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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
06 September 2019 (06.09.2019)

WIPO | PCT

(10) International Publication Number
WO 2019/166696 A1

(51) International Patent Classification:
E05B 17/20 (2006.01) *E05C 7/00* (2006.01)
E05B 63/00 (2006.01) *E05C 19/00* (2006.01)
E05B 65/00 (2006.01)

(21) International Application Number:
PCT/FI2019/050154

(22) International Filing Date:
26 February 2019 (26.02.2019)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:
20185190 01 March 2018 (01.03.2018) FI

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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, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, 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, ST, 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).

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

(54) **Title:** LOCKING DEVICE TO PREVENT OPENING OF A DOOR/DOORS

(57) **Abstract:** The invention relates to a locking device in- tended to prevent opening of a door/doors, said locking device comprising a body (2), which is capable of being coupled immovably to a door handle (1) and prevents opening of a door/doors (o1). The body (2) is provided with a coupling arrangement adjustable with adjustment elements (2a) for locking the handle (1) against an ex- ternal surface (U) of the door (ol) by being propped immovably on a vertical frame member (y) of the door or on a handle of the adjacent door.

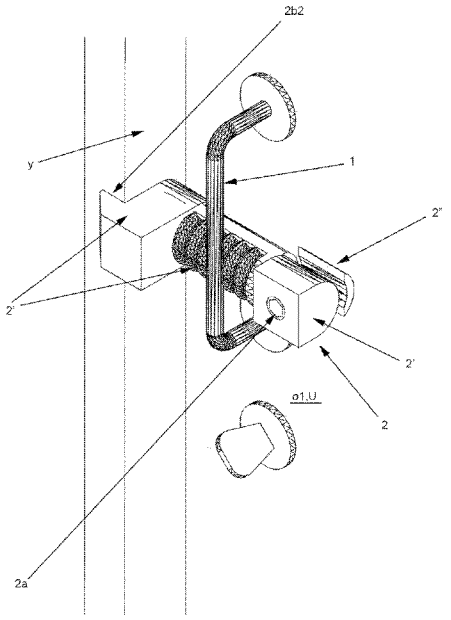

FIG.1

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Locking device to prevent opening of a door/doors

The invention relates to a locking device according to the preamble of an independent claim directed thereto.

In particular, doors provided with so-called pull handles or double doors are used also in indoor spaces without a separate locking arrangement for locking the door or double doors shut, which is nevertheless necessary in certain cases for preventing uncontrolled passage of e.g. pets, small children or memory-impaired persons. As for the locking of doors provided with pull handles, there are not available today easily installable and reliably working locking arrangements which would not require fixed installations to be made on the door or doors.

An objective for a locking device according to the present invention is to provide a decisive improvement regarding the foregoing problem and to thereby raise substantially the present state of the art. In order to attain this objective, the locking device of the invention is principally characterized by what is presented in the characterizing clause of an independent claim directed thereto.

As most significant benefits gained by a locking device of the invention should be mentioned the simplicity of its construction and operation, whereby disallowing the opening of a door, especially one with a pull handle, is achievable with a very simple and easily mountable construction. As the invention

is based on mechanically locking a door handle against an external surface of the door by being propped immovably on an upright frame member of the door or on a handle of the adjacent door, it is not necessary to provide either the door or its frame member with any installations but, instead, the device is in any event readily and quickly mountable in its place.

In a preferred embodiment, the locking device's body includes body members, which are movable relative to each other, bearing against a rear surface of the door handle and an external surface of the door, and which are provided with clamping elements for coupling the body immovably to the door handle by distancing the body members with respect to each other. In a preferred embodiment of the invention, there is further utilized a locking rod, which is propped on a horizontal support surface such as a floor, on a door frame structure or in the like manner, and which, in addition, is further coupled to the body in a removable manner. Thus, the locking device is easily storable in parts. In this context, it is further possible to minimize the space demand of a locking rod by constructing the same on a so-called fishing rod principle of several short sections.

Other preferred embodiments for a locking device of the invention are presented in the dependent claims directed thereto.

A detailed description of the invention will be presented in the subsequent specification with reference to the accompanying drawings, in which:

Fig. 1 shows one preferred locking device of the invention in a perspective view in connection with a door handle of the so-called pull handle type,

fig. 2 shows, in a perspective view, one preferred locking device of the invention in connection with the pull handles of double doors,

fig. 3 shows, in a perspective view, one further embodiment for a locking device of the invention,

fig. 4 shows, in a perspective view, the embodiment of fig. 3 in connection with double doors, and

fig. 5 shows, in a perspective view, an enlarged detail of one preferred aspect in a locking device of the invention in connection with the pull handles of double doors,

fig. 6 shows, in a perspective view, one further optional locking device of the invention in connection with the pull handles of double doors, and

fig. 7 shows, in a perspective view, one further locking device which is optional with respect to the locking device presented in fig. 6.

