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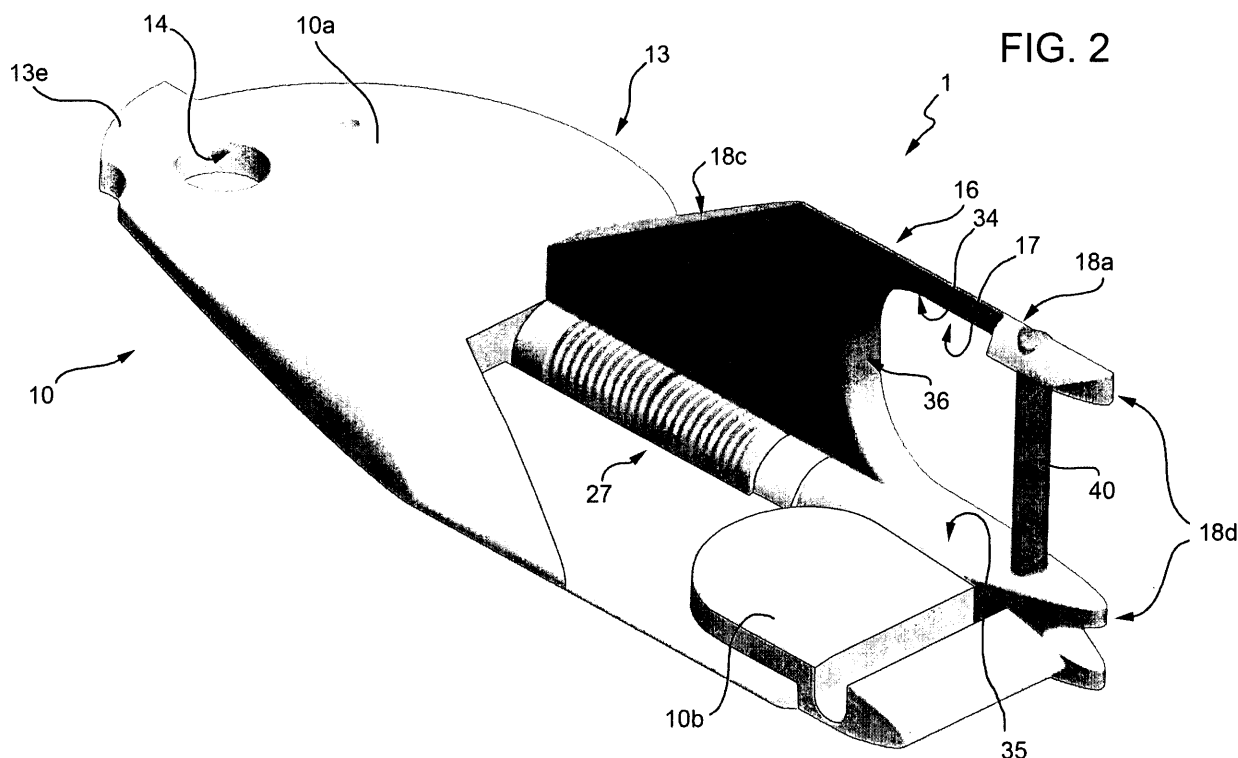
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(54) **Torpedo umbilical cord cutting device**

(57) A device for cutting the umbilical cord (3) of a torpedo (4), and having: a substantially flat rotary member (10) defining a peripheral cutting portion (13) and having a hinge hole (14) by which to hinge it to an outer surface of the torpedo (4); and a flap (16) connected to the substantially flat rotary member (10) and defining an

eye (17) through which to thread the umbilical cord (3). The flap (16) is movable between a raised work position, in which the flap (16) is crosswise to the substantially flat rotary member, and a withdrawn rest position, in which the flap (16) is substantially coplanar with the substantially flat rotary member (10).



Description

[0001] The present invention relates to a torpedo umbilical cord cutting device.

[0002] As is known, before a torpedo is launched, the electronic equipment on the torpedo is supplied with torpedo mission data, normally by means of an electric/optical connection extending between the torpedo and the launch tube.

