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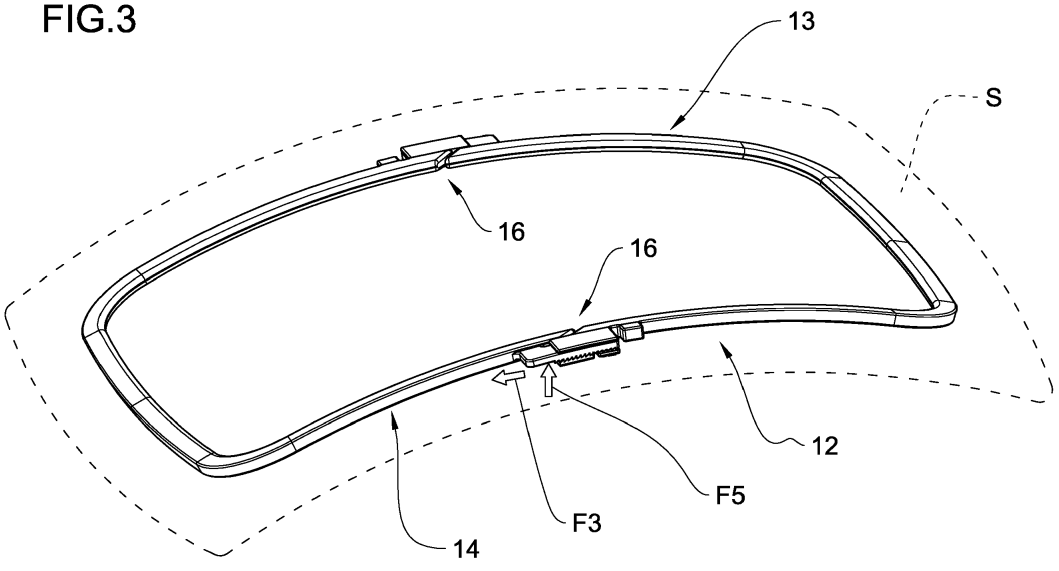
(54) WASHING AND/OR DRYING MACHINE

(57) The present invention is related to a washing and/or drying machine, comprising: a housing (C) having an access opening (5); a rotating drum (2); a tub (T) having a tub opening (8) and enclosing the rotating drum (2); a sleeve (11) disposed between the access opening (5) of the housing (C) and the tub opening (8) of the tub (T); at least one clamping framework (12) surrounding at least one end of the sleeve (11) to fasten the sleeve (11) to the housing (C) and/or to the tub (T). The clamping framework (12) comprises a first, preferably U-shaped, frame (13) and a second, preferably U-shaped, frame (14) and at least one connecting device (16) configured to releasably connect the first frame (13) to the second frame (14). The connecting device (16) comprises a first part (15) provided with a first toothed profile (21) engaging a second part (17) provided with a second toothed profile (29). The teeth of said first and second toothed profiles (21, 29 project substantially perpendicular to a surface (S) on which the clamping framework (12) lies.

FIG.3



EP 3 333 302 A1

Description

Field of the art

[0001] The present invention relates to a washing and/or drying machine comprising a housing having an access opening closed by a door, a wash tub having an opening and enclosing a rotating drum, a sleeve disposed between the access opening of the housing and the opening built into the wash tub. Preferably, the present invention relates to a top-loading washing and/or drying machine comprising a housing having a top access opening, a tub mounted in the cabinet with a top opening, a perforated drum rotatably mounted within said tub about a horizontal axis and having an aperture on its cylindrical side. In particular, the present invention refers to the clamp or clamps configured to fasten the sleeve to the housing and/or to the wash tub.

State of the art

[0002] It is known that washing and/or drying machines include a support cabinet, on which a washing tub is mounted, inside which rotates a drum, wherein the garments to be washed are placed. The tub has an opening through which the access to the drum is possible and clothes can be placed inside the drum. An opening closed by a door is also present on the cabinet or housing.
Public document EP1793029 discloses a machine for washing and/or drying clothes of top loading horizontal axis type, comprising a housing with an access opening closed by a door, a tub that has an opening and surrounds a rotary drum, and a sleeve between the access opening and the tub opening, comprises a sleeve with a fastener, one side of which is inserted into a U-shaped part of the sleeve that fits into a groove in the tub. The sleeve is usually made of flexible rubber or the like, it is subject to aging and deterioration and sometimes it should be replaced. The fastener allows to mount and dismantle said sleeve.

Object of the invention

[0003] The Applicant observed that known fasteners suffer from some drawbacks related to their assembly and disassembly.
In fact, the Applicant verified that the known means for fixing the fasteners (like the lugs and bosses of EP1793029) does not grant a safe attachment and are not easy to handle during mounting and dismantling of the sleeve.
It is therefore a main object of the present invention to overcome the above-mentioned drawbacks by providing a fastener in the form of a clamping framework surrounding at least one end of the sleeve which is easy to assemble and disassemble.
Another object of the present invention is to provide a clamping framework which allows the sleeve to be mounted and dismantled quickly and easily.
Another object of the present invention is to provide a clamping framework which allows the sleeve to be mounted safely into the washing and/or drying machine and assure the correct and steady position of said sleeve during operation of the machine.

Summary of the invention

[0004] The Applicant has found that such objectives can be obtained by providing a clamping framework comprising two frames which are releasably connected one to the other through a toothed connecting device, wherein said connecting device can be unlocked by exerting a force on the first frame and/or the second frame along a direction substantially perpendicular to a surface on which the clamping framework lies.

[0005] More specifically, according to one aspect, the present invention relates to a washing and/or drying machine, comprising: a housing having an access opening preferably closed by a door; a rotating drum; a tub having a tub opening and enclosing the rotating drum; a sleeve disposed between the access opening of the housing and the tub opening of the tub; at least one clamping framework surrounding at least one end of the sleeve to fasten said sleeve to the housing and/or to the tub; said at least one clamping framework comprising a first, preferably U-shaped, frame and a second, preferably U-shaped, frame and at least one connecting device configured to releasably connect the first frame to the second frame, the connecting device comprising a first part provided with a first toothed profile engaging a second part provided with a second toothed profile; wherein the teeth of said first and second toothed profiles project substantially perpendicular to a surface on which the clamping framework lies.

