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(54) **Winding staircase**

(57) A winding staircase is disclosed, provided with a supporting device for steps comprising a pair of collars (C1, C2, C3) adapted to be fixed on the central support column (P) of the staircase and a connection means (M) that is fixed to both collars (C1, C2, C3) and adapted to support the tread (G) of a step.

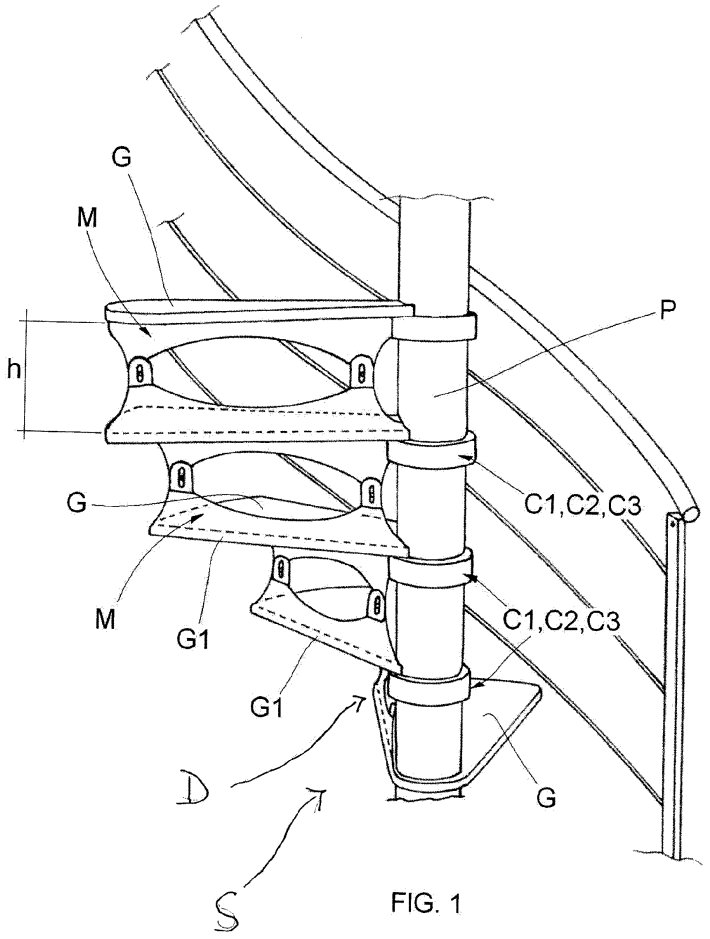

FIG. 1

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Description

[0001] The present patent application for industrial invention relates to a supporting device for the steps of a winding staircase and to a winding staircase comprising at least one of said supporting devices.

[0002] The present invention has been devised in the sector of winding staircases in order to provide a single modular supporting device used to realize a plurality of staircases.

[0003] More precisely, the winding staircase is a type of staircase wherein the circular course develops according to a helicoidal direction around a central vertical axis, normally defined as support column.

[0004] Winding staircases take less space than traditional staircases and their volume corresponds to the volume of a column having a radius approximately equal to the width of the treads of the staircase.

[0005] Normally, when seen in a plan view, treads are tapered towards the center of the staircase and precisely towards said support column where they are anchored, whereas the external side of the treads is normally supported by a railing that defines the course of the staircase and connects the steps.

[0006] During the design of a winding staircase with support column, it is necessary to determine the direction of the series of points where each step must be fixed to the support column. In other words, according to the design and size of the tread of the step, the angle and difference in height between a step and the next one must be determined.

[0007] EP0195666 discloses a spiral staircase with fixed treads. Referring to Fig. 1 of EP0195666, the spiral staircase comprises treads (3) supported by tread mounting brackets (2) fixed to the support column (1) by means of a flexible metal strap (12) tensioned by means of a tie-rod. The tread (2) is fixed to the baluster (4) of the handrail by means of a mounting bracket (29). Fig. 4 illustrates the mounting bracket (29) composed of a collar comprising two parts (31) and (32) that are slidingly coupled at the lower end of the baluster (4). A grub screw (33) with vertical axis passes through the first part (31) and presses the second part, in such way to vertically space the two parts (31, 32) to engage them into slots of the tread (2). Once they are mounted, the treads (2) cannot be adjusted in position. In fact, the mounting bracket (29) is not provided with any system to tighten the two parts to the baluster that can be loosened to make the parts slide and adjust the height of the tread.

