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- (71) Applicant: VOLVO TRUCK CORPORATION [SE/SE];
405 08 Göteborg (SE).
- (72) Inventor: JADHAV, Anil; C303, Spring Apratment, Next
to Bookfield Hospital/, McDonald, AECS Layout, ITPL
Main Road, Kundanahali Gate, Bangalore 560066 (IN).
- (74) Agent: VOLVO TECHNOLOGY CORPORATION;
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08 Göteborg (SE).

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(54) Title: A CAP ASSEMBLY FOR ATTACHMENT TO A FASTENER

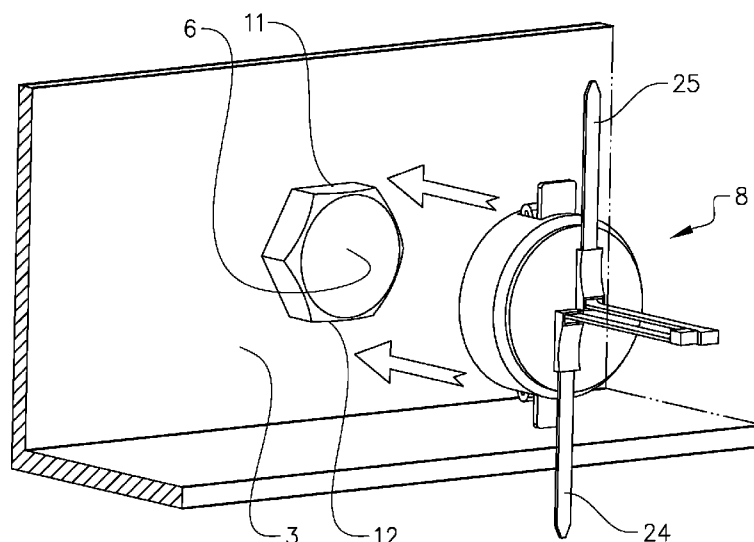


FIG. 3a

(57) Abstract: The invention relates to a cap assembly (8) for attachment to a fastener (6), the assembly (8) comprising a cap (9) for receiving a part of the fastener (6) and a resilient retention means (10) connected to the cap (9) and adapted to be biased towards an external surface (11,12) of the fastener (6) for engagement of the cap assembly (8) with the fastener (6).

A CAP ASSEMBLY FOR ATTACHMENT TO A FASTENER

TECHNICAL FIELD

The invention relates to a cap assembly for attachment to a fastener, the assembly comprising a cap for receiving a part of the fastener. The invention is especially directed
5 towards a cap assembly adapted for holding an object, such as a cabling, in relation to the fastener.

This is utilized, for example, in the vehicle industry for holding cabling. According to one vehicle example, a truck comprises a frame carrying the drive line, cab and the truck's
10 superstructure. The frame has two longitudinal beams in the form of U-profiled side members, which are positioned at a distance from each other in a sideways direction of the truck. The longitudinal beams are arranged so that the openings in the U-profiles face each other. Further, the longitudinal beams are interconnected via cross beams.

15 Said beams may be provided with a plurality of fasteners for holding different components relative to the beam. Further, a cabling is routed along the beams for providing different components with electricity, fluids etc. A plurality of cap assemblies may then be attached to selected ones of said fasteners for positioning and routing the cabling.

20 The invention can be applied in heavy-duty vehicles, such as trucks, buses and construction equipment. Although the invention will be described with respect to a truck, the invention is not restricted to this particular vehicle, but may also be used in other vehicles or machines such as construction equipment (wheel loaders, excavators, articulated haulers etc) and boats.

25

PRIOR ART

EP0946839 discloses a cap assembly for attachment to a fastener. Mounting of the cap assembly takes place via hammer strokes, wherein an internal surface of the cap is deformed as the external surface of the fastener engages the internal surface of the cap.

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SUMMARY

An object of the invention is to provide a cap assembly, which creates conditions for being reused or repositioned after a first application to a fastener. A secondary purpose is to achieve a reliable attachment and easy and quick mounting/dismounting.

5

The object is achieved by a cap assembly according to claim 1. Thus, it is achieved by a cap assembly for attachment to a fastener, the assembly comprising

- a cap for receiving a part of the fastener,

characterized in that the assembly comprises

- 10 - a resilient retention means connected to the cap and adapted to be biased towards an external surface of the fastener for engagement of the cap assembly with the fastener.

This design of the cap assembly creates conditions for a time-efficient routing of a cabling
15 to a structure as the operator only has to push the cap assembly to a bolt head. Likewise, it creates conditions for a time-efficient removal of the cabling from the structure as the operator only has to pull the cap assembly from the bolt head.

Further, this design of the cap assembly creates conditions for a cost-efficient
20 manufacture of a cap assembly. For example, the cap may be connected to the resilient retention means via moulding a plastic material to/around the resilient retention means.

According to one example, the engagement of the cap assembly with the fastener is achieved via frictional engagement. The resilient retention means is thus non-destructively
25 attached to the fastener, which creates conditions for releasing the cap assembly from the fastener and reattaching the cap assembly to the same fastener or another fastener.

According to one embodiment, the resilient retention means is adapted to be biased in a radial direction of the cap assembly towards the external surface of the fastener.

30

The cap assembly defines a longitudinal axis commensurate with an axial direction of the fastener in a state where the fastener is received in the cap. The radial direction of the cap assembly is then perpendicular to the axial direction of the cap assembly.

The biasing in the radial direction of the cap assembly creates conditions for a reliable positioning of the cap assembly on the fastener and an easy mounting/dismounting operation. It further creates conditions for a space-efficient construction especially in the direction of the longitudinal axis of the cap assembly.

5

According to a further embodiment, the resilient retention means is adapted to be biased towards the external surface of the fastener from opposite sides. It creates conditions for a further reliable positioning of the cap assembly on the fastener. It also creates conditions for an easy mounting/dismounting operation in that the cap assembly may be
10 mounted to the fastener by using one hand only and likewise being dismounted from the fastener by using one hand only.

According to a further embodiment, the cap assembly is adapted to be attached to the fastener via a movement of the cap assembly in an axial direction of the fastener.

15

The axial direction of the fastener may be defined as a longitudinal direction of the fastener or an application direction of the fastener to a structure. Attaching the cap assembly to the fastener via movement along the axial direction creates conditions for an automatic and uniform biasing of the resilient retention means to an engaged state during
20 the movement of the cap assembly to its operative position on the fastener.

According to a further embodiment, the cap assembly is releasably attached to the fastener via the resilient retention means. Thus, the cap assembly may be reused or repositioned after a first application to a fastener.

25

According to a further embodiment, the cap assembly is adapted to be removed from the fastener via a movement of the cap assembly in an axial direction of the fastener. It creates conditions for a uniform unbiasing of the resilient retention means to a disengaged state during the movement of the cap assembly from its operative position on the
30 fastener.

According to a further embodiment, the cap assembly is adapted to be removed from the fastener via first releasing the frictional engagement between the resilient retention means and the fastener and then withdrawing the cap assembly from the fastener with the

resilient retention means disengaged. It creates further conditions for removing the cap assembly from the fastener without damaging the resilient retention means.

According to a further embodiment, the resilient retention means is accessible for
5 disengagement from the fastener from an exterior side of the cap. It creates further conditions for removing the cap assembly from the fastener by means of a single hand in a continuous operation, wherein the resilient retention means may be actuated by applying a pressure and withdrawing the cap assembly in a continuous movement.

10 According to a further embodiment, the cap and the resilient retention means are different parts, which are connected to a single unit. It creates conditions for using different materials in the cap and the resilient retention means. According to one example, the cap may be formed in plastics, while the resilient retention means is formed in metal.

15 According to a further embodiment, the cap comprises an annular portion circumscribing a compartment for said part of the fastener and wherein the resilient retention means is connected to the annular portion. It creates conditions for a rigid connection of the resilient retention means to the cap.

20 According to one example, the cap further comprises a plate shaped portion in one piece with the annular portion forming a closed end of the compartment. Thus, the plate-shaped portion forms a bottom surface of the compartment forming a stop surface for the fastener during assembly. Further, the annular portion, or collar, defines an inwardly facing circumferential surface, which defines the compartment. According to one example, the
25 inwardly facing circumferential surface has a cross sectional shape matched to an external shape of the fastener for a tight fit.

According to a further embodiment, the resilient retention means comprises an annular portion adapted for fitting at least partially in the cap compartment. The annular portion of
30 the resilient retention means may be continuous in its circumferential direction. Further, the annular portion of the resilient retention means may form a ring. Further, the annular portion of the resilient retention means may be circular. Further, the annular portion of the resilient retention means may be formed with an exterior dimension matching an interior dimension of the cap for a tight fit.