[0006] According to another aspect, the present invention relates to a clamping framework for sleeves of washing and/or drying machines, comprising: a first, preferably U-shaped, frame and a second, preferably U-shaped, frame and at least one connecting device configured to releasably connect the first frame to the second frame, the connecting device comprising a first part provided with a first toothed profile engaging a second part provided with a second toothed profile; wherein the teeth of said first and second toothed profiles project substantially perpendicular to a surface on which the clamping framework lies.

[0007] The Applicant verified that the position of the toothed profiles allows to move away the first toothed profile from the second toothed profile in order to disengage/unlock the connecting device in easy and rapid way. Therefore, the invention allows to disconnect the first frame from the second frame and to remove the clamping framework quickly and easily.

[0008] The present invention, in at least one of the aforesaid aspects, can have one or more of the preferred characteristics that are described hereinbelow.

[0009] In one aspect, the first part comprises an elongated element provided with the first toothed profile and delimiting, together with an end of the first frame or of the second frame, a slot.

[0010] In one aspect, the first toothed profile lies on a face of the elongated element substantially parallel to the surface on which the clamping framework lies.

[0011] In one aspect, the second part presents a seat placed at an end of the second frame or of the first frame and configured to accommodate the elongated element. In one aspect, the second toothed profile is placed inside said seat and lies substantially parallel to the surface on which the clamping framework lies.

[0012] In one aspect, the seat presents a front opening to allow insertion of the elongated element into said seat and engagement of the first toothed profile with the second toothed profile.

[0013] In one aspect, the second part comprises a C-shaped body provided with a first tab, a second tab and a connecting portion delimiting said seat.

[0014] In one aspect, said seat opens laterally towards the outside of the clamping framework.

[0015] In one aspect, the connecting portion is configured to be inserted into the slot to engage the first and second toothed profiles.

[0016] In one aspect, the first tab presents an inner surface comprising the second toothed profile facing the first toothed profile of the elongated element.

[0017] In one aspect, the second tab presents an inner substantially smooth surface configured to come into contact with a surface of the elongated element opposite the first toothed profile.

[0018] In one aspect, the first tab and/or the second tab are flexible so to allow disengagement of the first toothed profile from the second toothed profile by exerting a force on the first part and/or the second part along a direction substantially perpendicular to the surface on which the clamping framework lies. The term "flexible" means that the first tab and/or the second tab may be deformed during assembling and disassembling of the connecting device when subjected to the forces needed to engage/disengage the toothed profiles. When the first tab and/or the second tab are not subject to said forces, they are able to recover their un-deformed configurations.

[0019] In one aspect, the first toothed profile extends only in part on the respective surface of the elongated element. In one aspect, the second toothed profile extends only in part on the respective surface of the first tab. In one aspect, the second toothed profile is shorter than the inner surface. These features allow an easy engagement and disengagement of the toothed profiles.

[0020] In one aspect, the second part comprises a protrusion placed on the opposite side of the C-shaped body with respect to the front opening.

[0021] In one aspect, a rear portion of the elongated element and said protrusion are configured to be clamped by an assembly tool to insert the elongated element in the seat through the front opening when mounting the clamping framework.

[0022] In one aspect, the teeth of the first toothed profile are placed one after the other along a first direction.

[0023] In one aspect, the teeth of the second toothed profile are placed one after the other along a second direction.

[0024] In one aspect, engagement of the first toothed profile with the second toothed profile is performed by aligning the first and second directions and making the first toothed profile and the second toothed profile slide one over the other along said first and second common directions.

[0025] In one aspect, the first U-shaped frame and the second U-shaped frame are identical and each comprises one first part placed on a first end and one second part placed on a second end.

[0026] In one aspect the clamping framework is made of plastic material. In one aspect, each of the first and second frames is made of plastic, preferably molded in one piece.

Brief description of the drawings

[0027] Further objects, features and advantages of the present invention will become apparent from the following detailed description and from the annexed drawings, which are supplied by way of non-limiting example, wherein:

Fig. 1 is a schematic view of a horizontal drum washing machine;
Fig. 2 is a tridimensional view of a portion of the horizontal drum washing machine of figure 1;
Fig. 3 is a clamping framework of the portion of figure 2 in a first configuration;
Fig. 3A is an enlarged view of a part of the clamping framework of figure 3;
Fig. 4 is the clamping framework of figure 3 in a second configuration;
Fig. 4A is an enlarged view of a part of the clamping framework of figure 4;
Fig. 5 is another view of an element of the clamping framework of figures 3 and 4.

Detailed description of the preferred embodiments of the invention

[0028] Referring now to the annexed drawings, in Fig. 1 reference numeral 1 designates a top loading horizontal drum washing machine.

[0029] A perforated rotating drum 2 of the machine 1 comprises a stainless steel cylindrical wrapper provided with a rectangular drum aperture 3 provided doors 4. The drum 2 is rotating within a plastic tub T mounted, with the interposition of known dampers, within a housing or cabinet C. Such cabinet C is provided with a lid L for closing an access opening 5 towards the drum 2.

[0030] The tub T is fixed to the cabinet C and the drum 2 is mounted within said cabinet C and within the tub T to rotate about a horizontal axis X-X by means of a motor 6 mounted in the cabinet C and connected to the drum 2 through a pulley 7.

[0031] The tub T has a tub opening 8 facing the access opening 5. The access opening 5 in the housing C is delimited by a first wall 9 protruding downwards in the cabinet towards the tub T. The tub opening 8 is delimited by a second wall 10 protruding upwards towards the access opening 5.