The invention relates to a locking device intended to prevent opening of a door/doors, said locking device

comprising a body 2, which is capable of being coupled immovably to a door handle 1 and prevents opening of a door/doors o1, o2. The body 2 is provided with a coupling arrangement adjustable with adjustment elements 2a for locking the handle 1 against an external surface U of the door o1 by being propped, as shown e.g. in figs. 1 and 5, immovably on a vertical frame member y of the door or, as shown e.g. in figs. 2-4, on a handle of the adjacent door o2.

In a preferred embodiment for a locking device of the invention, its coupling arrangement comprises body members 2′, 2″, which are included in the body, movable relative to each other, and resting against a rear surface of the door handle 1 and the external surface U of the door. In this context, the adjustment elements 2a comprise preferably a screw arrangement 2a for engaging the body to be pressed between the rear surface of the door handle 1 and the external surface U of the door by distancing the body members 2′, 2″ with respect to each other.

In a preferred embodiment of the invention, referring specifically to the embodiment shown in fig. 1, the coupling arrangement comprises a form locking surface 2b2 included in the body 2 and resting against the vertical frame member y of the door 1.

Especially the body 2 of a locking device shown in fig. 1 includes an intermediate member 2′ presented with sparse threading, which presses against a rear surface of the door handle 1 as one end of the body is pressed against the external door surface U via a

movable body member 2″ by using the screw arrangement 2a. Consequently, the form locking surface 2b2, included in the body member 2′ present at an opposite end of the body, is also pressed against the door frame member y.

The locking device of fig. 2, present in association with double door handles 1, corresponds in its operating principle to the foregoing with the exception, however, that the body includes an auxiliary body 2‴ present between the handles 1 and likewise provided with a body member 2″ movable with adjustment elements 2a. Hence, the locking of double doors can be remarkably enhanced by the pressure applied to a gap between the doors.

In a further preferred embodiment of the invention, the form locking surface 2b2 is adapted, in a manner appearing from fig. 5, to be adjustable with adjustment pieces 2b2′ connectable to the body 2, in which context the adjustment pieces 2b2′ are adapted for attachment to the body's form locking surface 2b2 most preferably on a so-called quick release coupling principle or e.g. form locking. It is also possible to make use of the above-described adjustment principle similar manner e.g. in connection with a door frame structure which is multiband or curving in vertical direction.

In a further preferred embodiment of the invention, with particular reference to figs. 3 and 4, the coupling arrangement further comprises a locking rod 2b3, which is propped on a horizontal support surface

x, such as a floor, a door threshold member or the like, and set in a position a inclined towards the door. The body 2 and the locking rod 2b3 are coupled to each other preferably in a removable manner e.g. with a bayonet, threaded, snap-fit joint and/or the like.

The locking rod 2b3 consists preferably of two or more rod sections displaceable on telescopic principle lengthwise relative to each other, whereby the length adjustment of the locking rod 2b3 and its locking to a desired length is provided by means of an adjustment arrangement between its rod sections, such as by means of a conical surface, friction, screw joint and/or the like. In this regard, it is possible to utilize preferably stepless twist locking adjustment generally employed e.g. in Nordic walking poles or in the extension handles of cleaning products.

In further preferred embodiments, with particular reference to alternative locking devices depicted in figs. 6 and 7, there is provided a locking arrangement 3 for locking the body 2, which is used for locking two side-by-side door handles 1, a manner to make it non-rotatable relative to its longitudinal axis s, which is implemented with a plate assembly 3a bearing against back surfaces of the handles 1 and, by its orthogonally directed ends, against external surfaces of the doors o1, o2. In this context, it is possible to utilize as the locking assembly 3 a key-operated mechanical locking mechanism or optionally e.g. its wirelessly operated electrical counterpart.

In a further preferred embodiment, with reference to figs. 6 and 7, the locking device further includes a monitoring and/or alarm system 4 implemented preferably on a remote operating principle, such as e.g. on a cloud server principle, for tracking the locking device.

It is clear that the invention is not limited to the foregoing embodiments but can be varied within the basic inventive concept in a multitude of ways in connection with various types of doors and door structures. Hence, it is first of all obvious that the locking device according to the invention can be manufactured from most diverse materials, such as wood, plastic, metal, carbon fiber, a composite material or any material suitable for the purpose.

The locking device is further capable of being provided with alarm unit based on e.g. force and/or acceleration sensors, which alerts e.g. with a sound and/or light signal about having a force or movement applied thereto. The invention can be applied not only to prevent opening of a door or doors but naturally also for tracking that any type of pull handle-equipped door, window, cabinet door or hatch remains securely closed.