According to a further embodiment, the resilient retention means comprises two contact portions positioned on opposite sides of the compartment. It creates conditions for a further simplified operation, in that the resilient retention means may be disengaged from the fastener via operation by a single hand.

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According to a further embodiment, the resilient retention means comprises at least one leg connected to the annular portion of the resilient retention means and wherein said at least one leg comprises said contact portion.

- 10 According to a further embodiment, the leg of the resilient retention means is flexible in a radial direction of the annular portion of the resilient retention means.

According to a further embodiment, the leg of the resilient retention means extends inwards in a radial direction of the annular portion in a non-biased state and is flexible

- 15 radially outwards upon contact with the part of the fastener during attachment of the assembly for achieving said engagement.

According to a further embodiment, the cap comprises at least one opening for receipt of a portion of the resilient retention means. It creates conditions for a secure fit of the

- 20 resilient retention means to the cap.

According to a further development of the last mentioned embodiment, the opening for receipt of said portion of the resilient retention means forms a through hole. It creates conditions for a direct actuation of the contact means by hand.

25

According to a further development of the last mentioned embodiment, said leg of the resilient retention means extends through said through hole so that it is accessible for direct contact from an exterior side of the cap for disengaging the cap assembly from the fastener.

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According to a further embodiment, the cap comprises two through holes in said annular portion on opposite sides of said compartment and wherein the resilient retention means comprises two legs extending of through different ones of said through holes so that each one of the contact portions are directly accessible from an exterior side of the cap. It

creates conditions for a secure fit of the cap assembly to the fastener and also a quick release by a single hand operation.

According to a further embodiment, the cap assembly comprises a means for receipt of at least one strap adapted to form a loop around an elongate member and wherein the strap receipt means is connected to the cap. It creates conditions for routing elongated elements, such as cables, by means of the cap assembly. Preferably, the strap receipt means is connected to the cap on an exterior side of the cap facing away from the compartment.

10

According to a further embodiment, the strap receipt means is connected to the cap in a way allowing turning of the strap receipt means relative to the cap around an axial direction of the cap. It creates conditions for routing the elongated elements in any direction irrespective of the position of the cap assembly on the fastener.

15

According to a further embodiment, the cap assembly is adapted for positioning a cable relative to a structure being provided with the fastener. Preferably, the cap assembly is adapted for routing a cable along a beam of a vehicle, wherein the beam being provided with the fastener.

20

The invention is further directed to beam adapted for a frame of a vehicle, wherein the beam is provided with a plurality of fasteners distributed along its longitudinal direction and wherein at least one cap assembly according to any one of the above embodiments is attached to one of said fasteners.

25

Further advantages and advantageous features of the invention are disclosed in the following description and in the dependent claims.

BRIEF DESCRIPTION OF THE DRAWINGS

30

With reference to the appended drawings, below follows a more detailed description of embodiments of the invention cited as examples.

In the drawings:

35

Fig. 1 shows a truck in a perspective rear view,

Fig. 2 shows a frame of the truck in a similar view as in figure 1,

- 5 Fig. 3a shows a perspective view of a cap assembly according to a first embodiment example for being attached to a bolt head,

Fig. 3b shows a perspective view of the cap assembly according to figure 3a attached to the bolt head and routing a cabling,

10

Fig 4 and 5 show perspective views of the cap assembly according to figure 3a from above and below, respectively,

Fig. 6 shows an exploded view of the cap assembly according to figure 3a,

15

Fig. 7 shows a partly cut perspective view of the cap assembly according to figure 3a,

Fig. 8 shows a cut view of the cap assembly according to figure 3a,

- 20 Fig. 9 shows a cut view of the cap assembly attached to the bolt head and routing cabling according to figure 3b, and

Fig. 10-12 show three different positions during removal of the cap assembly from the bolt head according to figure 3b.

25

DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS OF THE INVENTION

- Figure 1 shows a truck 1 in a perspective rear view. The truck 1 comprises a frame 2 carrying the drive line, cab and the truck's superstructure. The frame 2 has two longitudinal beams 3,4 in the form of U-profiled side members, see figure 2, which are
30 positioned at a distance from each other in a sideways direction of the truck 1. The longitudinal beams 3,4 are arranged so that the openings in the U-profiles face each other. Further, the longitudinal beams are interconnected via cross beams 5.

- Each one of said beams 3,4,5 may be provided with a plurality of fasteners 6, see figure
35 3a, for holding different components relative to the beam 3. Further, a cabling 7, see

figure 3b, is routed along the beam 3 for providing different components with electricity, fluids etc. A cap assembly 8 is attached to a selected one of said fasteners 6 for positioning and routing the cabling 7.

- 5 Figure 4 and 5 show the cap assembly 8 in a perspective view from above and below, respectively. The cap assembly 8 comprises a cap 9 for receiving a part of the fastener 6 and a resilient retention means 10 connected to the cap 9 and adapted to be biased towards an external surface 11, 12 of the fastener 6 for engagement of the cap assembly 8 with the fastener. Said part of the fastener 6 is formed by a head. In the example shown, 10 the part of the fastener has a polygonal cross sectional shape. More specifically, the resilient retention means 10 is adapted to be biased in a radial direction of the cap assembly towards the external surface 11,12 of the fastener. More specifically, the external surface 11,12 of the fastener forms a flat surface. Further, the resilient retention means 10 is adapted to be biased towards the external surface 11,12 of the fastener 6 15 from opposite sides.

The cap assembly 8 is adapted to be attached to the fastener 6 via a movement of the cap assembly 8 in an axial direction of the fastener 6, see arrows in figure 3a. The axial direction of the fastener 6 is defined as the centre axis of the fastener. In case the 20 fastener is of a type bolted to its dedicated position, such as when the fastener is a bolt, the axial direction of the fastener 6 is defined as the axis of rotation of the fastener.

The cap assembly 8 is releasably attached to the fastener 6 via the resilient retention means 10.

25

Further, the cap assembly 8 is adapted to be removed from the fastener 6 via a movement of the cap assembly 8 in an axial direction of the fastener, see figures 10-12. According to the example shown in figures 10-12, the cap assembly 8 is adapted for a hand-operable release. More specifically, the cap assembly 8 is adapted to be removed 30 from the fastener 6 via first releasing the frictional engagement between the resilient retention means 10 and the fastener 6 and then withdrawing the cap assembly 8 from the fastener 6 with the resilient retention means 10 disengaged.

The resilient retention means 10 is accessible for disengagement from the fastener from an exterior side of the cap. According to the shown example, the resilient retention means 10 is directly accessible for contact by hand and actuation.

- 5 Further, the cap 9 and the resilient retention means 10 are different parts, which are connected to a single unit. The cap 9 and the resilient retention means 10 may be formed by different materials. For example, the cap 9 may be formed in plastic/polymer material and the resilient retention means 10 may be formed in a metallic material.
- 10 The cap 9 comprises an annular portion 13 circumscribing a compartment 14 for said part of the fastener 6 and wherein the resilient retention means 10 is connected to the annular portion 13. Further, the cap 9 comprises a roof portion 30 forming a closed end of the compartment 14. The roof portion 30 is formed in a one-piece unit with the annular portion 13.
- 15
- The resilient retention means 10 comprises an annular portion 21, see figure 6, adapted for fitting at least partially in the cap 9. The annular portion 21 is dimensioned for receiving the part of the fastener 6. More specifically, the annular portion 21 has a somewhat larger inner diameter than an outer diameter of the part of the fastener 6. The annular portion 21
- 20 is arranged in the cap 9 in a way that it circumscribes the compartment 14. The annular portion 21 is dimensioned for being received in the annular portion 13 of the cap 9. More specifically, the annular portion 21 of the resilient retention means 10 is arranged with the same or somewhat smaller diameter of its inner periphery than the annular portion 13 of the cap 9. Further, the annular portion 21 of the resilient retention means 10 is embedded
- 25 in a wall 22 defining the compartment 14. Further, the annular portion 21 of the resilient retention means 10 is rigidly attached to the annular portion 13 of the resilient retention means 10. For example, the annular portion 21 of the resilient retention means 10 may be molded into the annular portion 13 of the resilient retention means 10.
- 30 Further, the resilient retention means 10 comprises two contact portions 15,16 positioned on opposite sides of the compartment 14. The two contact portions 15,16 are positioned on opposite sides of the annular portion 21. Further, the two contact portions 15,16 are arranged in one-piece with the annular portion 15.