[0008] DE1659526 discloses a spiral staircase with height-adjustable treads. Referring to Fig. 1 of document DE1659526, the spiral staircase comprises a tread (1) joined with a sleeve (2) mechanically tightened between two rings (3) by means of nuts (8) screwed onto a threaded support column (4). The above allows for adjusting the height of collars (3). However, such a solution is impaired by several drawbacks. In fact, the support column must be entirely threaded, involving high costs. Moreover, in order to adjust the position of a single tread, all treads above it must be disassembled to access the tightening nut (8).

[0009] The purpose of the present invention is to devise a supporting device for the steps of a winding staircase, which allows for changing the position of each step also after installation.

[0010] A further purpose of the present invention is to devise a supporting device for the steps of a winding staircase, which leaves the support column untouched after the repositioning of the supporting device.

[0011] Finally, a further purpose of the present invention is to devise a new winding staircase provided with a series of devices according to the invention, which is characterized by high versatility.

[0012] The device of the invention comprises a pair of collars adapted to be fixed on the support column of a winding staircase, and a connection means fixed to both collars and adapted to support the tread of a step.

[0013] Each of said collars comprises:

- a first ring adapted to be slidingly inserted on the vertical support column and provided with internal surface;
- a second ring adapted to be slidingly inserted on the vertical support column and provided with internal surface;
- tightening means adapted to make the two rings slide horizontally in two opposite directions, so that opposite sections of the internal surfaces of said two rings act as jaws, allowing the collar to be locked on the support column.

[0014] For explanatory reasons, the description of the device according to the present invention continues with reference to attached drawings, which only have illustrative, not limiting value, wherein:

- Figure 1 is an axonometric view of a winding chair according to invention;
- Figure 2 is an enlarged view of Fig. 1 showing in detail the supporting device of the invention with collars according to a first embodiment;
- Figure 3 is the same as Fig. 2, with collars according to a second embodiment;
- Figure 4 is the same as Fig. 2, with collars according to a third embodiment;
- Figure 5 is an exploded axonometric view of Fig. 2.

[0015] Referring to Fig. 1, the supporting device (D) of the invention for steps of winding staircases (S) comprises a pair of collars (C1,C2,C3) adapted to be fixed on the support column (P) of the staircase (S) and a connection means (M) that is fixed to both collars (C1, C2, C3) and adapted to support the tread (G) of a step.

[0016] Referring to Figs. 2 to 5, according to a first embodiment, each collar (C1) comprises a first (1) and a second ring (2) adapted to be slidingly inserted on the

vertical central column (P). The first ring (1) comprises an internal surface (11) and an external surface (12). The second ring (2) comprises an internal surface (21) and an external surface (22). The supporting device (D) comprises tightening means (3, 4, 5) adapted to make the two rings (1, 2) slide horizontally in two opposite directions. By actuating the tightening means (3) the opposite sections of the internal surfaces (11, 21) of the two rings (1, 2) act as jaws allowing the collar (C1) to be locked on the support column (P).

[0017] Referring to Figs. 2 and 5, said tightening means (3, 4, 5) comprise:

- a bolt (3) provided with enlarged head (31) and threaded stem (32);
- a threaded hole (4) radially obtained on the external surface (12) of the first ring (1), wherein the threaded stem (32) of the bolt (3) is screwed;
- a plate (5) with through hole (51) adapted to receive said threaded stem (32) and an internal surface (52) adapted to abut against the external surface (22) of the second ring (2).

[0018] The mounting of a collar (C1) provides for:

- inserting the two rings (1, 2) on the support column (P);
- positioning both rings (1, 2) in the desired position;
- inserting the threaded stem (32) of the bolt (3) into the hole (51) of the plate (5);
- screwing the threaded stem (32) into the threaded radial hole (4) of the first ring (1) until the internal surface (52) of the plate (5) abuts against the external surface (22) of the second ring (2);
- tightening the bolt (3) until the pair of rings (1, 2) is locked on the support column (P).

[0019] Evidently, the radial thickness of the first ring (1) must be lower than the radial thickness of the second ring (2), so that the first ring (1) is tightened by the threaded stem (32) of the bolt and the second ring (2) is pushed by the plate (5) that is in turn pushed by the head (31) of the bolt.

[0020] In order to provide stable lock, the internal surface (11, 21) of the rings (1, 2), which is adapted to be pressed on the support column (P), can be provided with a series of notches to increase the grip between contact surfaces.