[0003] The electric/optical connection comprises a number of electric/optical conductors bunched together and enclosed in a sheath to form a so-called umbilical cord.

[0004] The umbilical cord must be cut to allow the torpedo to leave the launch tube.

[0005] A torpedo umbilical cord cutting device comprises a substantially flat rotary member defining a normally C-shaped peripheral cutting portion; and a flap integral with and crosswise to the rotary member, and defining an eye through which to thread the umbilical cord projecting from a rear portion of the torpedo.

[0006] The rotary member is hinged to a rear surface of the torpedo, and is rotated about the hinge axis, by the pull exerted on the umbilical cord when the torpedo is launched, to cut the umbilical cord by means of the peripheral cutting portion.

[0007] A cutting device of the above type is described in German Patent Application DE 3310670 filed by Krupp Mak Maschinenbau GmbH.

[0008] As the torpedo moves through the water, the cutting device may rotate about the hinge axis, and the flap may produce swirl in the laminar flow about the torpedo.

[0009] Such swirl produces noise detectable by the enemy to determine the course of the torpedo, which, as is known, must move as silently as possible to avoid detection.

[0010] It is an object of the present invention to provide a cutting device designed to reduce such noise.

[0011] According to the present invention, there is provided a device for cutting the umbilical cord of a torpedo, and comprising: a substantially flat rotary member defining a peripheral cutting portion and having hinge means by which to hinge it to an outer surface of the torpedo; and a flap connected to said substantially flat rotary member and defining at least part of an eye through which to thread said umbilical cord; the device being **characterized in that** said flap is movable between a raised work position, in which said flap is crosswise to the substantially flat rotary member, and a withdrawn rest position, in which said flap is substantially coplanar with said substantially flat rotary member.

[0012] A preferred, non-limiting embodiment of the invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a topside view in perspective of an umbilical cord cutting device in accordance with the

teachings of the present invention and in a first operating position;

Figure 2 shows a topside view in perspective of the Figure 1 device in a second operating position;

Figure 3 shows an underside view in perspective of the Figure 1 device in the second operating position; Figure 4 shows a side view in perspective of the Figure 1 device in the second operating position;

Figure 5 shows an example of the Figure 1-4 device in use.

[0013] Number 1 in Figure 1 indicates as a whole a cutting device for cutting an umbilical cord 3 of a torpedo 4 (Figure 5).

Device 1 comprises:

[0014]

- a substantially flat rotary member 10 defining a C-shaped peripheral cutting portion 13, and having an end portion 13e with a hole 14 used (in known manner not described) to hinge rotary member 10 to an outer surface of a rear portion of torpedo 4 (Figure 5);
- a flap 16 connected to rotary member 10 and defining at least part of an eye 17 through which to thread umbilical cord 3; and
- an angular positioning device 27 enabling flap 16 to move from a raised work position (Figures 2, 3, 4, 5), in which flap 16 is crosswise to substantially flat rotary member 10, and a withdrawn rest position (Figure 1), in which flap 16 is substantially coplanar with substantially flat rotary member 10.

[0015] More specifically, substantially flat rotary member 10 comprises a flat semicircular portion 10a, from which a substantially flat, substantially rectangular, elongated portion 10b extends integrally.

[0016] Hole 14 is formed close to one end of peripheral cutting portion 13.

[0017] Elongated portion 10b is bounded by a first straight long side 12a, by a second straight long side 12b (Figure 1), and by a straight short side 12c.

[0018] A parallelepiped-shaped appendix 15 extends integrally from a central portion of first side 12a (Figure 3), and is coplanar with elongated portion 10b.

[0019] Parallelepiped-shaped appendix 15 is fitted with a first end of a shaft 27 (Figures 3, 4) extending parallel, and equally spaced with respect, to first side 12a.

[0020] A second end (not shown) of shaft 27 is housed inside a threaded hole (not shown) formed in a lateral portion K of semicircular portion 10a.

[0021] Flap 16 is roughly in the shape of a right trapezium bounded by a minor-base edge 18a, a major-base edge 18b, an oblique-side edge 18c, and a right-side edge 18d.