The resilient retention means 10 comprises at least one leg 17,18 connected to the annular portion 21 of the resilient retention means 10 and wherein said at least one leg 17,18 comprises said contact portion 15,16. The leg 17,18 of the resilient retention means 10 is flexible in a radial direction of the annular portion 21 of the resilient retention means.

5 The leg 17,18 of the resilient retention means 10 will restore to a preflexed position following flexure. Each one of the leg 17,18 of the resilient retention means 10 extends inwards in a radial direction of the annular portion 21 in a non-biased state and is flexible radially outwards upon contact with the part of the fastener during attachment of the assembly for achieving said engagement. Thus, an interference fit is achieved and the

10 cap assembly 8 is easily press-engaged over the bolt head. In other words, the legs 17,18 are slightly compressed, thereby firmly securing the cap assembly 8 on the bolt head.

The leg 17,18 has a curved shape in cross section, wherein an external surface of a curved portion is adapted to engage an external surface of the fastener. More specifically,

15 the leg 17,18 has the shape of a Z in cross section. Further, the opposite legs 17,18 have the same shape and being mirrored seen in a cross section of the resilient retention means 10, see figure 8. Further, the leg 17,18 is in the form of a curved strip having the shape of an elongated plate. Further preferably, the leg 17,18 has a constant width along its extension direction.

20

The cap 8 comprises at least one opening 19,20 for receipt of a portion 15,16 of the resilient retention means. The opening 19,20 for receipt of said portion 15,16 of the resilient retention means 10 forms a through hole. More specifically, said leg 17,18 of the resilient retention means 10 extends through said through hole 19,20 so that it is

25 accessible for direct contact from an exterior side of the cap for disengaging the cap assembly from the fastener. More specifically, the cap 8 comprises two through holes 19,20 in said annular portion 13 on opposite sides of said compartment 14 and wherein the resilient retention means comprises two legs extending through different ones of said through holes so that each one of the contact portions are directly accessible from an

30 exterior side of the cap.

The cap assembly 8 comprises a means 23 for receipt of at least one strap 24,25, see figure 3a and 3b, adapted to form a loop around an elongate member 7 and wherein the strap receipt means 23 is connected to the cap 9. More specifically, the strap receipt

35 means 23 is positioned on an exterior side of the cap 9 facing away from the compartment

14. The strap receipt means 23 is connected to the cap 9 in a way allowing turning of the strap receipt means relative to the cap around an axial direction 26, see figure 6, of the cap 9. More specifically, the strap receipt means 23 comprises a centre member 27 adapted for a rotational engagement with a corresponding member 28 of the cap 9. The
5 rotational members 27,28 are adapted for a snap fit engagement. The centre member 27 is formed by a tubular portion projecting from a lower side of a disc-shaped portion 29 of the strap receipt means 23 and the corresponding member 28 of the cap 9 is formed by an opening through the roof portion 30 of the cap 9.

10 The strap receipt means 23 comprises at least one routing member 31,32 for receipt of at least one strap 24,25. The routing member 31,32 comprises a through hole for receipt of its associated strap 24,25. More specifically, the routing member 31,32 is adapted for changing direction of the strap 24,25. The routing member 31,32 comprises a channel, which has a curved shape for directing the strap 24,25 so that the strap is curved
15 accordingly avoiding any sharp turns.

The cap assembly 8 creates conditions for subsequent re-application of the cap assembly 8 on the bolt head or onto another bolt head.

20 It is to be understood that the present invention is not limited to the embodiments described above and illustrated in the drawings; rather, the skilled person will recognize that many changes and modifications may be made within the scope of the appended claims.

25 According to an alternative to that the resilient retention means 10 is accessible for actuation via direct hand contact, the cap is formed by a flexible material, the resilient retention means 10 may be arranged so that its contact portion is inside of the cap and the contact portion being accessible for actuation only indirectly via contacting an exterior surface of the cap. Thus, the contact portion of the resilient retention means 10 may be
30 concealed by a wall of the cap.

CLAIMS

1. A cap assembly (8) for attachment to a fastener (6), the assembly (8) comprising
 - a cap (9) for receiving a part of the fastener (6),
- 5 **characterized in that** the assembly comprises
 - a resilient retention means (10) connected to the cap (9) and adapted to be biased towards an external surface (11,12) of the fastener (6) for engagement of the cap assembly (8) with the fastener (6).
- 10 2. A cap assembly according to claim 1, wherein the resilient retention means (10) is adapted to be biased in a radial direction of the cap assembly (8) towards the external surface of the fastener.
3. A cap assembly according to claim 1 or 2, wherein the resilient retention means (10) is
15 adapted to be biased towards the external surface of the fastener from opposite sides.
4. A cap assembly according to any preceding claim, wherein the cap assembly (8) is adapted to be attached to the fastener via a movement of the cap assembly in an axial direction of the fastener.
- 20 5. A cap assembly according to any preceding claim, wherein the cap assembly (8) is releasably attached to the fastener via the resilient retention means (10).
6. A cap assembly according to claim 5, wherein the cap assembly (8) is adapted to be
25 removed from the fastener via a movement of the cap assembly in an axial direction of the fastener.
7. A cap assembly according to claim 5 or 6, wherein the cap assembly (8) is adapted to be removed from the fastener via first releasing the frictional engagement between the
30 resilient retention means (10) and the fastener (6) and then withdrawing the cap assembly from the fastener with the resilient retention means disengaged.
8. A cap assembly according to any one of claims 5-7, wherein the resilient retention means (10) is accessible for disengagement from the fastener from an exterior side of the
35 cap (9).

9. A cap assembly according to any preceding claim, wherein the cap (9) and the resilient retention means (10) are different parts, which are connected to a single unit.

5 10. A cap assembly according to any preceding claim, wherein the cap (9) comprises an annular portion (13) circumscribing a compartment (14) for said part of the fastener and wherein the resilient retention means (10) is connected to the annular portion (13).

11. A cap assembly according to claim 10, wherein the resilient retention means (10)
10 comprises an annular portion (21) adapted for fitting at least partially in the cap.

12. A cap assembly according to any preceding claim, wherein the resilient retention means (10) comprises two contact portions (15,16) positioned on opposite sides of the compartment (14).

15

13. A cap assembly according to claim 12, wherein the resilient retention means (10) comprises at least one leg (17,18) connected to the annular portion (21) of the resilient retention means (10) and wherein said at least one leg (17,18) comprises said contact portion (15,16).

20

14. A cap assembly according to claim 13, wherein the leg (17,18) of the resilient retention means (10) is flexible in a radial direction of the annular portion (21) of the resilient retention means.

25 15. A cap assembly according to claim 13 or 14, wherein the leg (17,18) of the resilient retention means (10) extends inwards in a radial direction of the annular portion (21) in a non-biased state and is flexible radially outwards upon contact with the part of the fastener during attachment of the assembly for achieving said engagement.

30 16. A cap assembly according to any preceding claim, wherein the cap (9) comprises at least one opening (19,20) for receipt of a portion (15,16) of the resilient retention means (10).

17. A cap assembly according to claim 16, wherein the opening (19,20) for receipt of said
35 portion (15,16) of the resilient retention means (10) forms a through hole.

18. A cap assembly according to any one of claims 13-15 and any one of claims 16-17, wherein said leg (17,18) of the resilient retention means (10) extends through said through hole (19,20) so that it is accessible for direct contact from an exterior side of the cap (9) for disengaging the cap assembly from the fastener.

19. A cap assembly according to claim 10 and 12, wherein the cap comprises two through holes (19,20) in said annular portion (13) on opposite sides of said compartment (14) and wherein the resilient retention means (10) comprises two legs (17,18) extending through different ones of said through holes so that each one of the contact portions are directly accessible from an exterior side of the cap.

20. A cap assembly according to any preceding claim, wherein the cap assembly (8) comprises a means (23) for receipt of at least one strap (24,25) adapted to form a loop around an elongate member (7) and wherein the strap receipt means (23) is connected to the cap (9).

21. A cap assembly according to claim 10 and 20, wherein the strap receipt means (23) is positioned on an exterior side of the cap (9) facing away from the compartment (24).

22. A cap assembly according to claim 20 or 21, wherein the strap receipt means (23) is connected to the cap (9) in a way allowing turning of the strap receipt means (23) relative to the cap around an axial direction of the cap.

23. A cap assembly according to any preceding claim, wherein the cap assembly (8) is adapted for positioning a cable (7) relative to a structure (2) being provided with the fastener.

24. A cap assembly according to any preceding claim, wherein the cap assembly (8) is adapted for routing a cable (7) along a beam (3,4) of a vehicle (1), wherein the beam being provided with the fastener.