[0021] Referring to Figs. 2 and 5, said connection means (M) between the pair of collars (C1) cooperates with the two bolts (3) of the collars (C1). More precisely, said connection means consists in a vertical bracket (M) that according to a preferred embodiment comprises two plates (5) obtained in one piece - a higher one to lock the higher collar (C1) and a lower one to lock the lower collar (C1).

[0022] The bracket (M) is vertical and the bolts (3) of the two collars (C1) connected by it are situated in aligned position one on top of the other.

[0023] Referring to Fig. 5, said connection means (M) is composed of two identical brackets (6 and 7) connected with means that allow to vary the total height (h) of the connection means (M).

[0024] Said means consist in slots (61, 71) obtained on both brackets (6 , 7), wherein screws are inserted - not shown in the enclosed figures - for mutual locking after choosing the total height (h).

[0025] By adjusting the height (h) it is possible to choose the height of the tread of each step, considered as the distance between the treads (G) of two consecutive steps.

[0026] Said connection means (M) is provided with slots (62, 72) in upper and lower position for insertion of screws for fixing to the pair of treads (G) between which it is interposed. In particular, said slots (62, 72) are obtained on the pair of brackets (6, 7).

[0027] Fig. 1 shows a winding staircase (S) wherein the tread (G) of each step is supported by the aforesaid device.

[0028] As shown in Fig. 1, the connection means (M) acts as tread of the step, being mounted flush with the front edge (G1) of the tread (G) of the step.

[0029] According to this first embodiment, the inconvenience of the collar (C1) consists in the fact that the bolt (3) and thread of the radial hole (4) are subject to non-axial forces.

[0030] Said inconvenience is remedied by realizing the collar according to a second embodiment, shown in Fig. 3, wherein each collar (C2) comprises a spacing element (E) that is put in contact with the first ring (1), between plate (50) and support column (P), so that the bolt (3) is centered between the second ring (2) and the spacing element (E).

[0031] Said spacing element (E) has width (L1) identical to the thickness (L2) of the second ring (2). The internal surface (52) of the plate (50) abuts against said spacing element (E), which remains interposed between the plate (50) and the external surface of the support column (P). So, the plate (50) is disposed with internal surface (52) in perfectly parallel position to the external surface of the support column (P).

[0032] Although in Fig. 3 said spacing element is separate from the plate (50), the same can be obtained in one piece with the latter.

[0033] Referring to Fig. 4, two supporting devices are disclosed according to the invention, wherein the collars (C3) are realized according to a third embodiment, wherein each collar (C3) comprises two first rings (1) interposed between two second rings (2).

[0034] Said solution is suitable when two connection means (M, M') are simultaneously fixed to each collar. The first connection means (M) supports a first tread (G) at the height of the collar (C3), and the second connection means (M') supports a second tread (G') at the height of a higher collar (C3'). In any case, the tread (M') is supported by a pair of collars (C3, C3').

[0035] In this version, the plate (500) of the connection means (M) is adapted to abut against the external surface (23) of two second rings (2) of the collar (C3).

Claims

1. Winding staircase (S) comprising:

- a central support column (P),
- a plurality of support devices (D) connected to said central support column (P),
- a plurality of treads (G), wherein each tread (G) is supported by the respective supporting device (D) for generating the steps of the winding staircase;
- said supporting device (D) comprising a pair of collars (C1, C2, C3) adapted to be fixed on said central support column (P) and a connection means (M) that is fixed to both collars (C1, C2, C3) and adapted to support the tread (G) of a corresponding step;

each collar (C1,C2,C3) comprising:

- a first ring (1) adapted to be slidingly inserted on the central support column (P) and provided with internal surface (11) and external surface (12); and
- a second ring (2) adapted to be slidingly inserted on the central support column (P) and provided with internal surface (21) and external surface (22);

characterized in that
said supporting device (D) comprises tightening means (3, 4, 5) adapted to make the two rings (1, 2) slide horizontally in two opposite directions, so that opposite sections of the internal surfaces (11, 21) of said two rings (1, 2) act as jaws, allowing the collar (C) to be locked on the central support column (P).

2. Winding staircase (S) according to claim 1, wherein said tightening means (3, 4, 5) comprise:

- a bolt (3) with enlarged head (31) and threaded stem (32);
- a threaded radial hole (4) on the external surface (12) of the first ring, where the threaded stem (32) of the bolt (3) is screwed;
- a plate (5; 50; 500) with a trough hole (51) adapted to receive said threaded stem (32) and an internal surface (52) adapted to abut against the external surface (22) of the second ring (2), in order to allow the two rings (1, 2) to slide horizontally in two opposite directions, by screwing of the threaded stem (32) into the threaded radial hole (4) of the first ring and by pressing of the enlarged head (31) of the bolt against the external surface of the plate (5; 50; 500).