[0032] A bellow sleeve 11 is connected to the first wall 9 and to the second wall 10 to delimit a tubular conduit extending between the access opening 5 and the tub opening 8. A first end of the bellow sleeve 11 surrounds the first wall 9 and a second end of the bellow sleeve 11 surrounds the second wall 10.

[0033] A clamping framework 12 surrounds the first end of the bellow sleeve 11 to hold said first end onto the first wall 9. A further clamping framework 12 surrounds the second end of the bellow sleeve 11 to hold said second end onto the second wall 10. The ends of the bellow sleeve 11 and the respective clamping framework 12 may be positioned in a respective groove, not shown, made in the first wall 9 and/or in the second wall 10.

[0034] The two clamping frameworks 12 have the same structure shown in figures 3, 3A, 4 and 4A and detailed in the following passages. In the annexed figures, the access opening 5, the tub opening 8 and the clamping framework 12 present a substantially rectangular shape but other shapes may be adopted.

[0035] The clamping framework 12 is preferably made of plastic and comprises a first U shaped frame 13 and a second U shaped frame 14. Each U shaped frame is a sort of rod shaped element profiled like a U.

[0036] One end of the first U shaped frame 13 comprises a first part 15 of a connecting device 16. The other end of the first U shaped frame 13 comprises a second part 17 of another connecting device 16. One end of the second U shaped frame 14 comprises a first part 15 of the connecting device 16. The other end of the second U shaped frame 14 comprises the second part 17 of the other connecting device 16. The first part 15 of the first U shaped frame 13 is configured to be releasably connected to the second part 17 of the second U shaped frame 14 and the first part 15 of the second U shaped frame 14 is configured to be releasably connected to the second part 17 of the first U shaped frame 13 as shown in figures 3 and 4. The assembly comprising a first part 15 and a second part 17 is a single connecting device 16 and will be detailed in the following passages.

[0037] The first part 15 comprises an elongated element 18 attached, like an appendix, to a side of an end 19 of the frame 13, 14 and running parallel to said end 19. Said elongated element 18 and said end 19 delimit between them a slot 20. The elongated element 18 protrudes beyond said end 19 and presents a first and a second opposite faces lying substantially parallel to a surface onto which the clamping framework 12 lies. Referring to figures 3A, 4A and 5, the upper face is flat and the lower face is provided with a first toothed profile 21. The first toothed profile 21 comprises a plurality of teeth placed in succession one after the other along a first direction Y. Each tooth presents a crest extending substantially perpendicular to the longitudinal extension of the elongated element 18. The end 19 is tapered and beveled.

[0038] The second part 17 comprises a C-shaped body provided with a first tab 22, a second tab 23 and a portion 24 connecting the first tab 22 to the second tab 23. The connecting portion 23 is attached to an end 25 of the other frame 14, 13. The first tab 22, the second tab 23 and the connecting portion 24 delimit a seat 26 which opens laterally towards the outside of the clamping framework 12. Said seat 26 further presents a front opening 27 and a rear opening 28. The end 25 of the other frame 14, 13 is beveled to mate with the end 19 of the frame 13, 14. Referring to figures 3A and 4A, the first lower tab 22 presents an inner surface comprising a second toothed profile 29 facing upwards. The second toothed profile 29 is shorter than the first toothed profile 21 and comprises a plurality of teeth placed in succession one after the other and a second direction Z. Each tooth presents a crest extending substantially perpendicular to the longitudinal extension of the seat 26. The second upper tab 23 further presents an inner substantially smooth surface 30.

[0039] The first tab 22 and/or the second tab 23 are flexible by exerting a force along a direction substantially perpendicular to the surface on which the clamping framework 12 lies.

[0040] A protrusion 31 is placed on the frame 14, 13 close to the C-shaped body. Such protrusion 31 is spaced from the rear opening 28 and faces said rear opening 28. Further, the elongated element 18 presents a rear portion 32 configured to be claimed by an assembly tool together with the protrusion 31 as detailed in the following passages.

[0041] The teeth of said first and second toothed profiles 21, 29 project substantially perpendicular to a surface S on which the clamping framework 12 lies (see figure 3).

[0042] As shown in figures 4, 4A, the first and second U shaped frames 13, 14 are assembled by inserting each elongated element 18 in the respective seat 26 through the front opening 27 of the C-shaped body along the common first and second direction Y, Z (arrows F1, F2). Simultaneously, the connecting portion 24 enters the slot 20.

[0043] This movement may be performed manually or by means of a clamping tool, like a wrench, which grasps and brings the first part 15 towards the second part 17. The clamping tool acts on the rear portion 32 and the protrusion 31.

[0044] The first toothed profile 21 faces the second toothed profile 29 and slides on said second toothed pro-

file 29 thanks to the flexibility of the tabs 22, 23, until the bevels of the ends 19, 25 come into mutual contact. The inner substantially smooth surface 30 of the second tab 23 slides freely on the upper surface of the elongated element 18.

[0045] In this position, the teeth of the first toothed profile 21 are engaged with the teeth of the second toothed profile 29 (Figure 3A) and the relative movement along arrow F3 is prevented. Also the relative movement along arrow F4 is prevented by the connecting portion 24 placed in the slot 20 (Figure 3A).

[0046] If the clamping framework 12 is to be disassembled, a force on the elongated element 18 along arrow F5 is exerted while the C-shaped body is held in place. The first tab 22 bends/deforms allowing the teeth of the first toothed profile 21 to disengage from the teeth of the second toothed profile 29. Then the elongated element 18 may be extracted along arrow F3 from the C-shaped body.

[0047] Please note that F5 is the direction perpendicular to the surface on which the clamping framework 12 lies.

[0048] The clamping framework described herein by way of example may be subject to many possible variations without departing from the novelty spirit of the inventive idea. For instance shape of the framework may be circular or elliptic.

[0049] It is also clear that in the practical implementation of the invention the illustrated details may have different shapes or be replaced with other technically equivalent elements.

[0050] It can therefore be easily understood that the present invention is not limited to the above-described clamping framework but may be subject to many modifications, improvements or replacements of equivalent parts and elements without departing from the inventive idea, as clearly specified in the following claims.