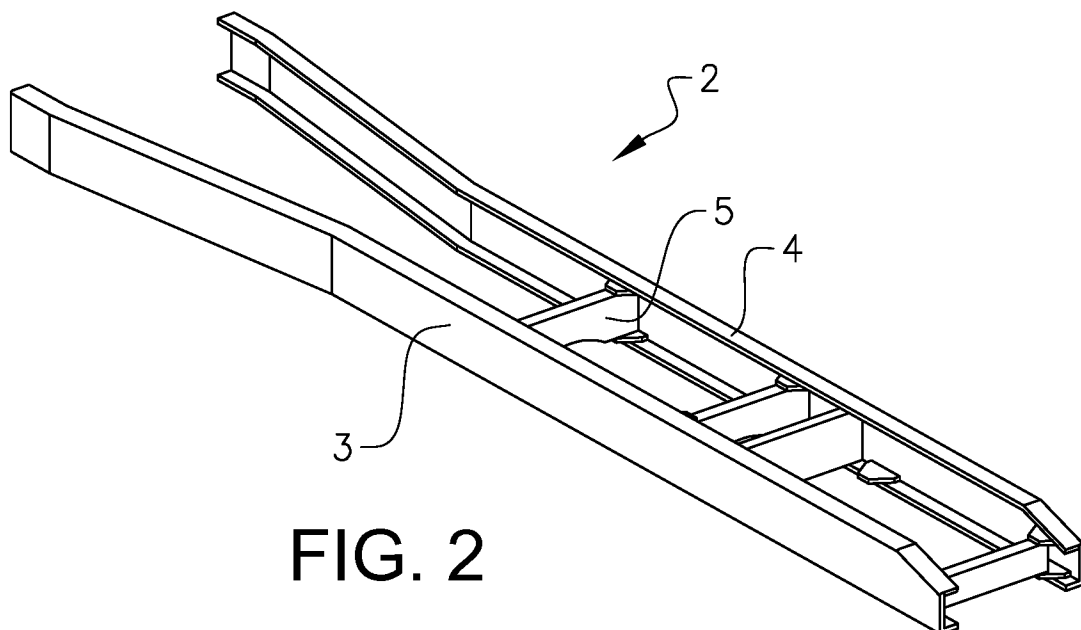
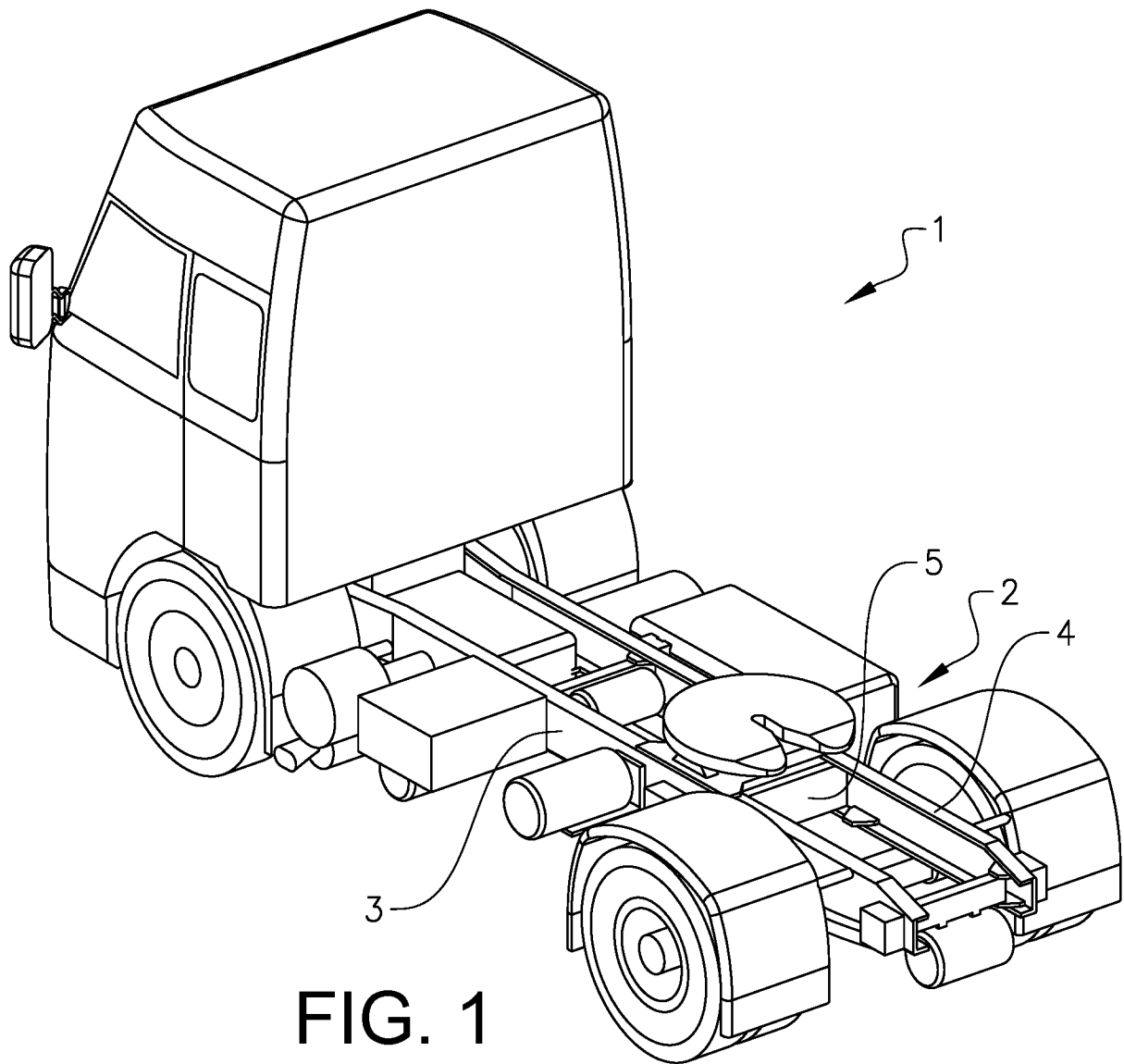
25. A beam (3,4) adapted for a frame (2) of a vehicle (1), wherein the beam (3,4) is provided with a plurality of fasteners (6) distributed along its longitudinal direction and

wherein at least one cap assembly (8) according to any one of claims 1-24 is attached to one of said fasteners.

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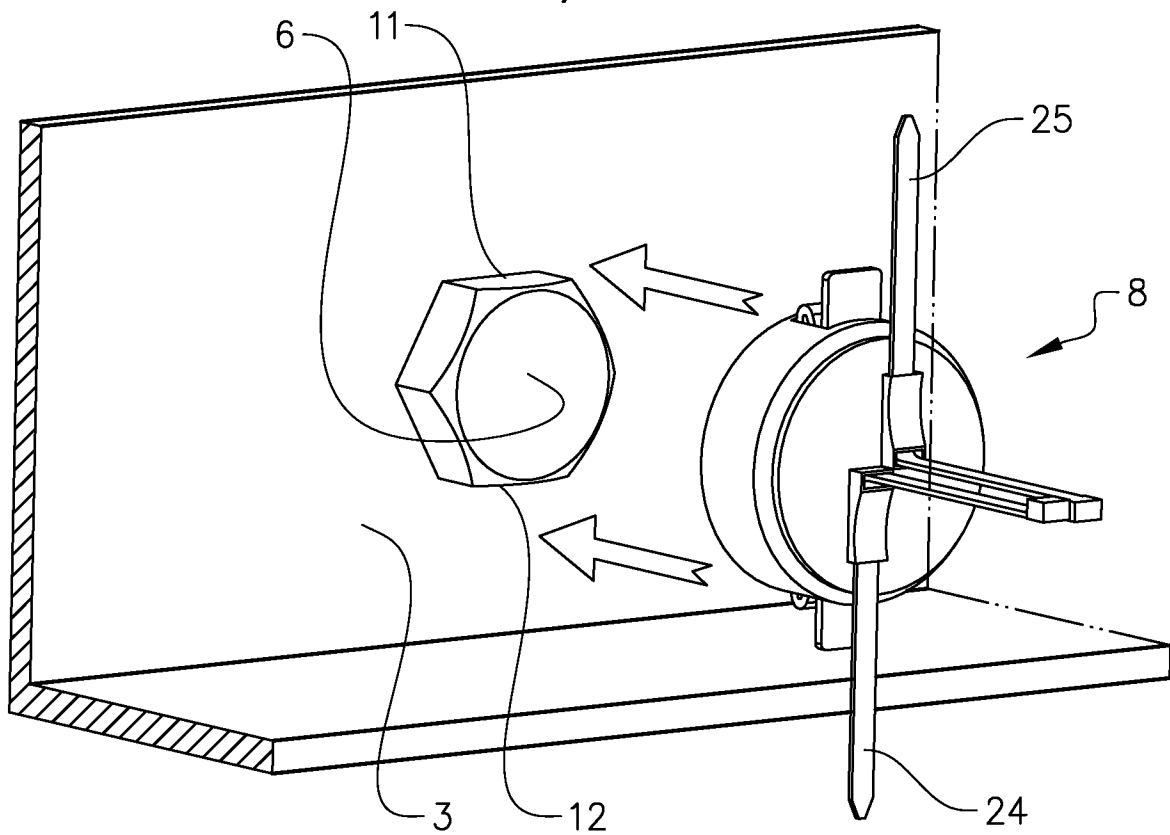