3. Winding staircase (S) according to claim 2, wherein said plate (5; 50; 500) is fixed to said connection means (M).

4. Winding staircase (S) according to claim 2 or 3, wherein said connection means (M) comprises at least a vertical bracket comprising, in one piece, two plates (5, 50, 500) to lock two collars (C1, C2, C3) to be connected by said connection means (M).

5. Winding staircase (S) according to claim 4, wherein said connection means (M) comprises two brackets (6, 7) connected by adjusting means (61, 71) that allow for adjusting the total height (h) of the connection means (M).

6. Winding staircase (S) according to claim 5, wherein said adjusting means (61, 71) that allow for adjusting the total height (h) consist in slots (61, 71) obtained on both brackets (6, 7), where screws are inserted for mutual locking of the brackets (6, 7).

7. Winding staircase (S) according to any one of the preceding claims, wherein said connection means (M) is provided with slots (62, 72) in upper and lower position for insertion of screws to fix the pair of treads (G) between which said connection means (M) is interposed.

8. Winding staircase (S) according to anyone of the claims 2 to 7, wherein each collar (C2) comprises a spacing element (E) disposes in contact with the first ring (1) and with width (L1) identical to the thickness (L2) of the second ring (2); wherein the internal side (52) of the plate (50) abuts against said spacing element (E), and the spacing element (E) remains interposed between the plate (50) and the external surface of the central support column (P).

9. Winding staircase (S) according to anyone of the claims 2 to 7, wherein each collar (C3) comprises two first rings (1) disposed near each other and interposed between two second rings (2), so that the internal surface of the pate (500) abuts against the external surface (23) of said two second rings (2).

10. Winding staircase (S) according to claim 9, wherein two connection means (M, M') are fixed to each collar (C3), said two connection means (M, M') supporting two treads (G, G') at different heights.