Claims

1. A washing and/or drying machine, comprising:

a housing (C) having an access opening (5);
a rotating drum (2);
a tub (T) having a tub opening (8) and enclosing the rotating drum (2);
a sleeve (11) disposed between the access opening (5) of the housing (C) and the tub opening (8) of the tub (T);
at least one clamping framework (12) surrounding at least one end of the sleeve (11) to fasten said sleeve (11) to the housing (C) and/or to the tub (T);
said at least one clamping framework (12) comprising a first, preferably U-shaped, frame (13) and a second, preferably U-shaped, frame (14) and at least one connecting device (16) configured to releasably connect the first frame (13) to the second frame (14), the connecting device (16) comprising a first part (15) provided with a first toothed profile (21) engaging a second part (17) provided with a second toothed profile (29);
wherein the teeth of said first and second toothed profiles (21, 29) project substantially perpendicular to a surface (S) on which the clamping framework (12) lies.

2. The machine of claim 1, wherein the first part (15) comprises an elongated element (18) provided with the first toothed profile (21) and delimiting, together with an end (19) of the first frame (13) or of the second frame (4), a slot (20); wherein the first toothed profile (21) lies on a face of the elongated element (18) substantially parallel to the surface (S) on which the clamping framework (12) lies.

3. The machine of claim 2, wherein the second part (17) presents a seat (26) placed at an end (25) of the second frame (14) or of the first frame (13) and configured to accommodate the elongated element (18).

4. The machine of claim 3, wherein the second toothed profile (29) is placed inside said seat (26) and lies substantially parallel to the surface (S) on which the clamping framework (12) lies.

5. The machine of claim 3 or 4, wherein the seat (26) presents a front opening (27) to allow insertion of the elongated element (18) into said seat (26) and engagement of the first toothed profile (21) with the second toothed profile (29).

6. The machine of claim 3, 4 or 5, wherein the second part (17) comprises a C-shaped body provided with a first tab (22), a second tab (23) and a connecting portion (24) delimiting said seat (26).

7. The machine of claim 6, wherein said seat (26) opens laterally towards the outside of the clamping framework (12).

8. The machine of claim 6 or 7, wherein the connecting portion (24) is configured to be inserted into the slot (20) to engage the first and second toothed profiles (21, 29).

9. The machine of claim 6, 7 or 8, wherein, when the connecting device (16) is assembled, the first tab (22) presents an inner surface comprising the second toothed profile (29) facing the first toothed profile (21) of the elongated element (18); wherein the second tab (23) presents an inner substantially smooth surface (30) configured to come into contact with a

surface of the elongated element (18) opposite the first toothed profile (21).

10. The machine any of claims 6 to 9, wherein the first tab (22) and/or the second tab (23) are flexible so to allow disengagement of the first toothed profile (21) from the second toothed profile (29) by exerting a force on the first part (15) and/or the second part (17) along a direction substantially perpendicular to the surface (S) on which the clamping framework (12) lies.

11. The machine of claim 9, wherein the second toothed profile (29) is shorter than the inner surface to allow an easy disengagement of the toothed profiles (21, 29).

12. The machine of any of claims 6 to 11, wherein the second part (17) comprises a protrusion (31) placed on the opposite side of the C-shaped body with respect to the front opening (27), wherein a rear portion (32) of the elongated element (18) and said protrusion (31) are configured to be clamped by an assembly tool to insert the elongated element (18) in the seat (26) through the front opening (27) when mounting the clamping framework (12).

13. The machine of any of the preceding claims, wherein the teeth of the first toothed profile (21) are placed one after the other along a first direction (Y); wherein the teeth of the second toothed profile (29) are placed one after the other along a second direction (Z); wherein engagement of the first toothed profile (21) with the second toothed profile (29) is performed by aligning the first and second directions (Y, Z) and making the first toothed profile (21) and the second toothed profile (29) slide one over the other along said first and second common directions (Y, Z).

14. The machine of any of the preceding claims, wherein the first U-shaped frame (13) and the second U-shaped frame (14) are identical and each comprises one first part (15) placed on a first end and one second part (17) placed on a second end.