FIG. 3a

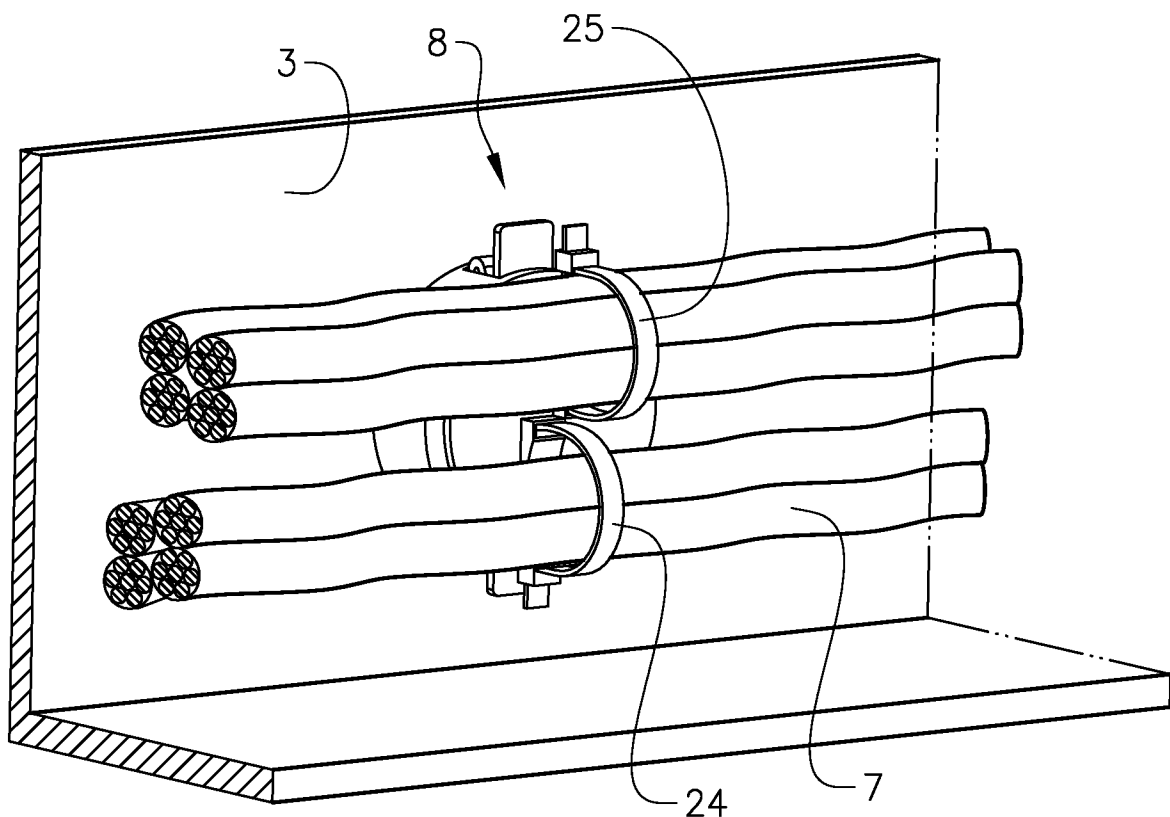


FIG. 3b

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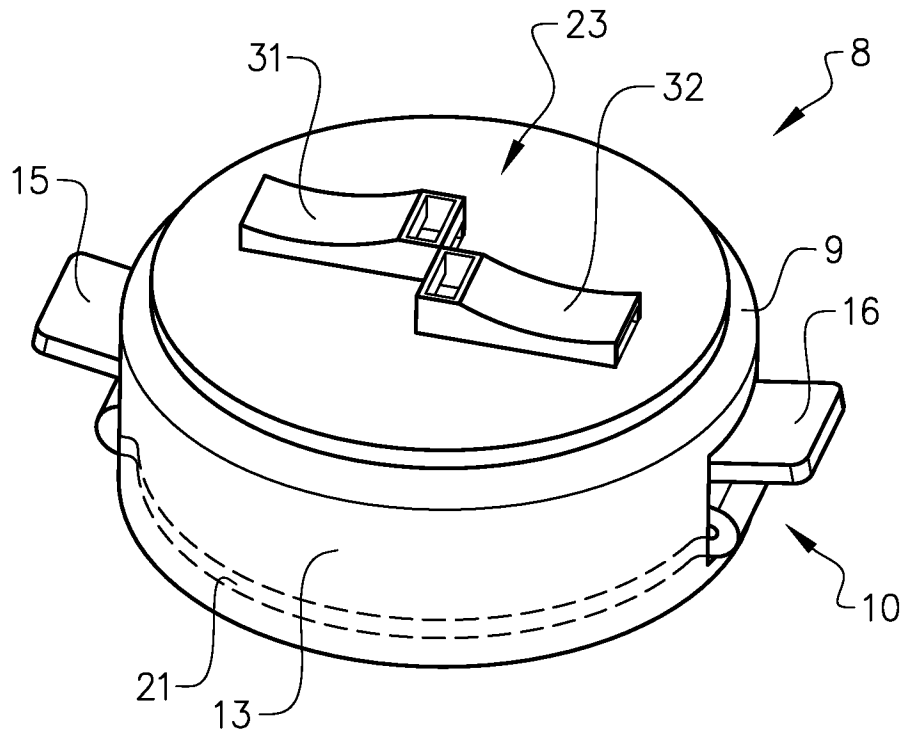