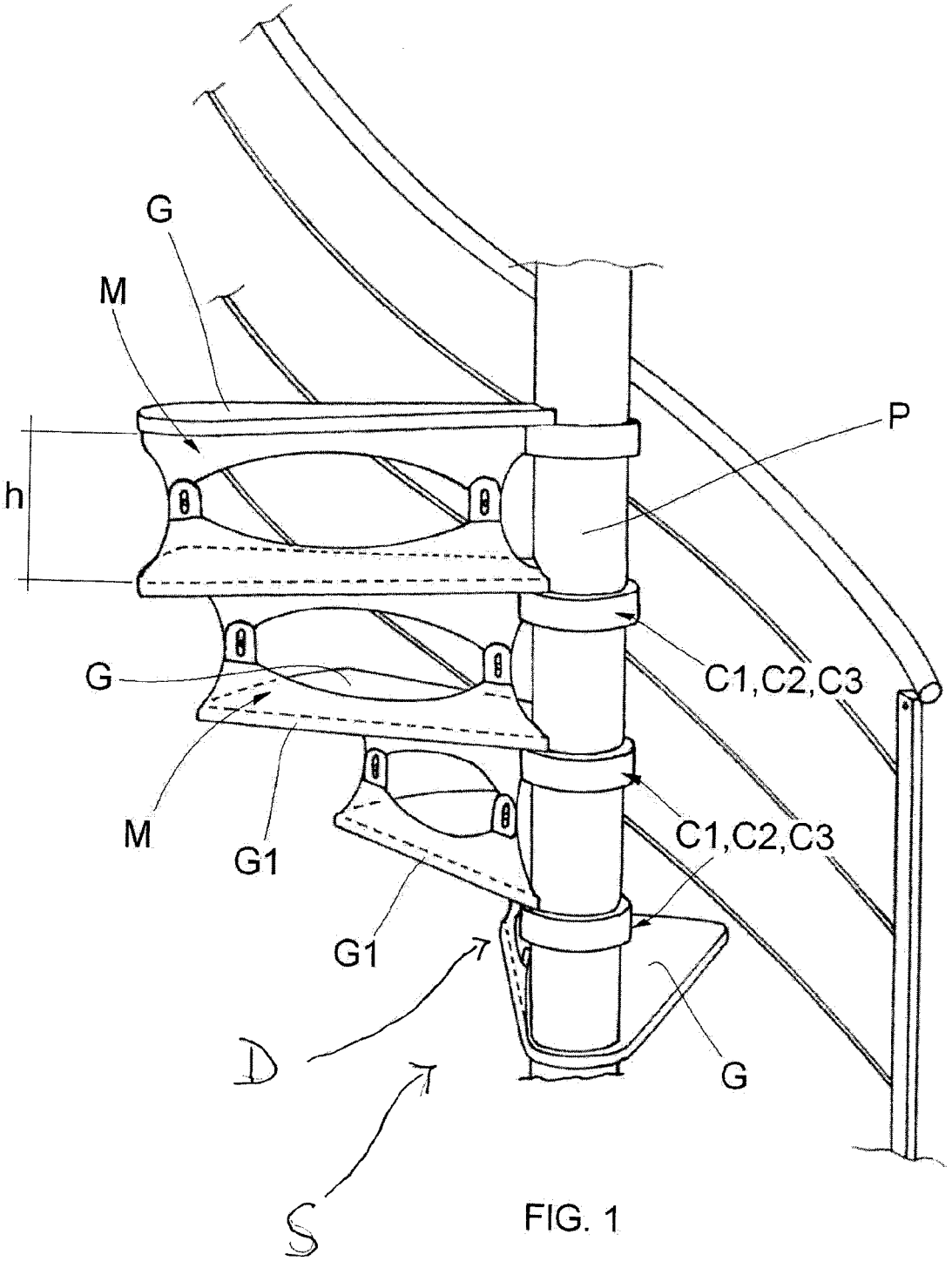

FIG. 1

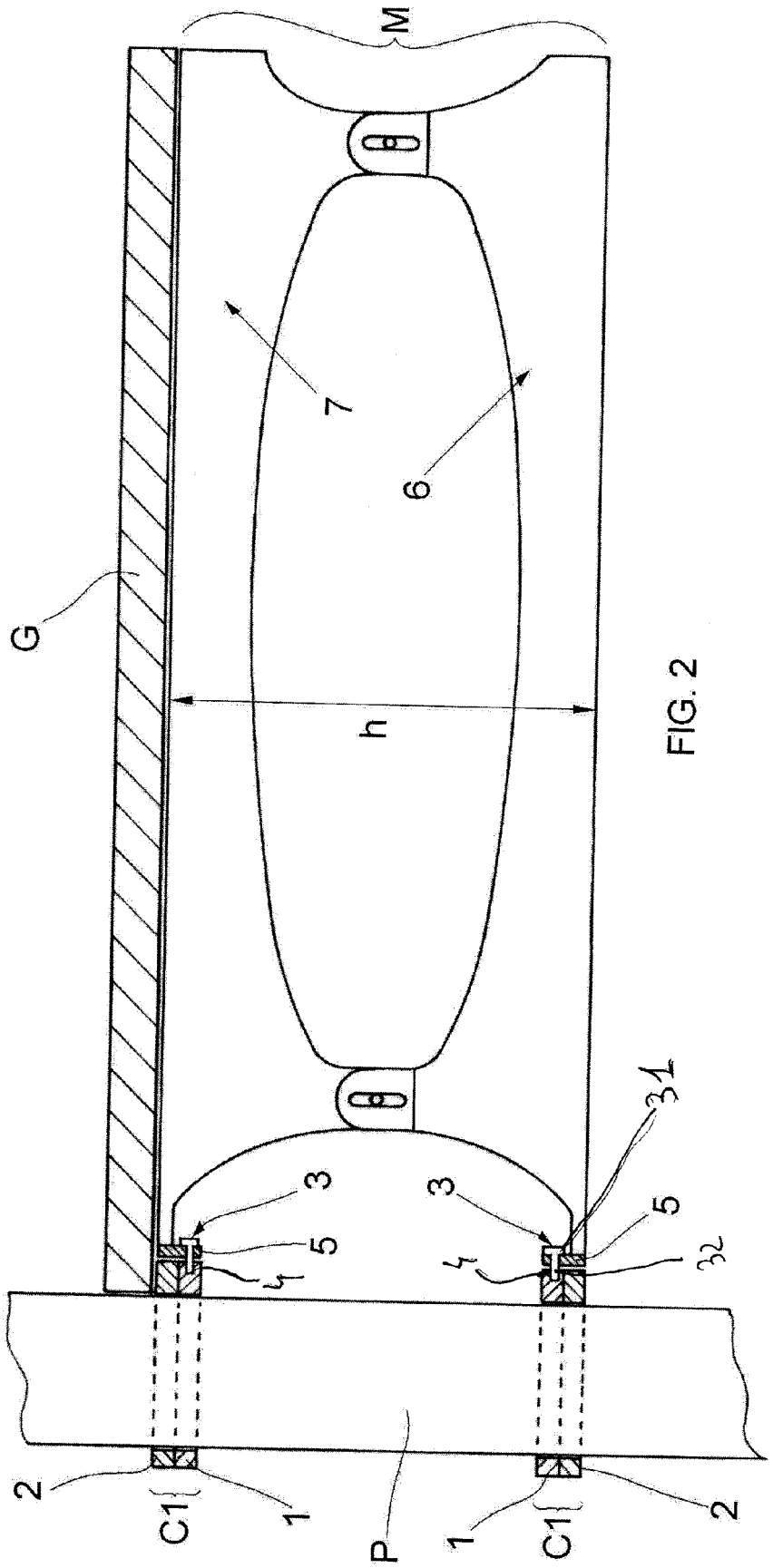