FIG.1

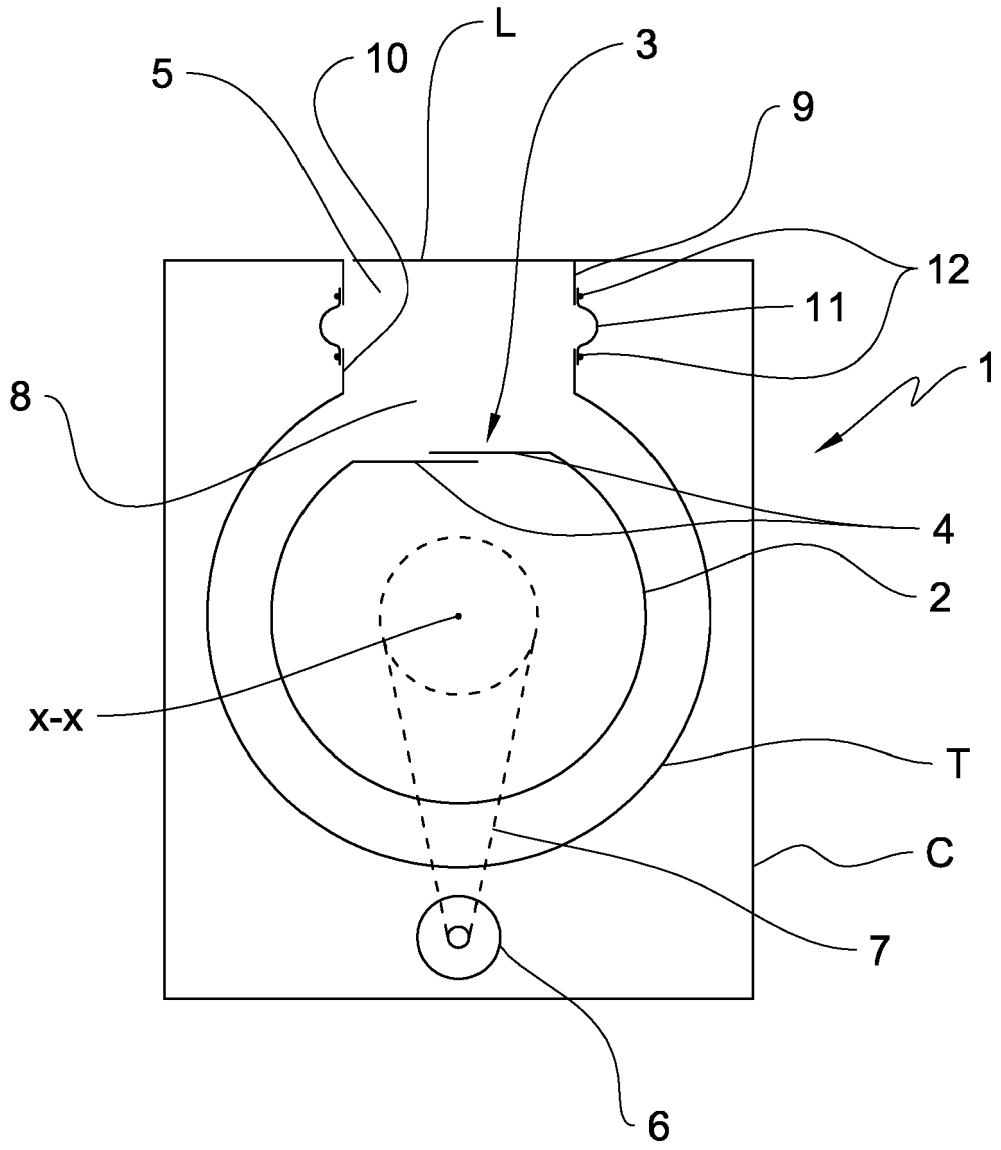
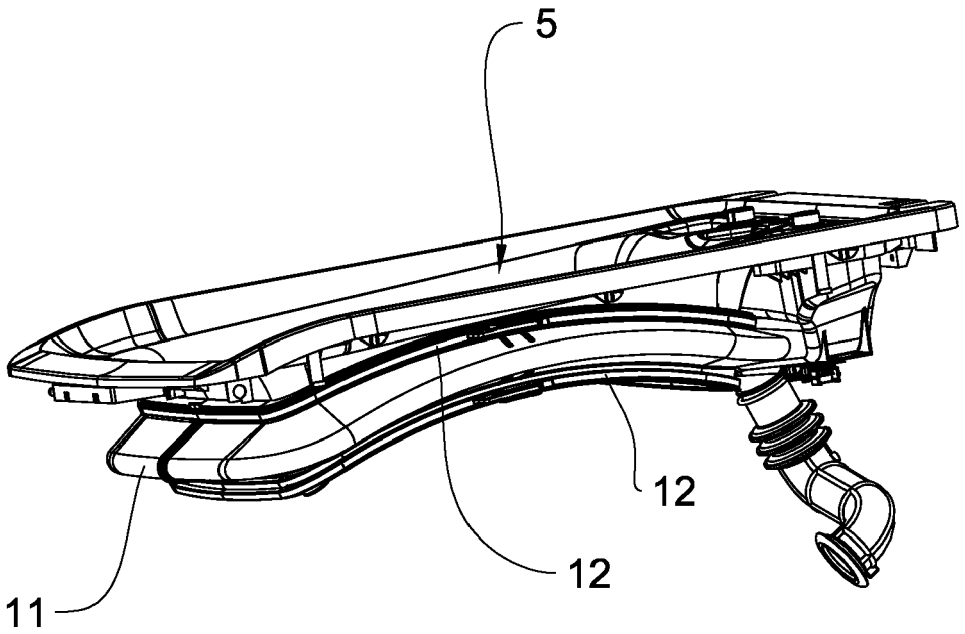