FIG. 4

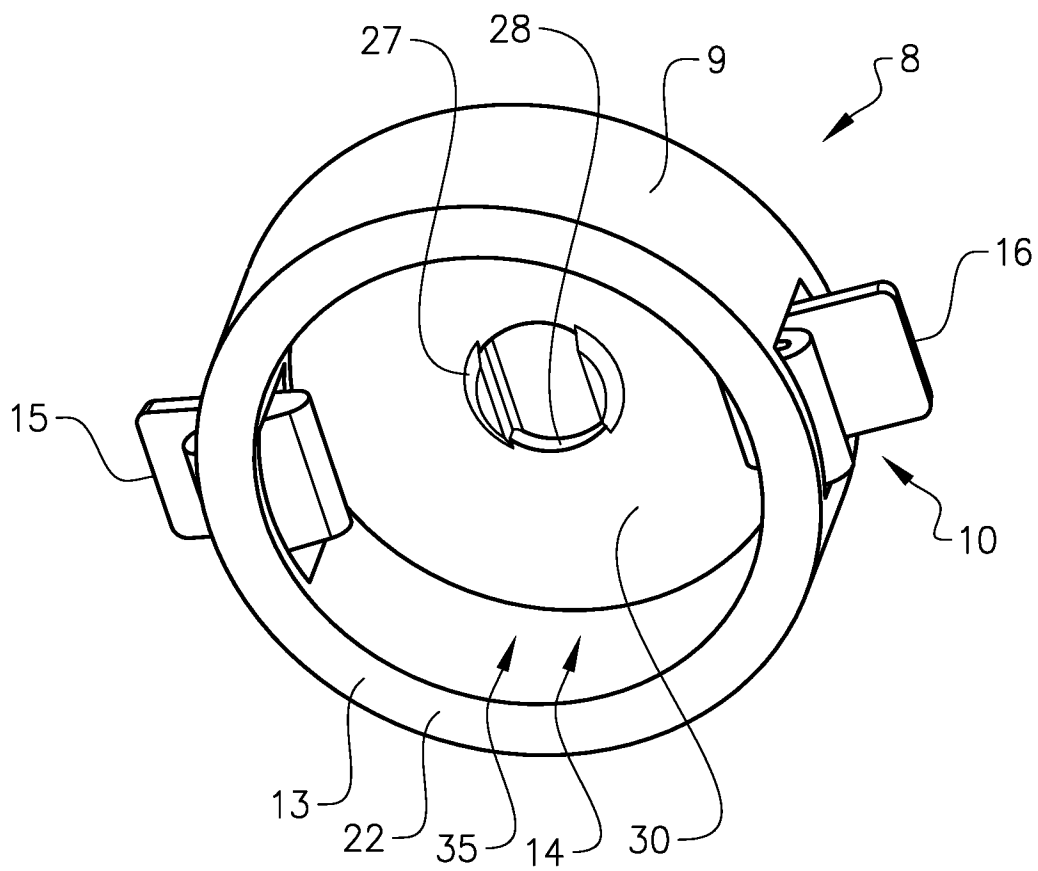


FIG. 5

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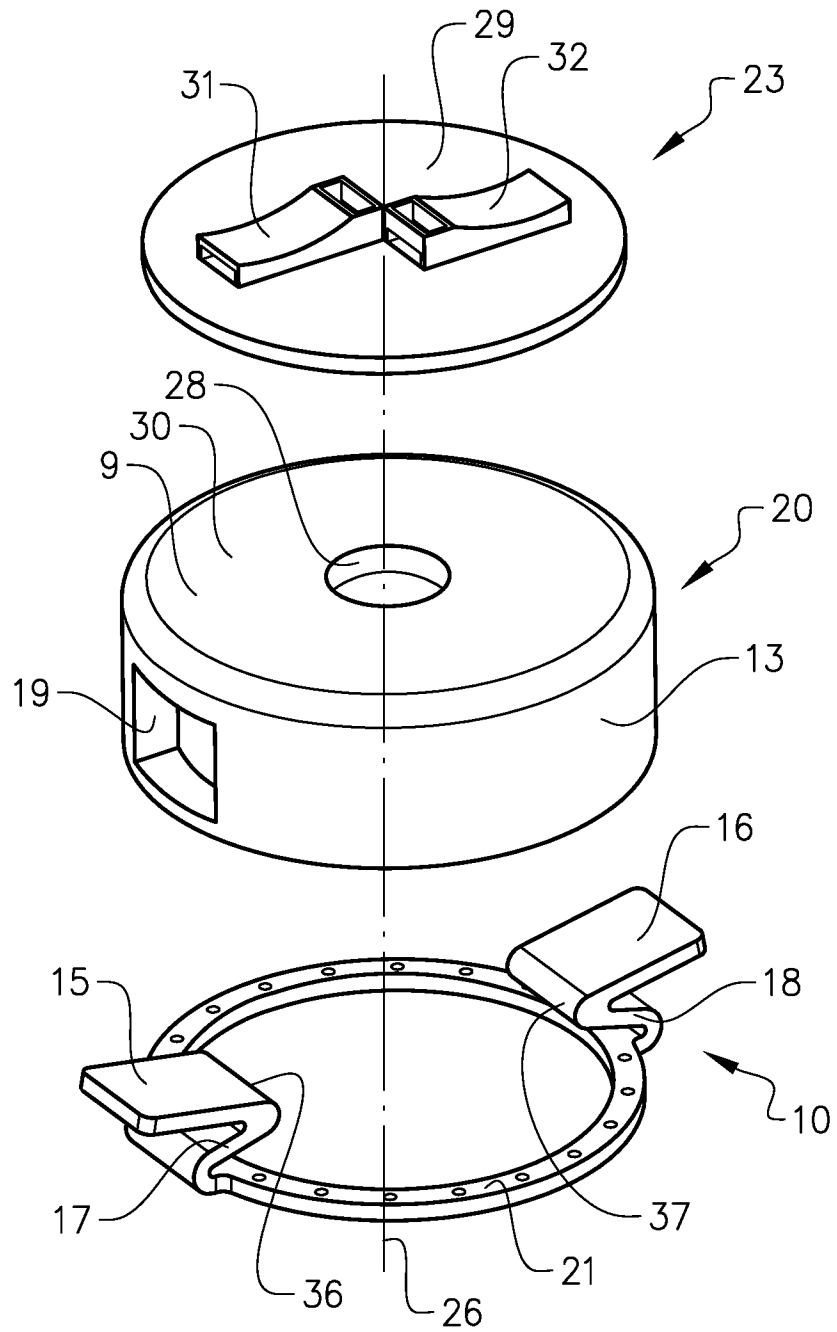


FIG. 6

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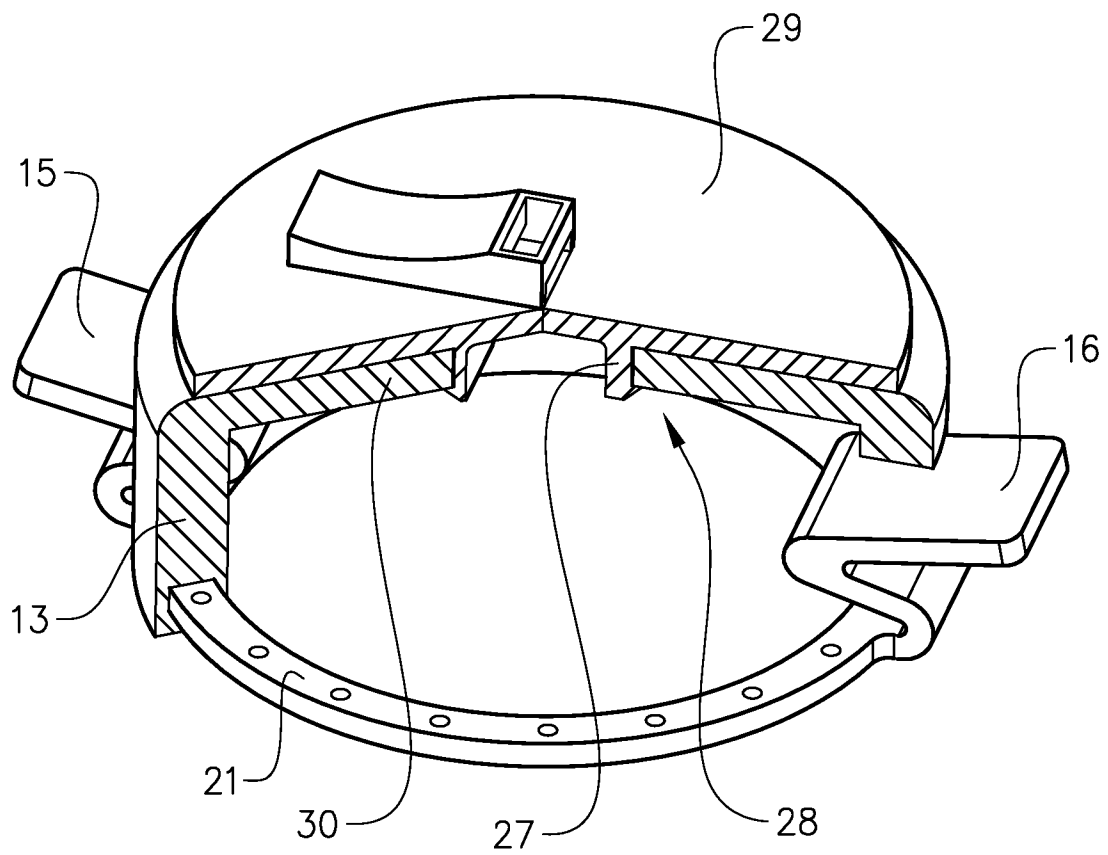


FIG. 7

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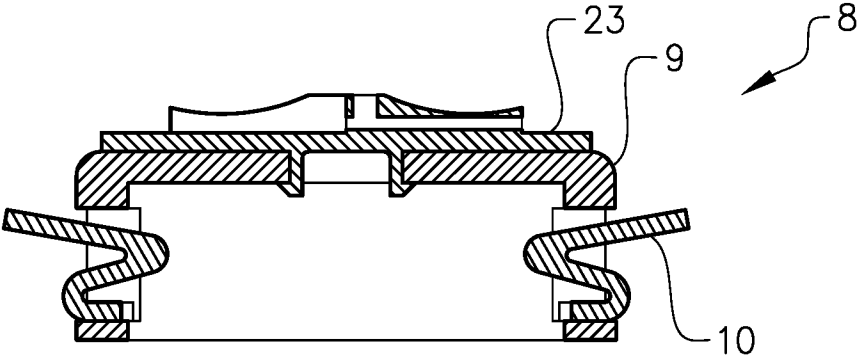