Claims

1. A locking device intended to prevent opening of a door/doors, said locking device comprising a body (2), which is capable of being coupled immovably to a door handle (1) and prevents opening of a door/doors (o1, o2), the body (2) being provided with a coupling arrangement adjustable with adjustment elements for locking the handle (1) against an external surface (U) of the door (o1) by being propped immovably on a vertical frame member (y) of the door or on a handle of the adjacent door (o2), said coupling arrangement comprising body members (2′, 2″), which are included in the body (2) and resting against a rear surface of the door handle (1) and the external surface (U) of the door, **characterized** in that the adjustment elements (2a) for engaging the body to be pressed between the rear surface of the door handle (1) and the external surface (U) of the door are arranged by distancing the mutually movable body members (2′, 2″) of the body (2) away from each other.

2. A locking device according to claim 1, **characterized** in that the adjustment elements (2a) comprise a screw arrangement.

3. A locking device according to claim 1 or 2, **characterized** in that the coupling arrangement comprises a form locking surface (2b2) included in the body (2) and resting against the vertical frame member (y) of the door (1).

4. A locking device according to claim 3, **characterized** in that the form locking surface (2b2) is adapted to be adjustable with adjustment pieces (2b2') connectable to the body (2) and adapted for attachment to the body's form locking surface (2b2) most conveniently on a quick release coupling principle such as form locking or the like.

5. A locking device according to any of the preceding claims 1-4, **characterized** in that the coupling arrangement comprises a locking rod (2b3), which is propped on a horizontal support surface (x), such as a floor, a door threshold member or the like, and set in a position (a) inclined towards the door.

6. A locking device according to claim 5, **characterized** in that the body (2) and the locking rod (2b3) are coupled to each other in a removable manner with a bayonet, threaded, snap-fit joint and/or the like.

7. A locking device according to claim 5 or 6, **characterized** in that the locking rod (2b3) consists of two or more rod sections displaceable on telescopic principle lengthwise relative to each other.

8. A locking device according to any of the preceding claims 5-7, **characterized** in that the length adjustment of the locking rod (2b3) and its locking to a desired length is provided by means of an adjustment arrangement between its rod sections, such as by means of a conical surface, friction, screw joint and/or the like.

9. A locking device according to any of the preceding claims 1-8, **characterized** in that there is provided a locking arrangement (3) for locking the body (2), which is used for locking two side-by-side door handles (1), in a manner to make it non-rotatable relative to its longitudinal axis.

10. A locking device according to any of the preceding claims 1-9, **characterized** in that it includes a monitoring and/or alarm system (4) implemented most preferably on a cloud server principle.