FIG.2



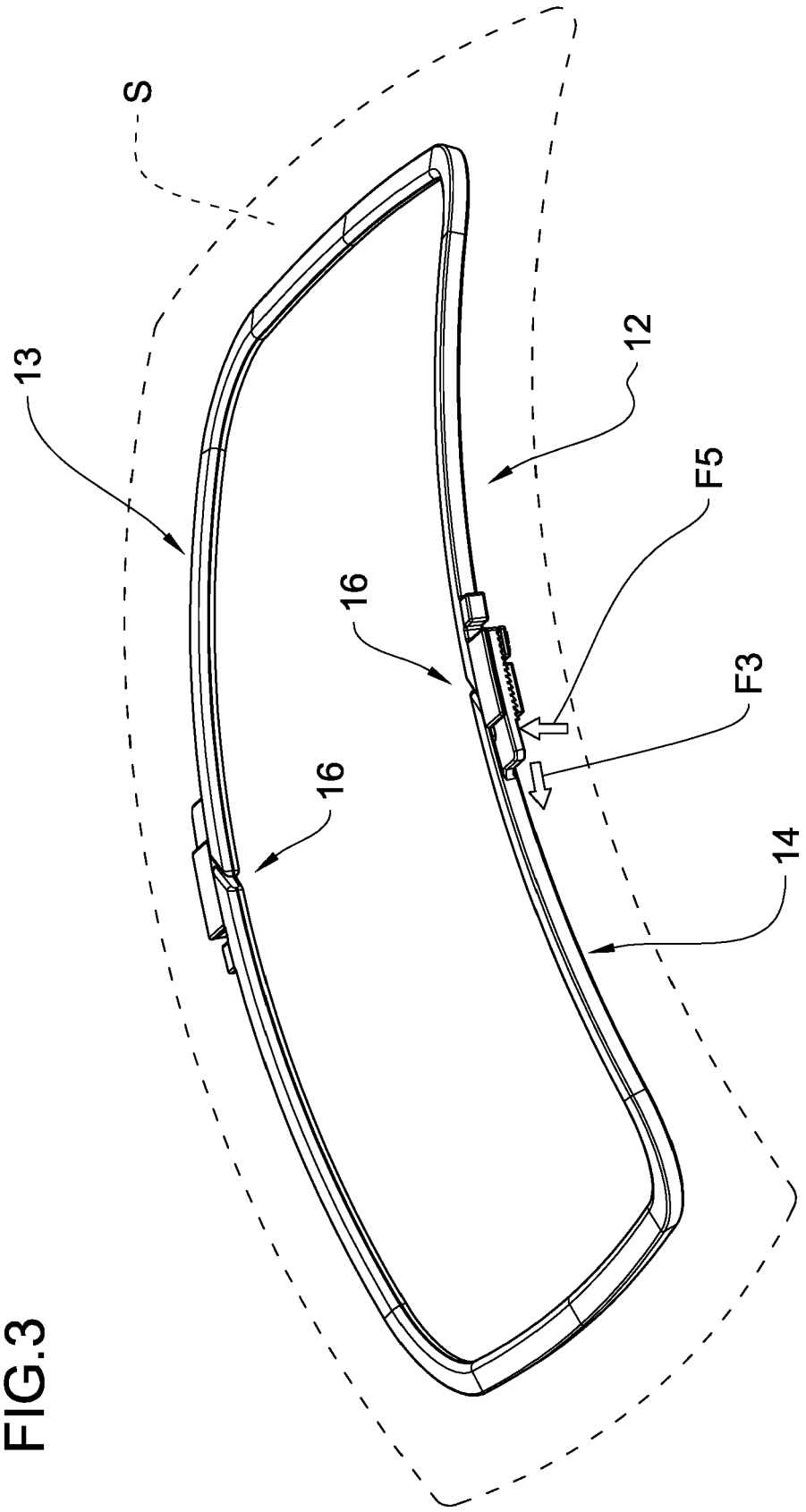


FIG.3

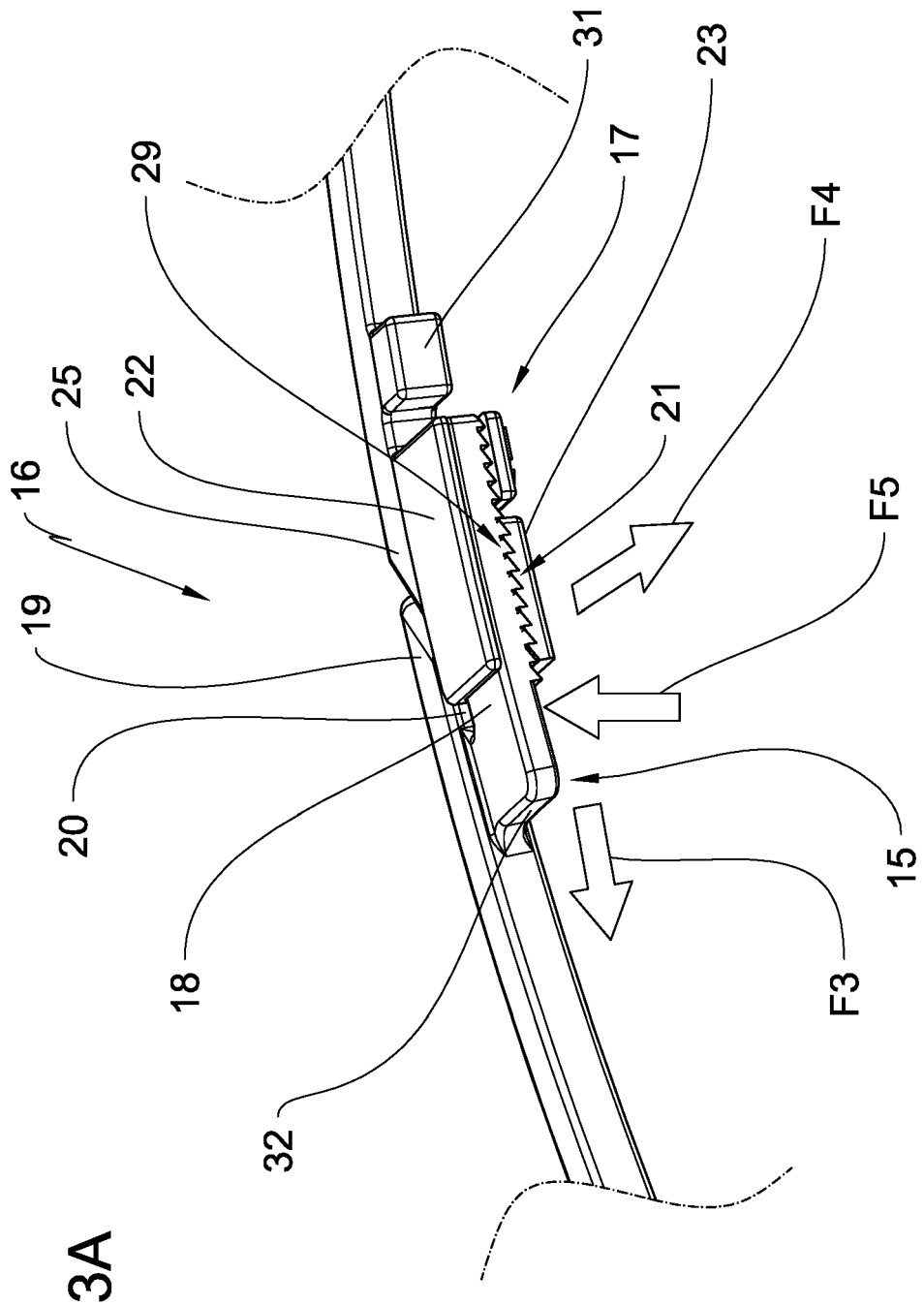


FIG.3A

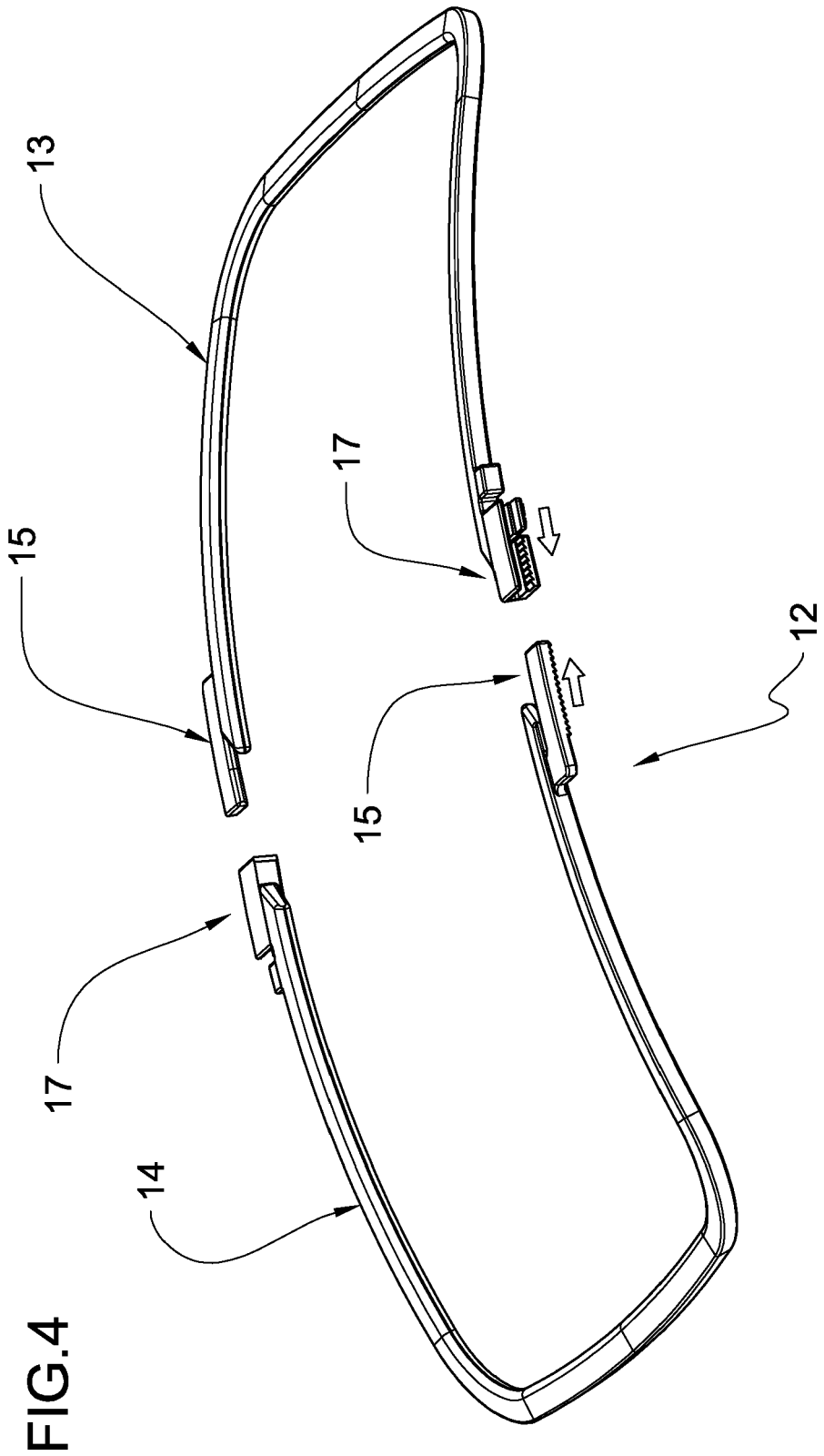


FIG.4

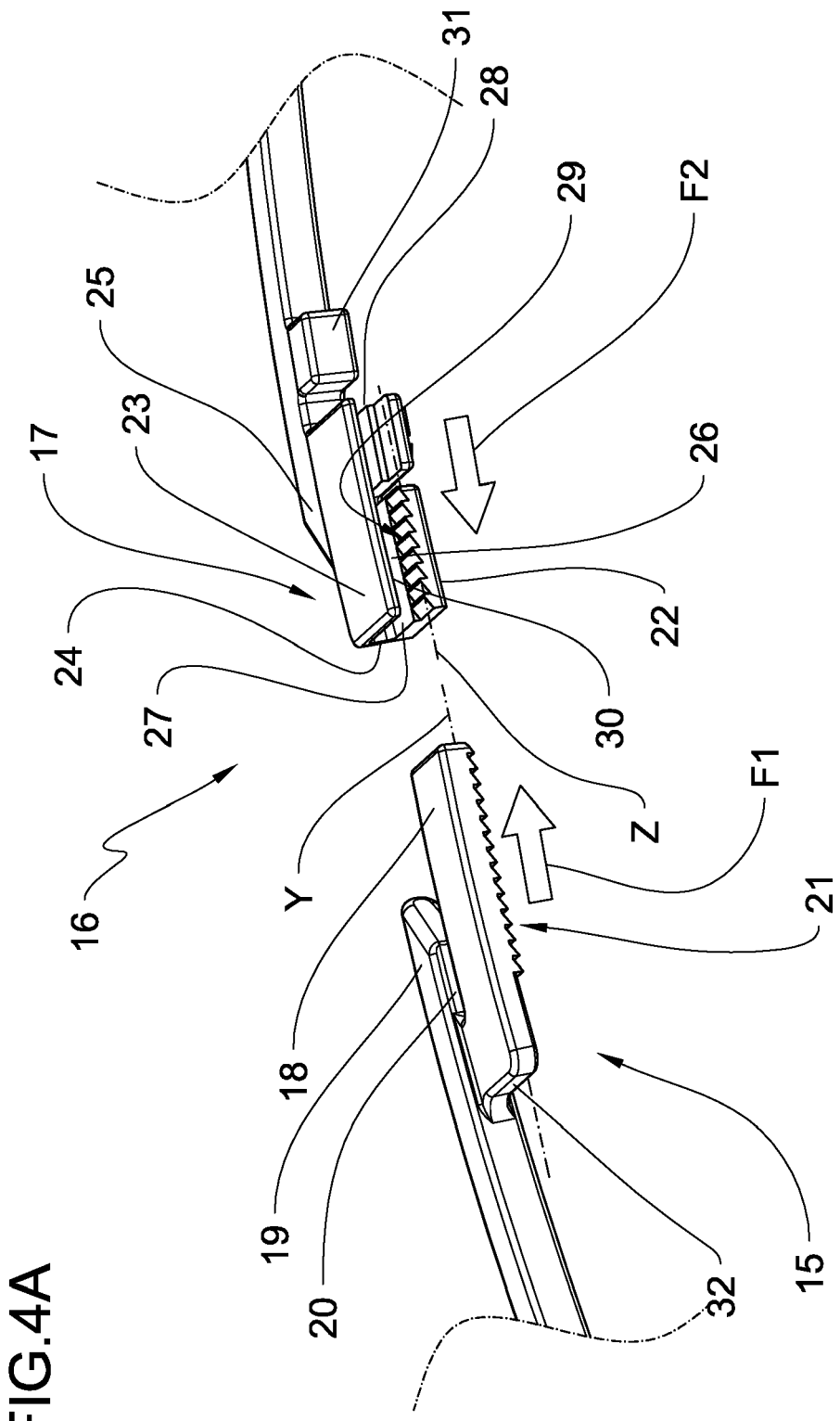


FIG.4A

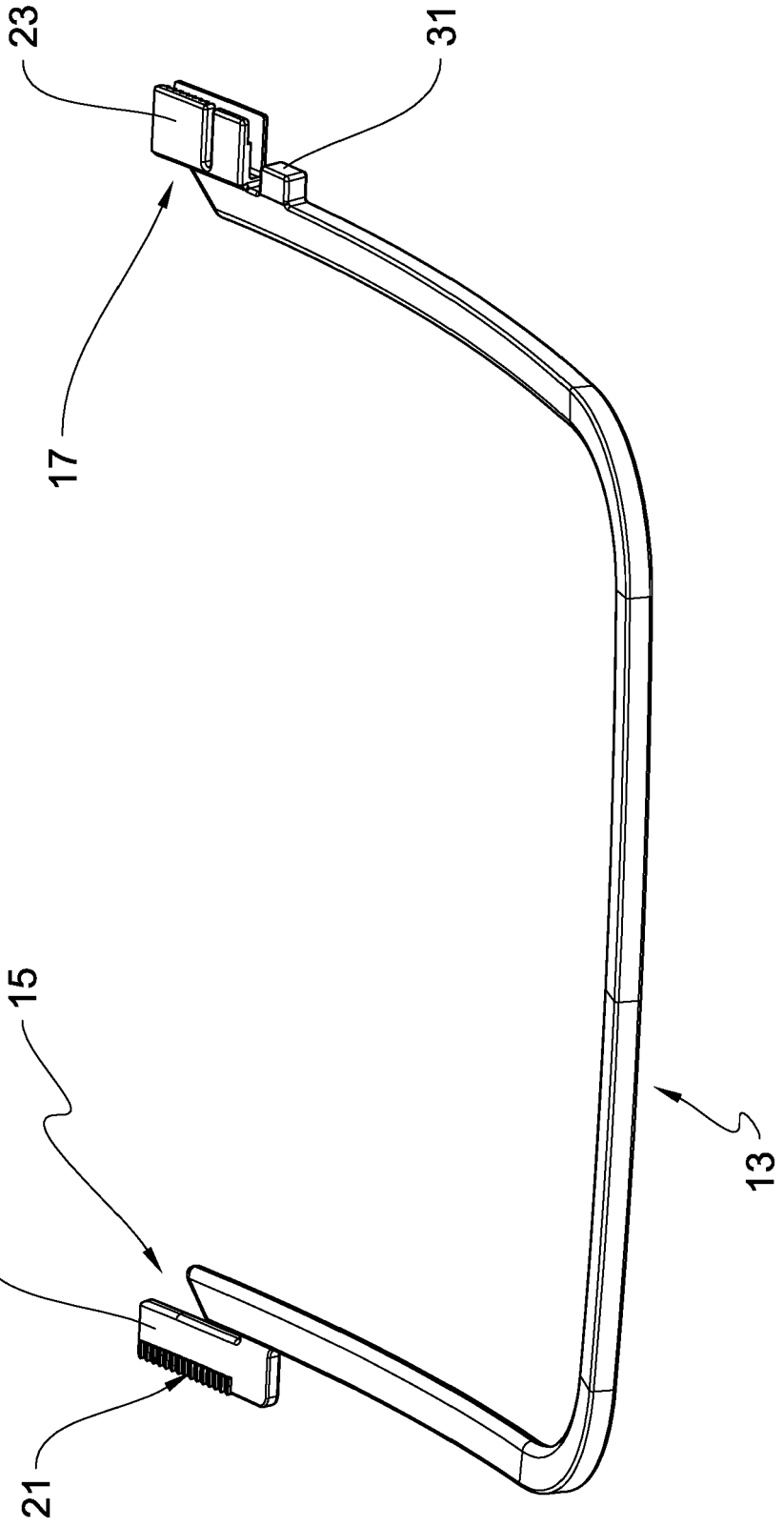


FIG.5

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EUROPEAN SEARCH REPORT

Application Number
EP 16 20 3519

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	DE 25 58 343 A1 (THOMSON BRANDT) 8 July 1976 (1976-07-08) * page 10, paragraph 2 - page 12, paragraph 1; claims 5-10; figures 11,12 *	1	TECHNICAL FIELDS SEARCHED (IPC) D06F F16B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	10 February 2017	Beckman, Anja

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 16 20 3519

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