FIG. 2

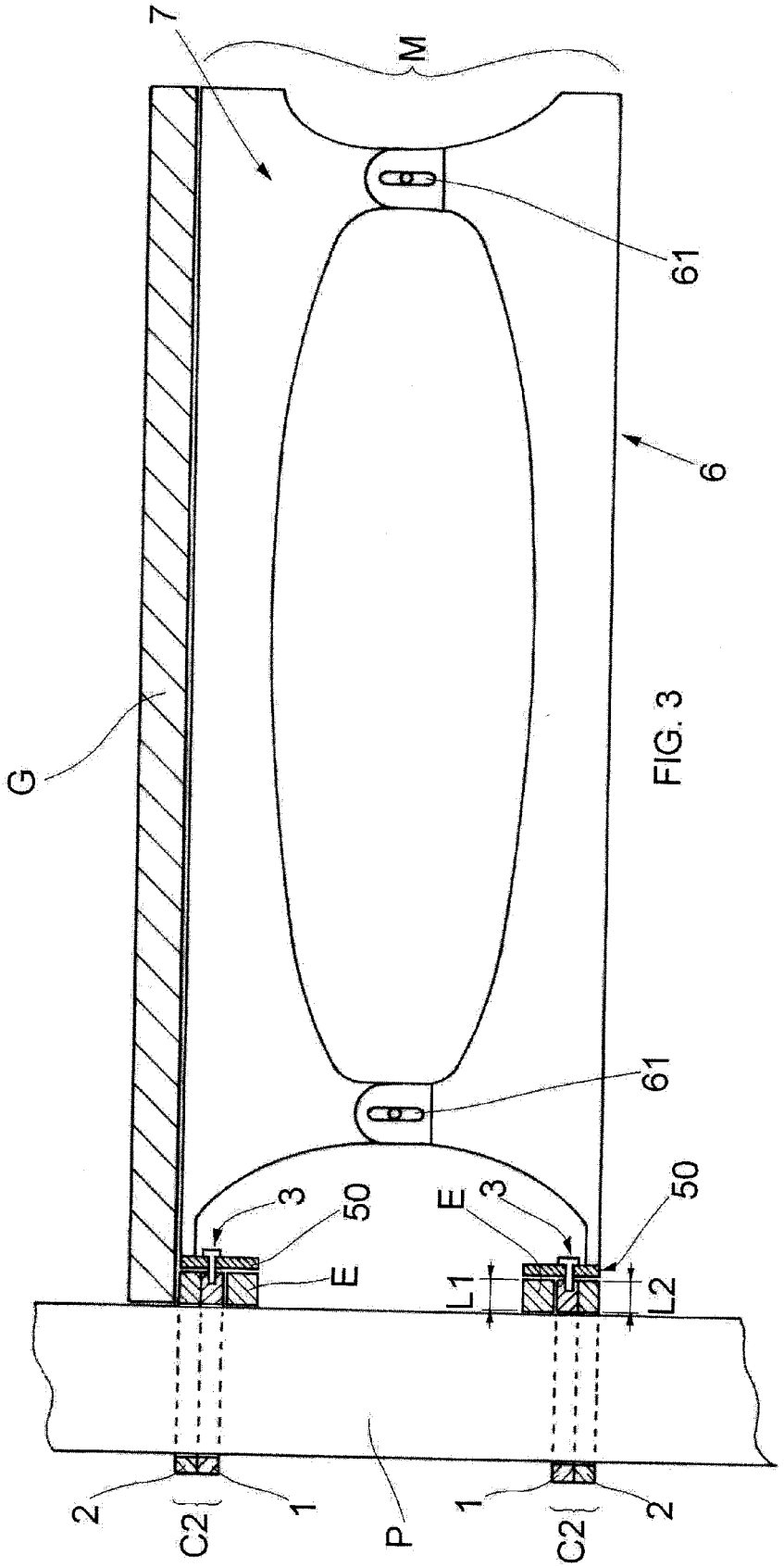

FIG. 3