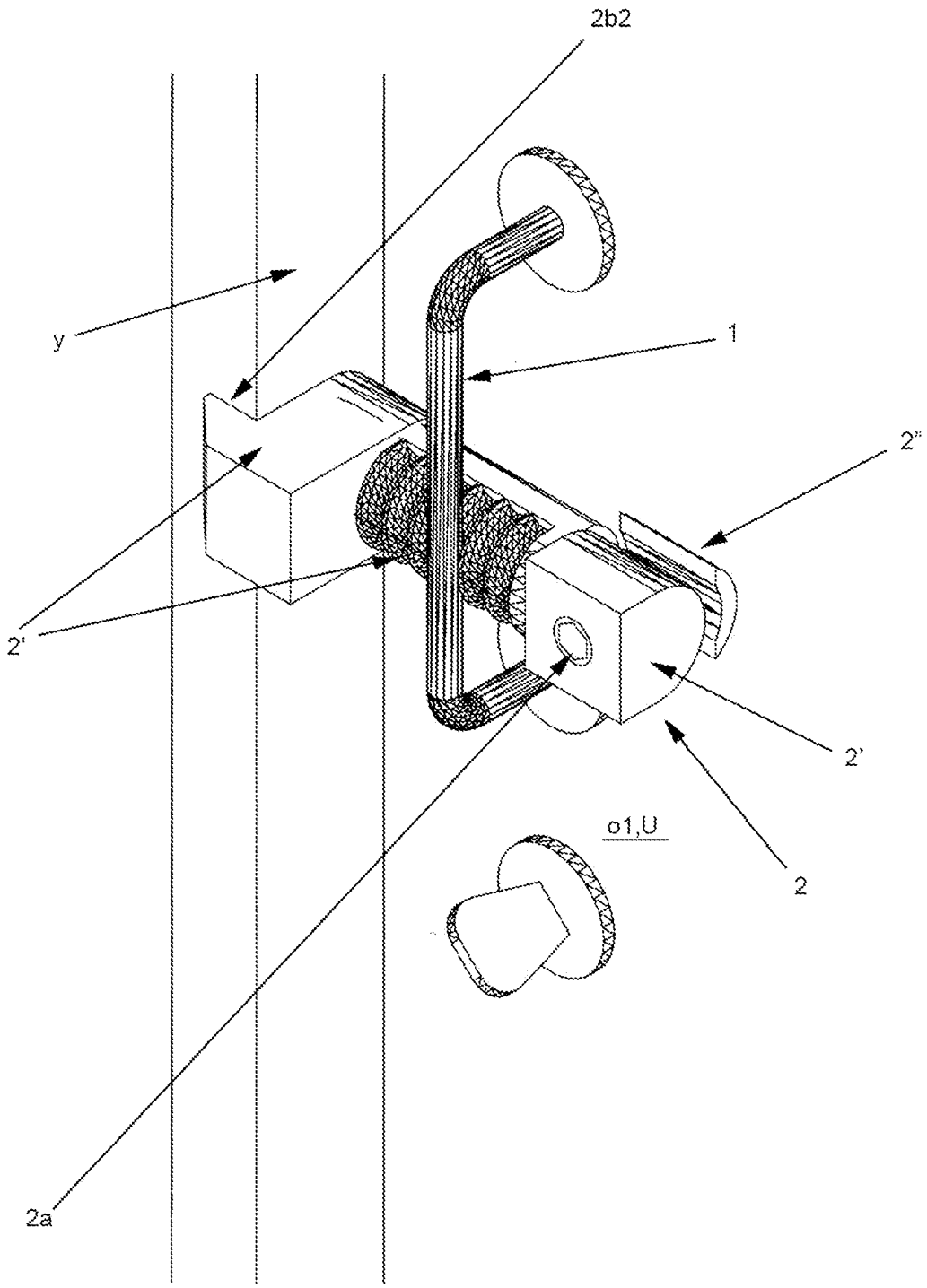

FIG.1

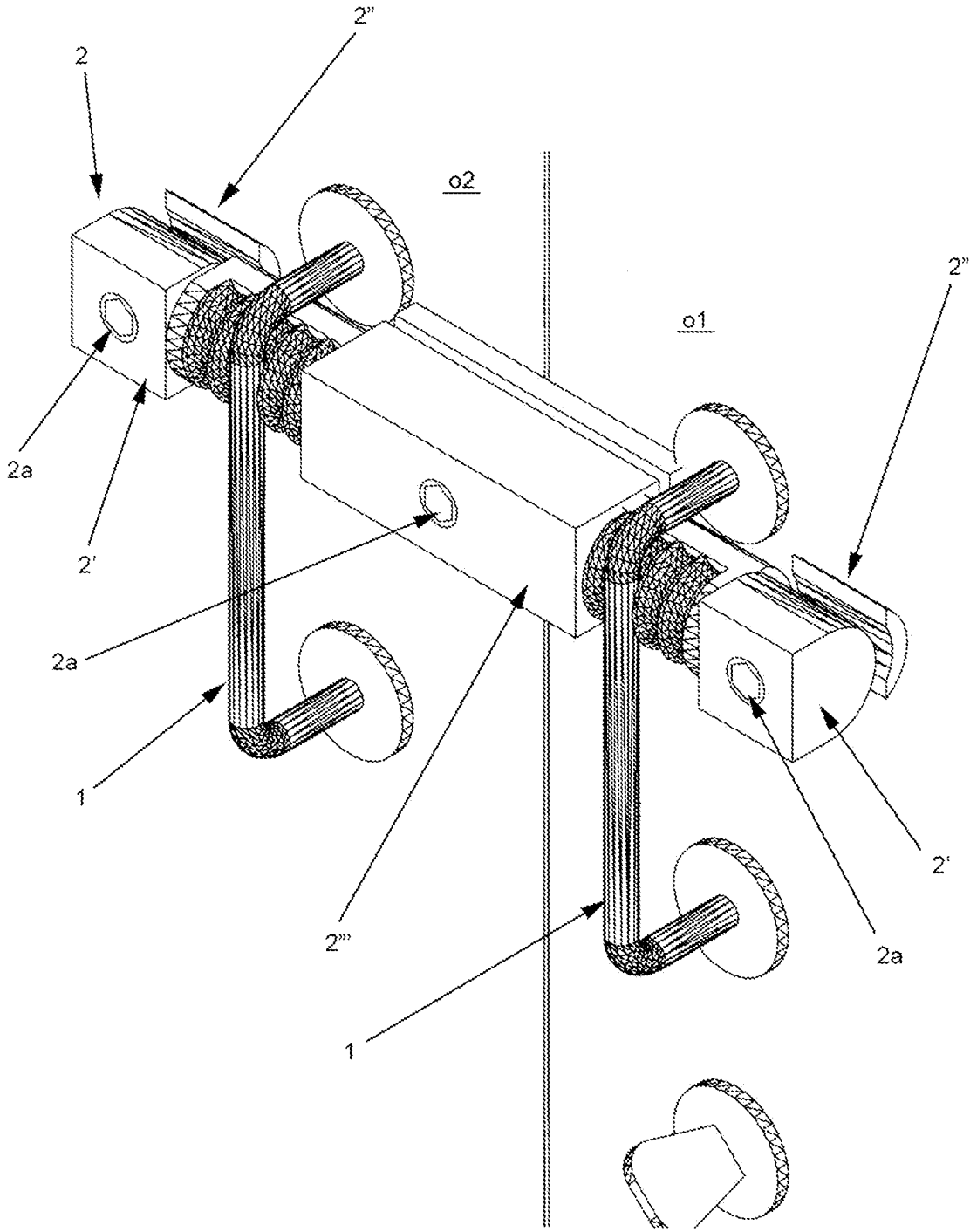

FIG.2

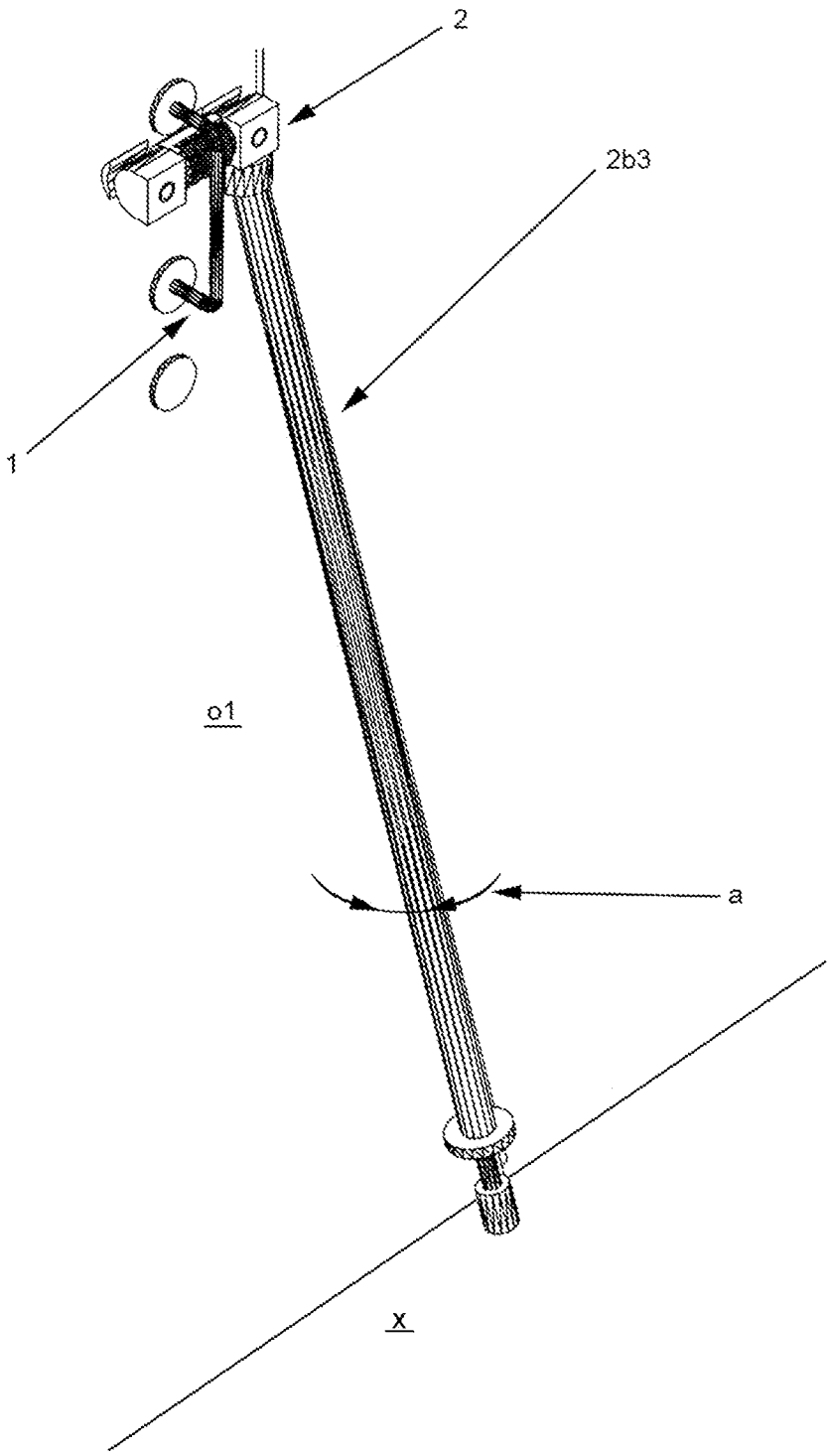

FIG.3

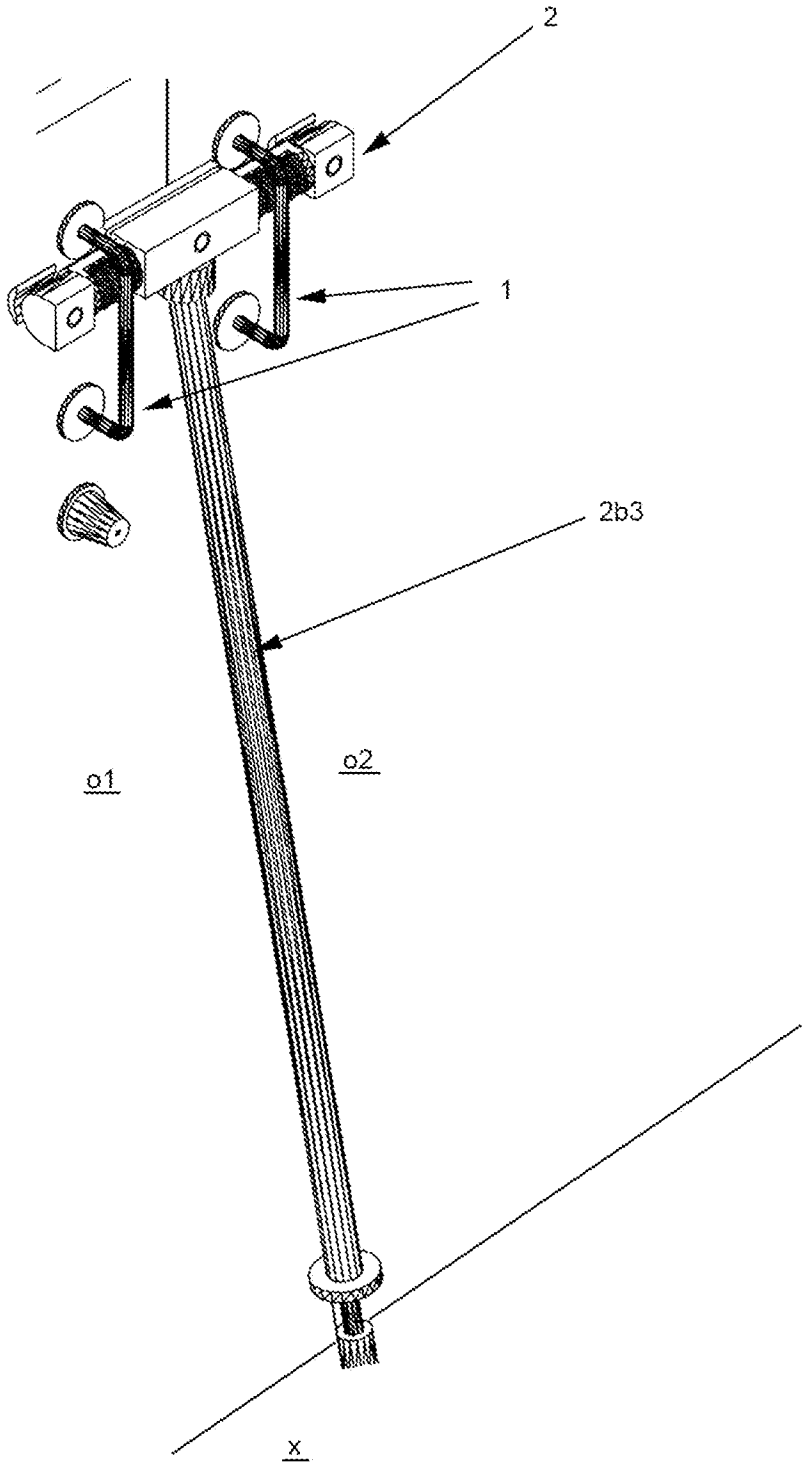

FIG.4

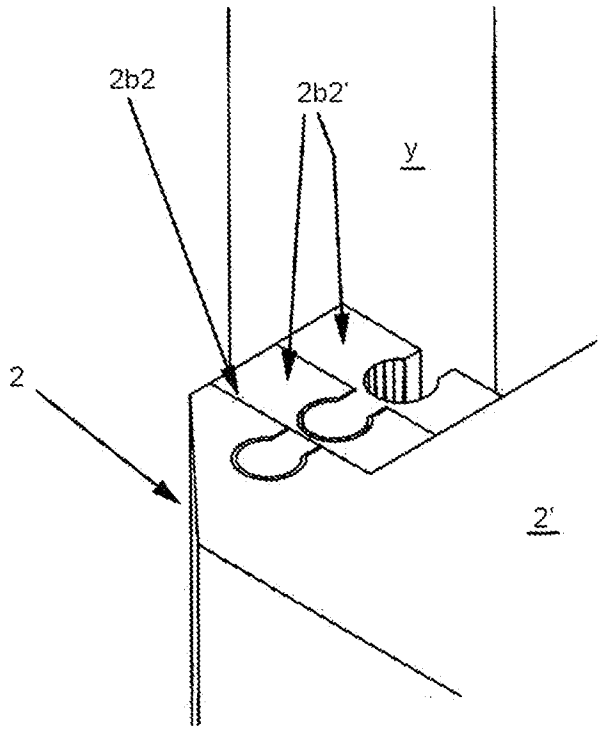

FIG.5

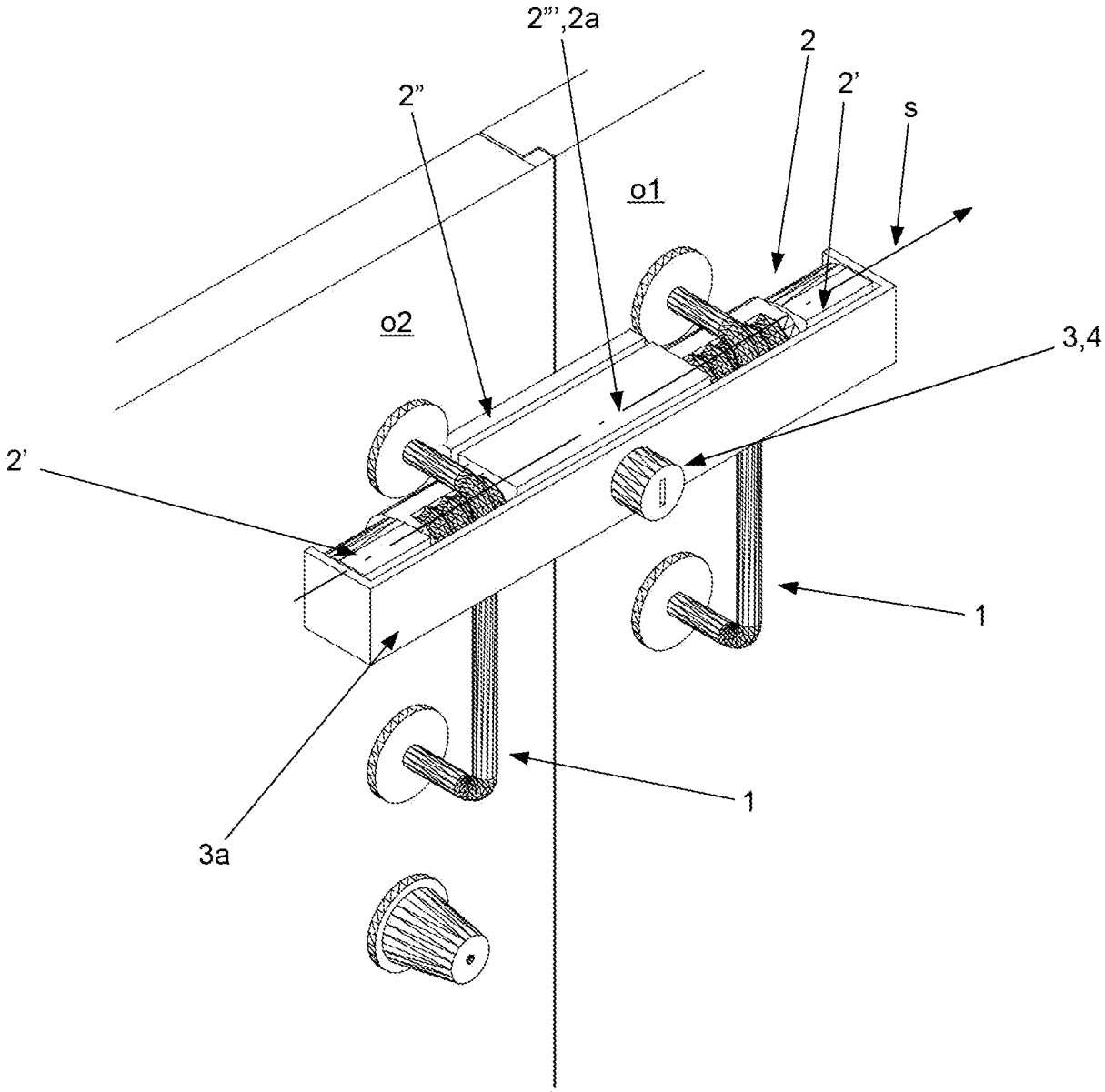

FIG.6

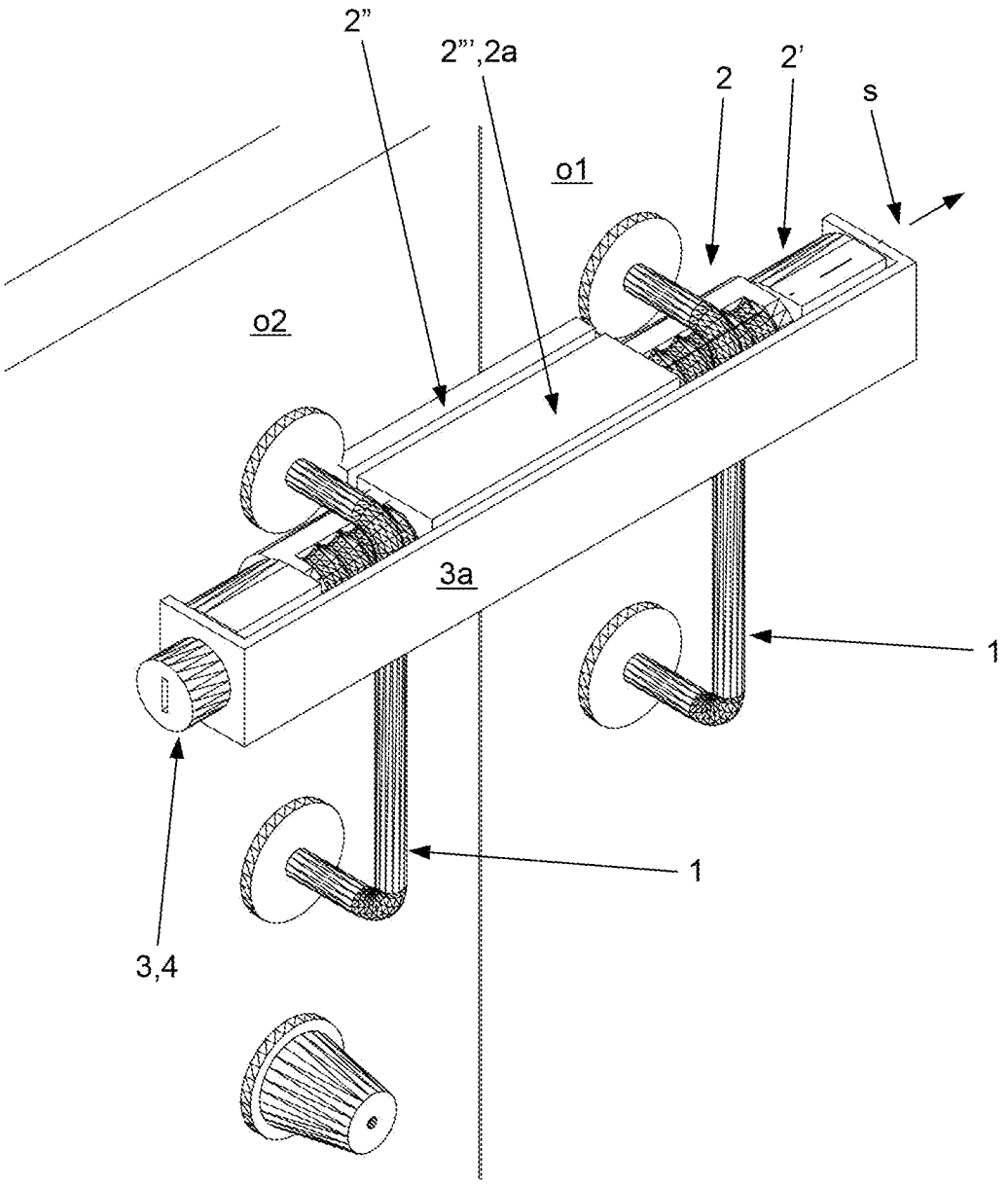

FIG.7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2019/050154

A. **CLASSIFICATION OF SUBJECT MATTER**

