **characterized by that** at least a part of the end piece (3, 4) is made from a metal material.

11. The arm of the ceiling holder according to any of claims 9 and 10 **characterized by that** at least a part of the end piece (3, 4) is made from a composite material.

12. The arm of the ceiling holder according to any one of preceding claims **characterized by that** the end piece (3, 4) is connected with the supporting part (2) by pressing and/or glue layer.

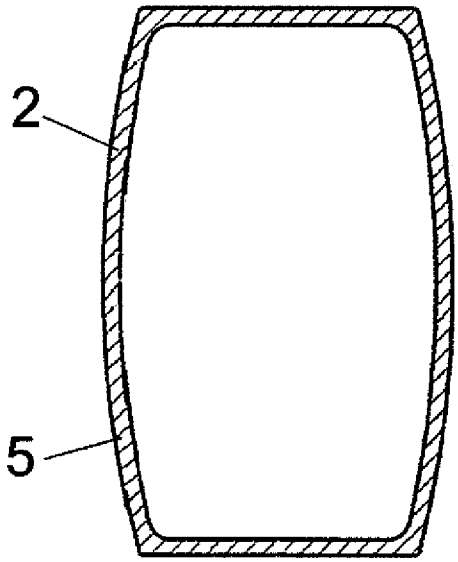

Fig.1

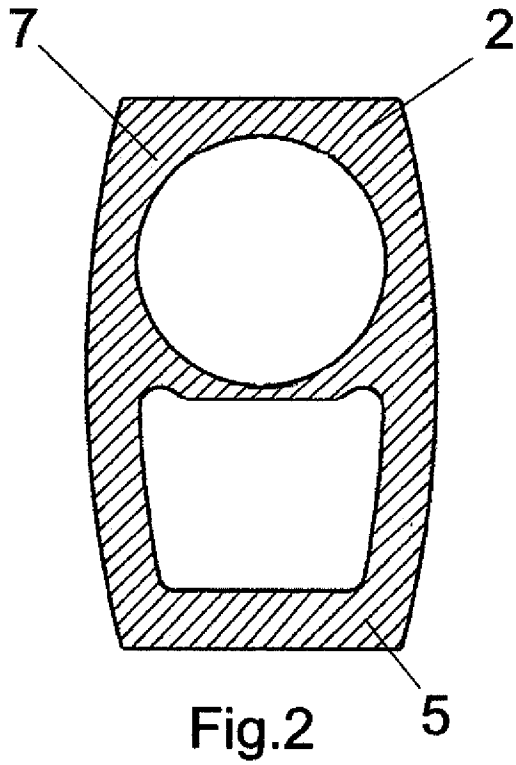

Fig.2

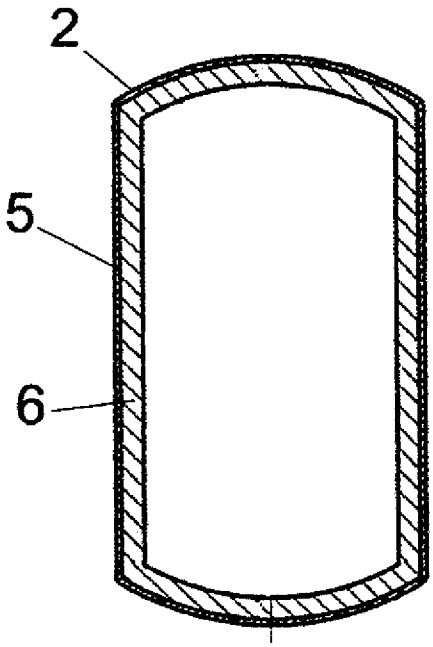

Fig.3

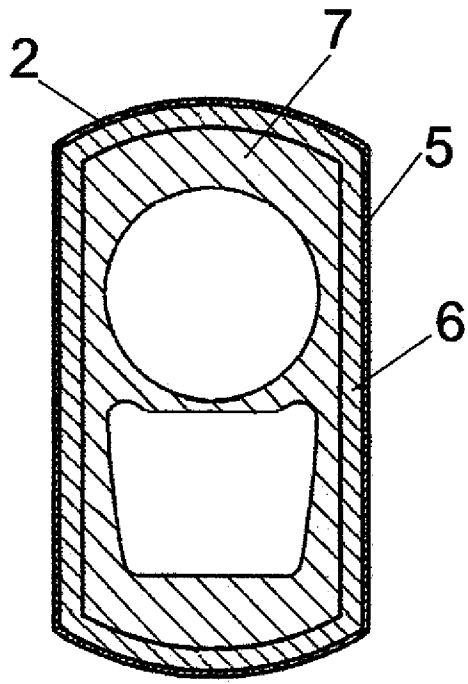

Fig.4

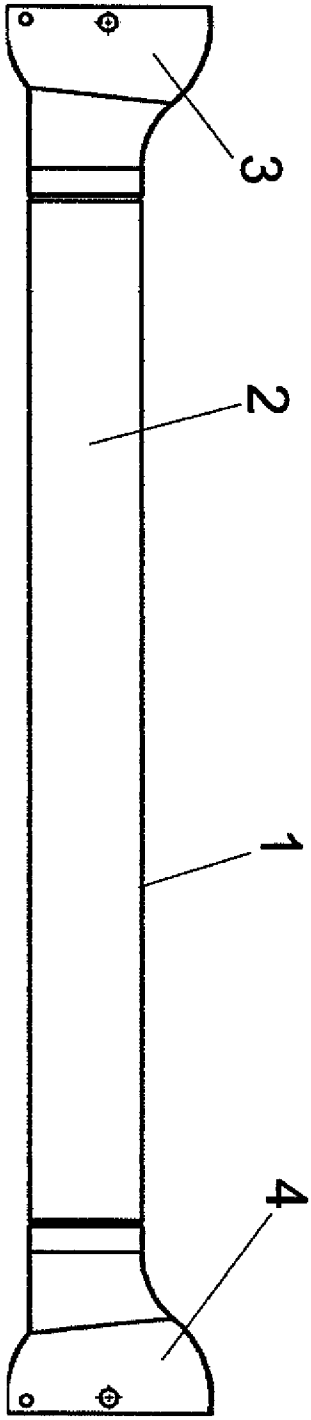

Fig.6

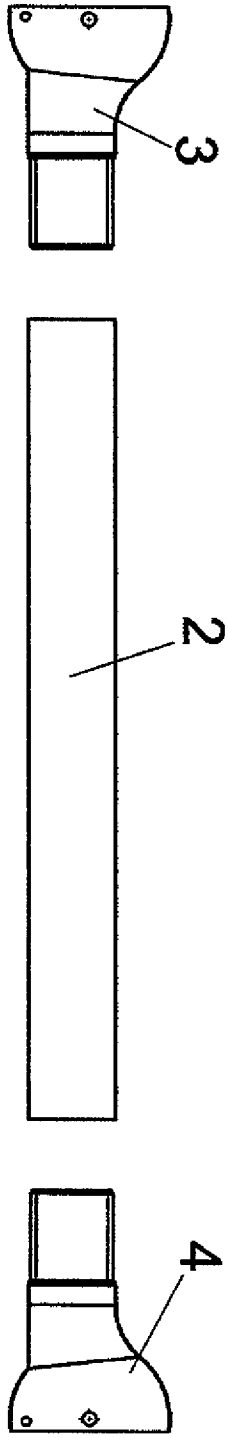

Fig.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2014/000065

A. CLASSIFICATION OF SUBJECT MATTER
INV. F16M13/02 A61B6/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F16M A61B

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 practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 956 719 A1 (FUDOW COMPANY LTD [JP]) 26 August 2011 (2011-08-26) the whole document	1-12
X A	US 5 425 068 A (SCHAEFER WILLI [DE] ET AL) 13 June 1995 (1995-06-13) column 2, line 24 - column 3, line 39; figures 1-5	1,8,9, 11,12 3,4,6,7
A	US 2012/257725 A1 (NODA KOUJI [JP]) 11 October 2012 (2012-10-11) paragraph [0038] - paragraph [0040]; figures 14,15	3,4,6,7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
17 November 2014	24/11/2014

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CZ2014/000065

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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