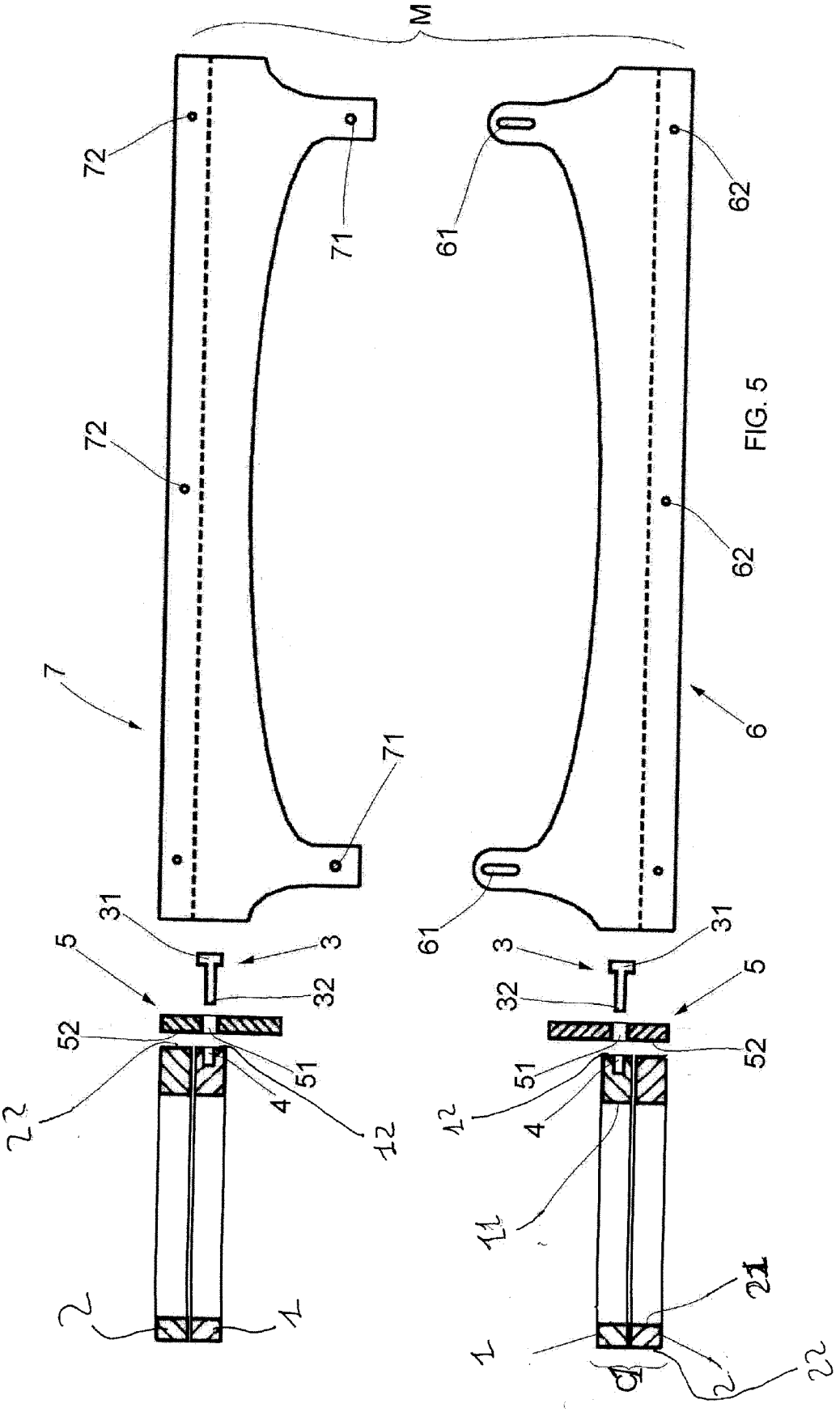
M
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FIG. 5