FIG. 8

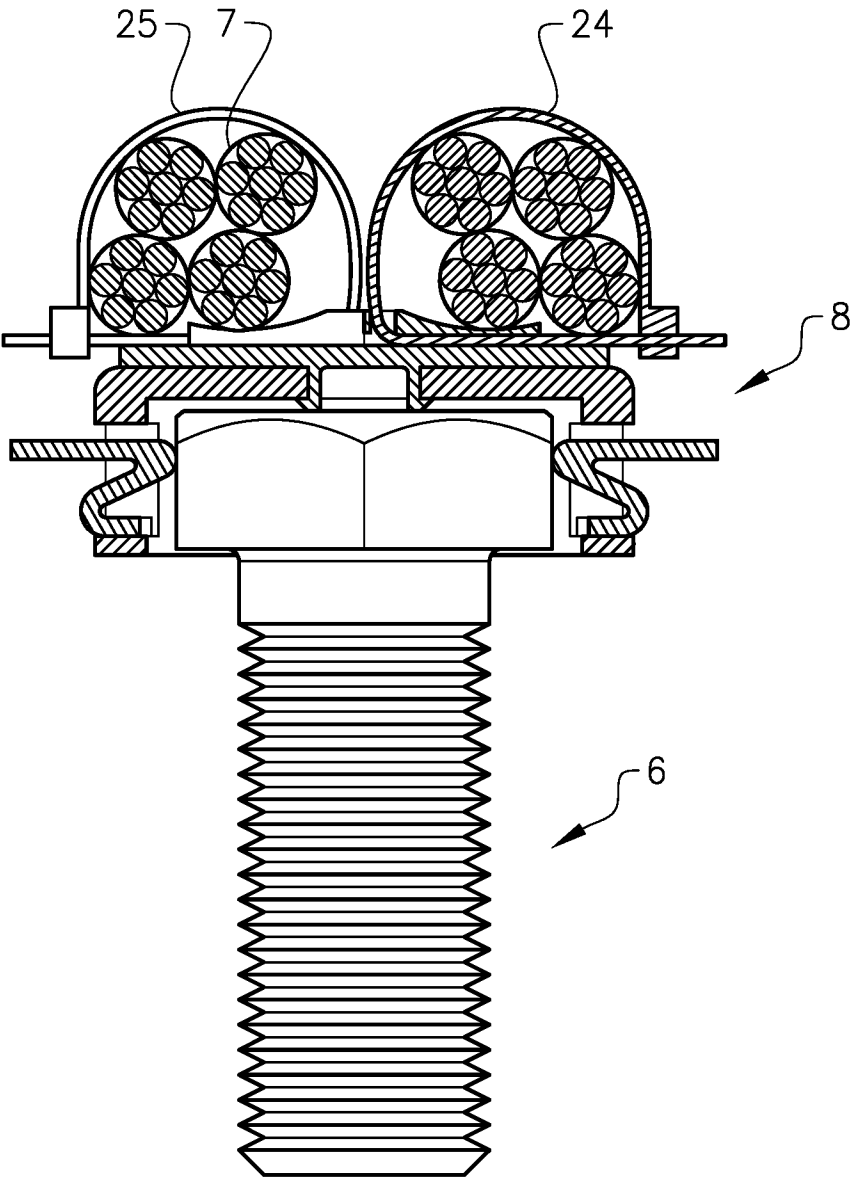


FIG. 9

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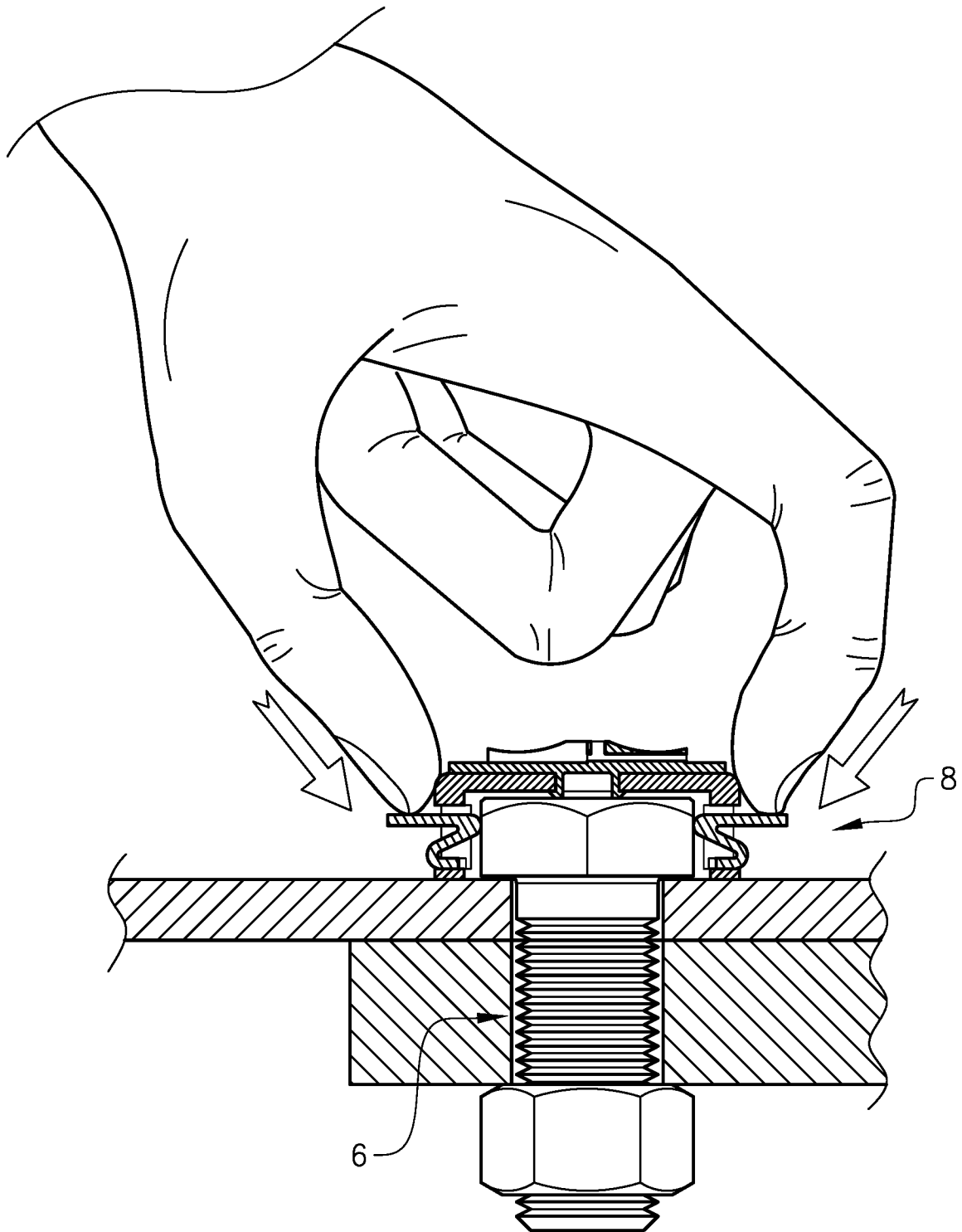