[0022] A first parallelepiped-shaped seat 20 is formed in a central portion of major-base edge 18b (Figure 3) to

house parallelepiped-shaped appendix 15; and a second parallelepiped-shaped seat 21 is formed in major-base edge 18b, alongside first seat 20.

[0023] There are thus defined a first appendix 23 separating first and second seat 20 and 21; and a second appendix 24 defining one side of second seat 21.

[0024] First and second appendix 23, 24 have through holes (not shown) engaged by shaft 27, so that flap 16 can rotate about shaft 27 and, therefore, with respect to rotary member 10 to which it is hinged.

[0025] More specifically, the rotation axis of flap 16 is perpendicular to the axis (coinciding with the axis of hole 14) about which rotary member 10 rotates with respect to torpedo 4.

[0026] Shaft 27 is fitted with a first and second coil spring 30, 31, which are coaxial with shaft 27 and spaced axially apart inside second seat 21.

[0027] First spring 30 and second spring 31 each have a first end portion 30a, 31a inserted inside a groove in flap 16; and a second end portion 30b, 31b inserted inside a groove formed in a bottom wall of elongated portion 10b positioned, in use, facing the outer wall of torpedo 4.

[0028] Springs 30, 31 are loaded to push flap 16 towards elongated portion 10b, so flap 16 is substantially coplanar with elongated portion 10b.

[0029] A U-shaped opening extends from right-side edge 18b, and is bounded by two straight lateral edges 34, 35, and by a curved end edge 36.

[0030] A straight cylindrical member 40 extends between straight lateral edges 34, 35 to define one side of opening 17, the other sides of which are defined by straight lateral edges 34, 35, and by curved end edge 36.

[0031] In actual use, the portion of umbilical cord 3 projecting from the rear portion of torpedo 4 faces peripheral cutting portion 13; and umbilical cord 3 is bent towards flap 16, is threaded through eye 17, and extends roughly 360° about the eye to extend in a substantially straight line towards a rear portion of the launch tube.

[0032] Threading umbilical cord 3 through eye 17 prevents springs 30 and 31 from moving flap 16 from the raised work position to the withdrawn rest position.

[0033] When torpedo 4 is launched, the pull exerted on umbilical cord 3 rotates rotary member 10 about the axis of hole 14, so that peripheral cutting portion 13 is brought into contact with and cuts umbilical cord 3 at the root.

[0034] Umbilical cord 3 thus slips through eye 17, and the force exerted by springs 30 and 31 moves flap 16 into the withdrawn rest position, thus minimizing the section of cutting device 1 in the torpedo travelling direction, and so reducing swirl produced by device 1 in the laminar flow about the torpedo as it moves through the water.

[0035] The noise generated by device 1 is therefore greatly reduced.

Claims

1. A device for cutting the umbilical cord (3) of a torpedo (4), and comprising:

- a substantially flat rotary member (10) defining a peripheral cutting portion (13) and having hinge means (14) by which to hinge it to an outer surface of the torpedo (4); and

- a flap (16) connected to said substantially flat rotary member (10) and defining at least part of an eye (17) through which to thread said umbilical cord (3);

the device being **characterized in that** said flap (16) is movable between a raised work position, in which said flap (16) is crosswise to the substantially flat rotary member, and a withdrawn rest position, in which said flap (16) is substantially coplanar with said substantially flat rotary member (10).

2. A device as claimed in Claim 1, wherein elastic means (30, 31) move said flap (16) from said work position to said rest position.

3. A device as claimed in Claim 2, wherein said elastic means comprise at least one coil spring (30, 31).

4. A device as claimed in Claim 3, wherein said substantially flat rotary member is fitted with a shaft (27) fitted coaxially with said coil spring (30, 31), which has at least a first end portion (30b, 31b) resting on said substantially flat rotary member (10), and a second end portion (30a, 31a) resting on said flap (16).

5. A device as claimed in any one of the foregoing Claims, wherein said flap (16) comprises a substantially flat wall, in which a U-shaped opening is formed; and a straight member (40) extends crosswise to parallel edges (34, 35) of said U-shaped opening to define said eye (17).