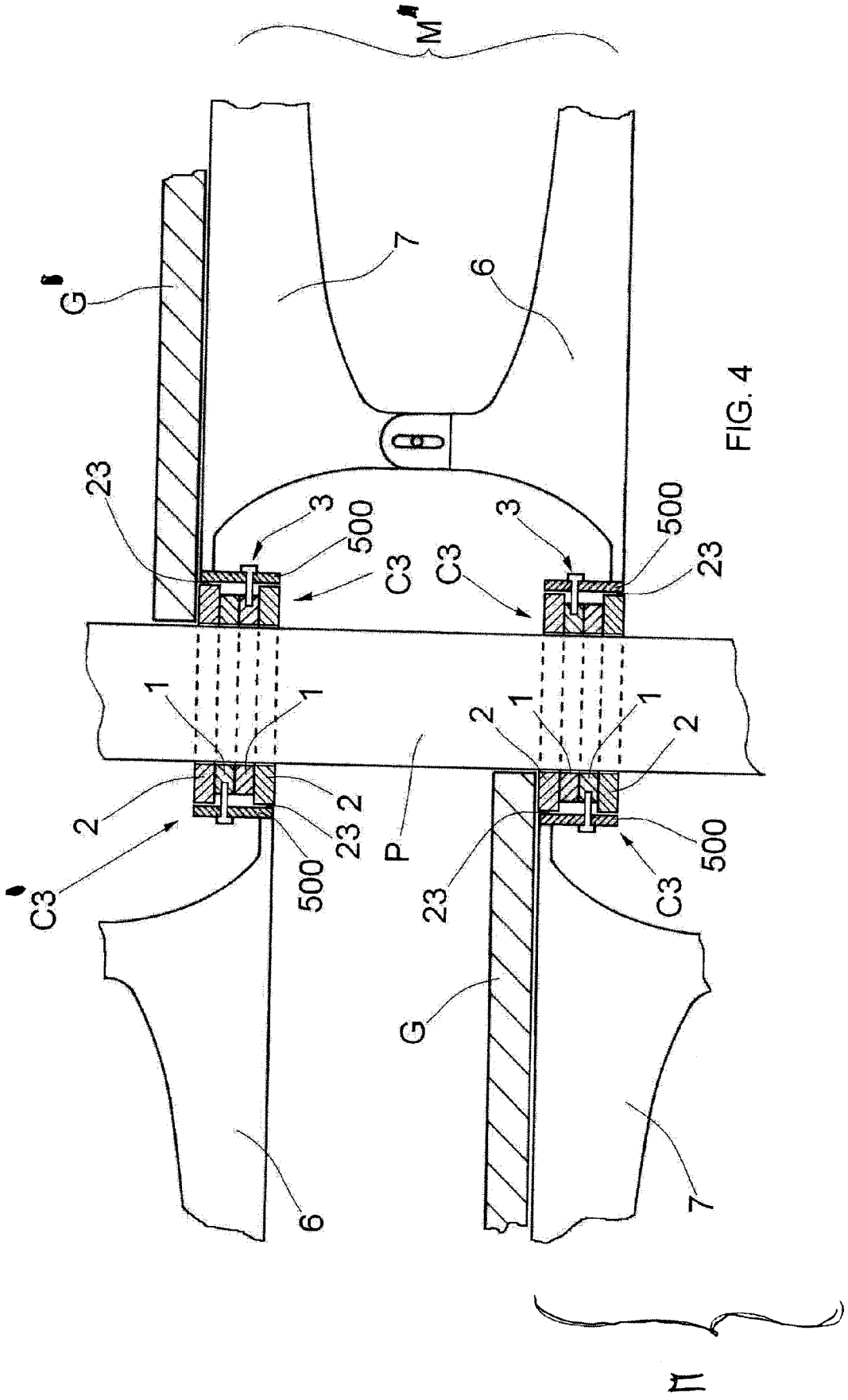

FIG. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 1180

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 1 726 133 A (WILSON ALBERT O) 27 August 1929 (1929-08-27) * figures 1, 7, 8 * -----	1-10	INV. E04F11/032
A	GB 2 020 713 A (SENZO TAKENAGA) 21 November 1979 (1979-11-21) * figures 2, 3, 4b * -----	1-10	
A	BE 762 308 A1 (SIBENALER NICOLAS G) 1 July 1971 (1971-07-01) * figure 4 * -----	1-10	
			TECHNICAL FIELDS SEARCHED (IPC) E04F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	9 August 2012	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

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09-08-2012

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

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- DE 1659526 **[0008]**