FIG. 10

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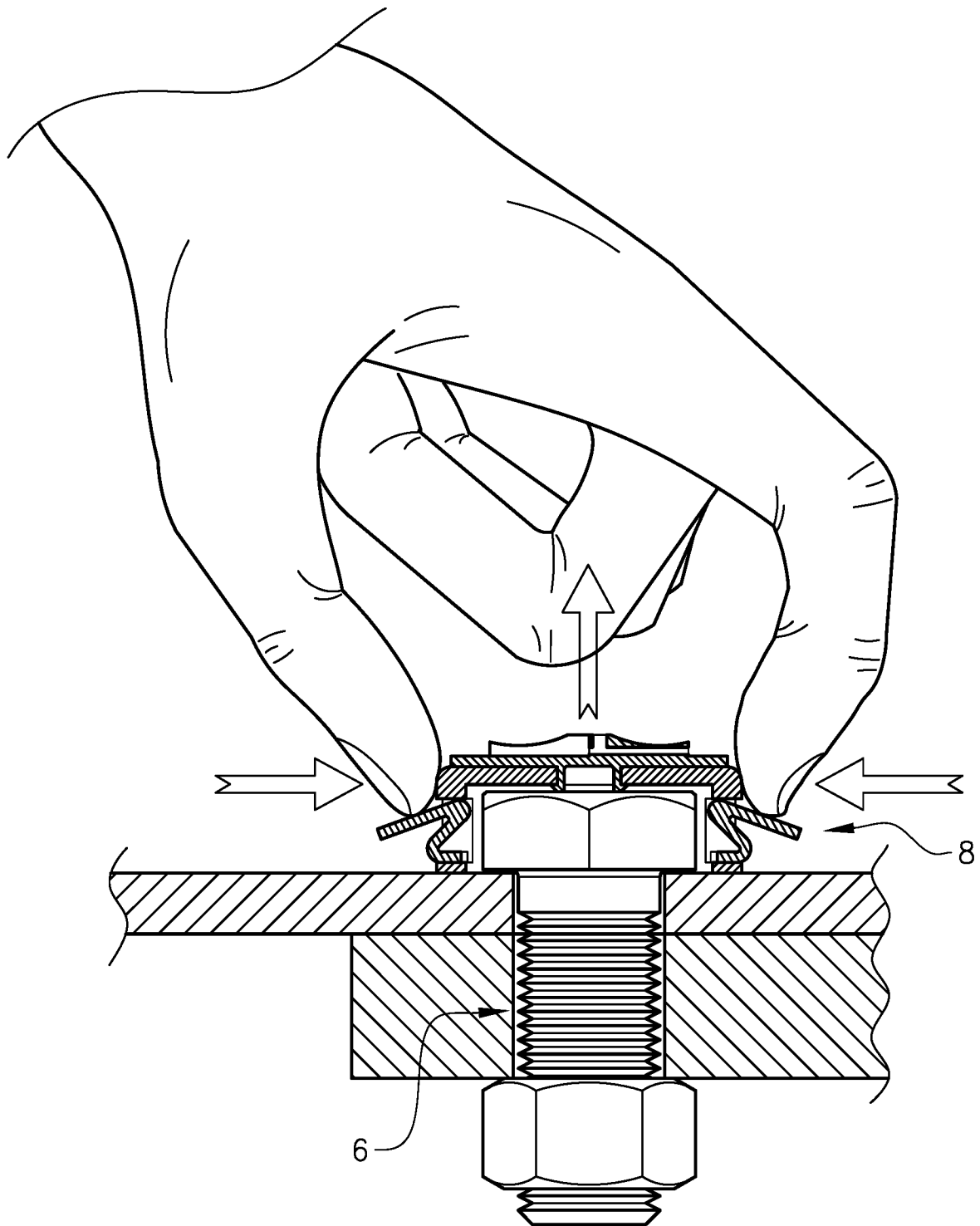


FIG. 11

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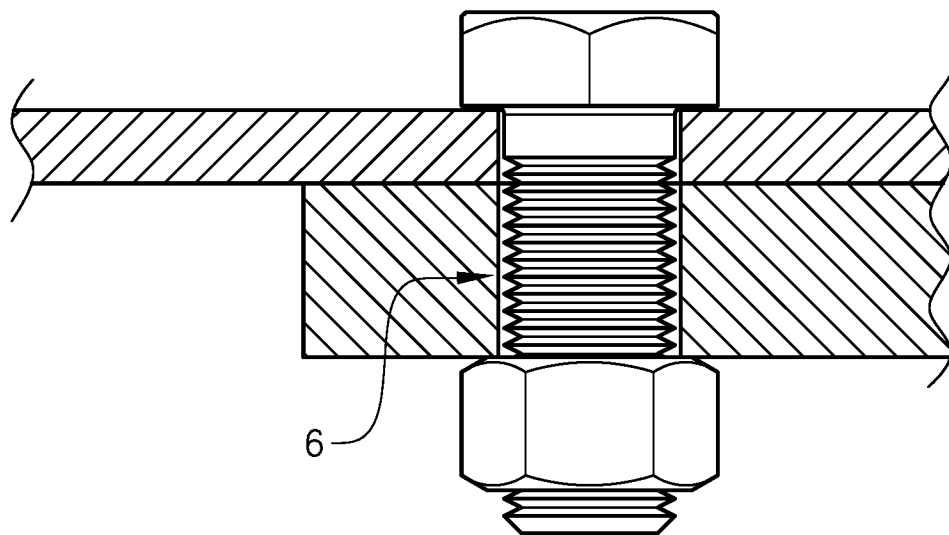
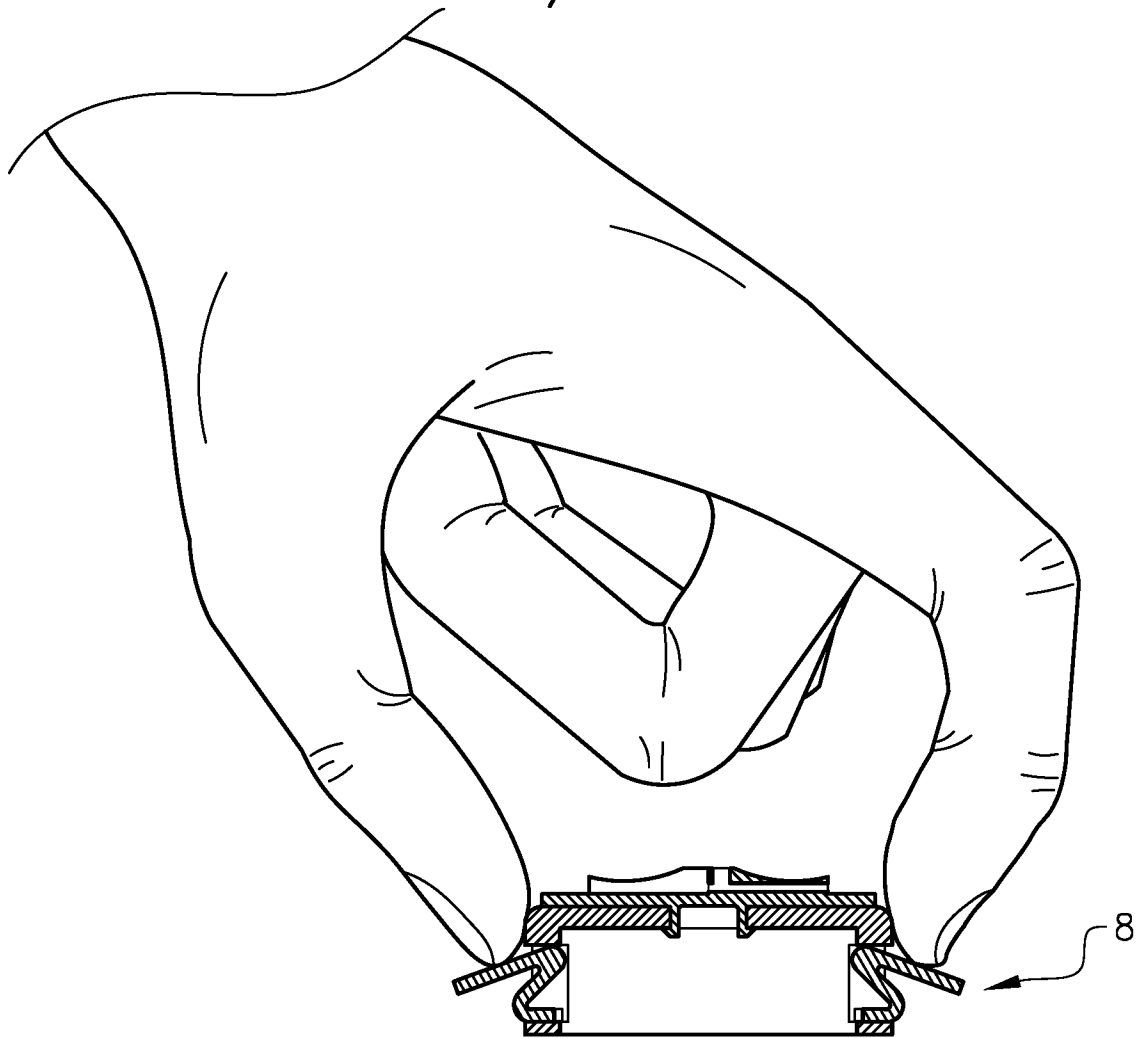


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/079930

A. CLASSIFICATION OF SUBJECT MATTER

INV. B65D59/06 F16L3/00 F16B1/00
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)
B65D F16L

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/164027 A1 (AUER ROBERT [US]) 19 July 2007 (2007-07-19) figure 1	1-25
X	US 2015/129073 A1 (QUAGLIANI NORMAN [US]) 14 May 2015 (2015-05-14) figure 1	1-25
X	US 1 642 330 A (BENJAMIN BROWNSTEIN) 13 September 1927 (1927-09-13) figure 2	1-25



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

3 February 2017

Date of mailing of the international search report

13/02/2017

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Dauvergne, Bertrand

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2016/079930

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007164027	A1	19-07-2007	NONE
US 2015129073	A1	14-05-2015	NONE
US 1642330	A	13-09-1927	NONE