See extra sheet

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)

IPC: E05B, E05C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

FI, SE, NO, DK

Electronic data base consulted during the international search (name of data base, and, where practicable, search terms used)

EPODOC, EPO-Internal full-text databases, Full-text translation databases from Asian languages, WPIAP, PRH-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2006272365 A1 (COPUS GARY D [US]) 07 December 2006 (07.12.2006) whole publication	1-10
A	US 2009102205 A1 (CARR RONALD R [US]) 23 April 2009 (23.04.2009) paragraphs [0027]-[0064] and figures 1-14d	1-10
A	GB 2336397 A (SULLMAN RUSSELL [GB]) 20 October 1999 (20.10.1999) abstract; page 3, second paragraph – page 4, first paragraph; claims 1, 3, 4 and 6; figures 3 and 4	1-10
A	GB 2514787 A (HAWKINS MARTIN TREVOR [GB]) 10 December 2014 (10.12.2014) abstract and figures 1-8c	1-10
A	US 5340172 A (SWEET LLOYD [US]) 23 August 1994 (23.08.1994) abstract and figures 1-6	1-10

☐ 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
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"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
17 May 2019 (17.05.2019)	06 June 2019 (06.06.2019)

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INTERNATIONAL SEARCH REPORT
Information on Patent Family Members

International application No.
PCT/FI2019/050154

Patent document cited in search report	Publication date	Patent family members(s)	Publication date
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US 5340172 A	23/08/1994	None	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI2019/050154

CLASSIFICATION OF SUBJECT MATTER

IPC
E05B 17/20 (2006.01)
E05B 63/00 (2006.01)
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E05C 7/00 (2006.01)
E05C 19/00 (2006.01)