6. A device as claimed in any one of the foregoing Claims, wherein said flap (16) is hinged with respect to said substantially flat rotary member (10).

7. A device as claimed in Claim 6, wherein the axis of rotation of said flap (16) with respect to said substantially flat rotary member (10) is perpendicular to the axis of rotation of the substantially flat rotary member (10) with respect to said torpedo (4).

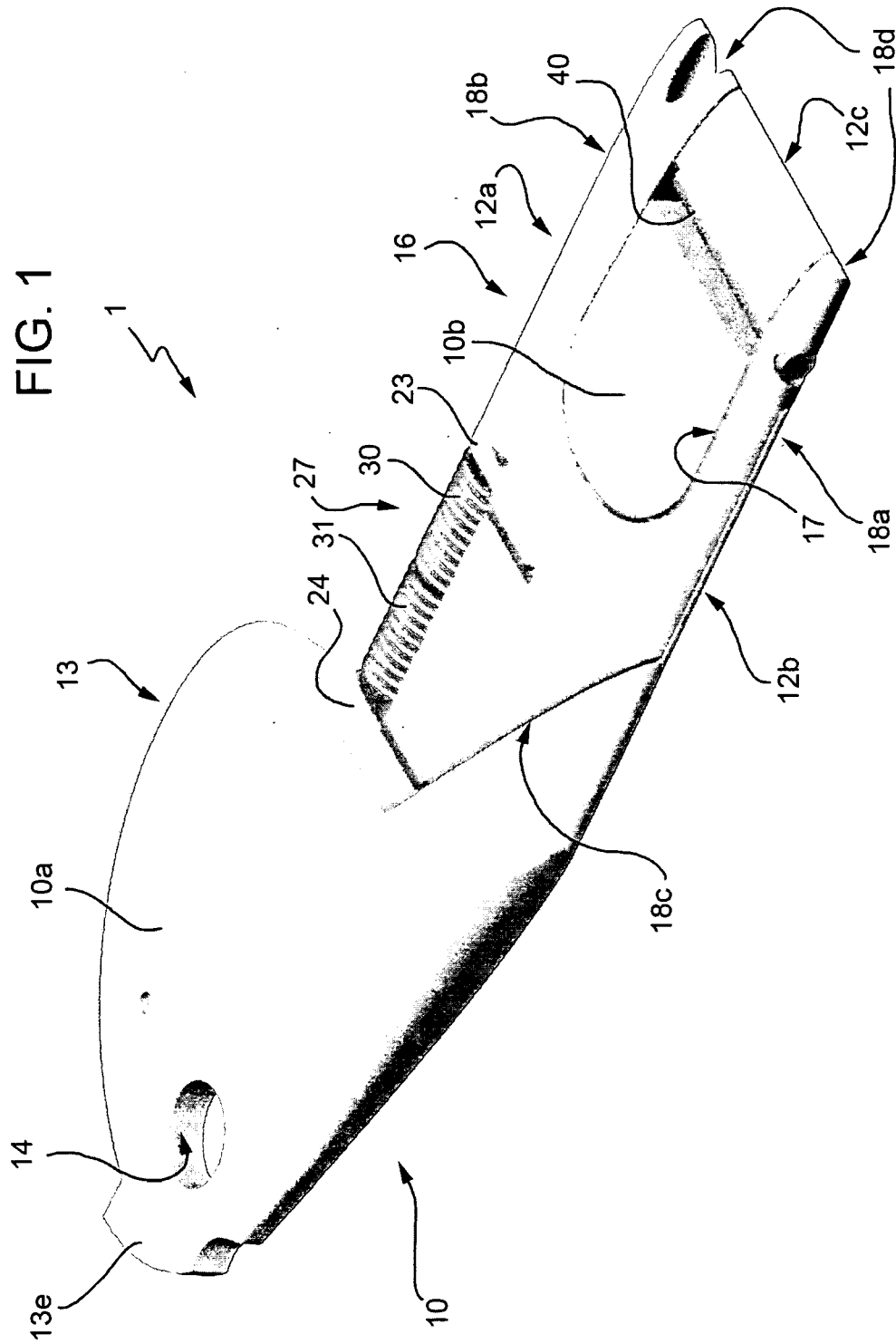


FIG. 2

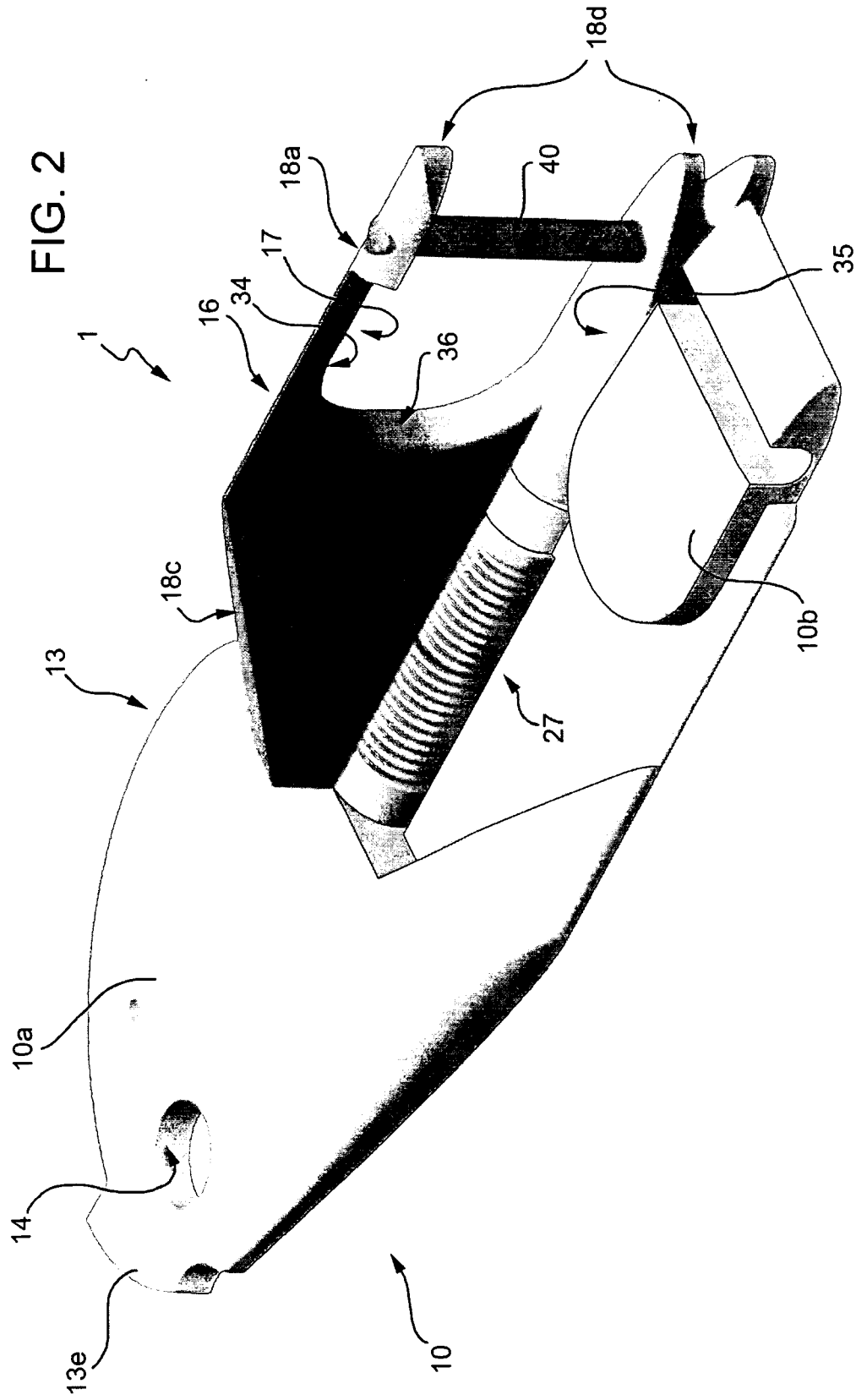
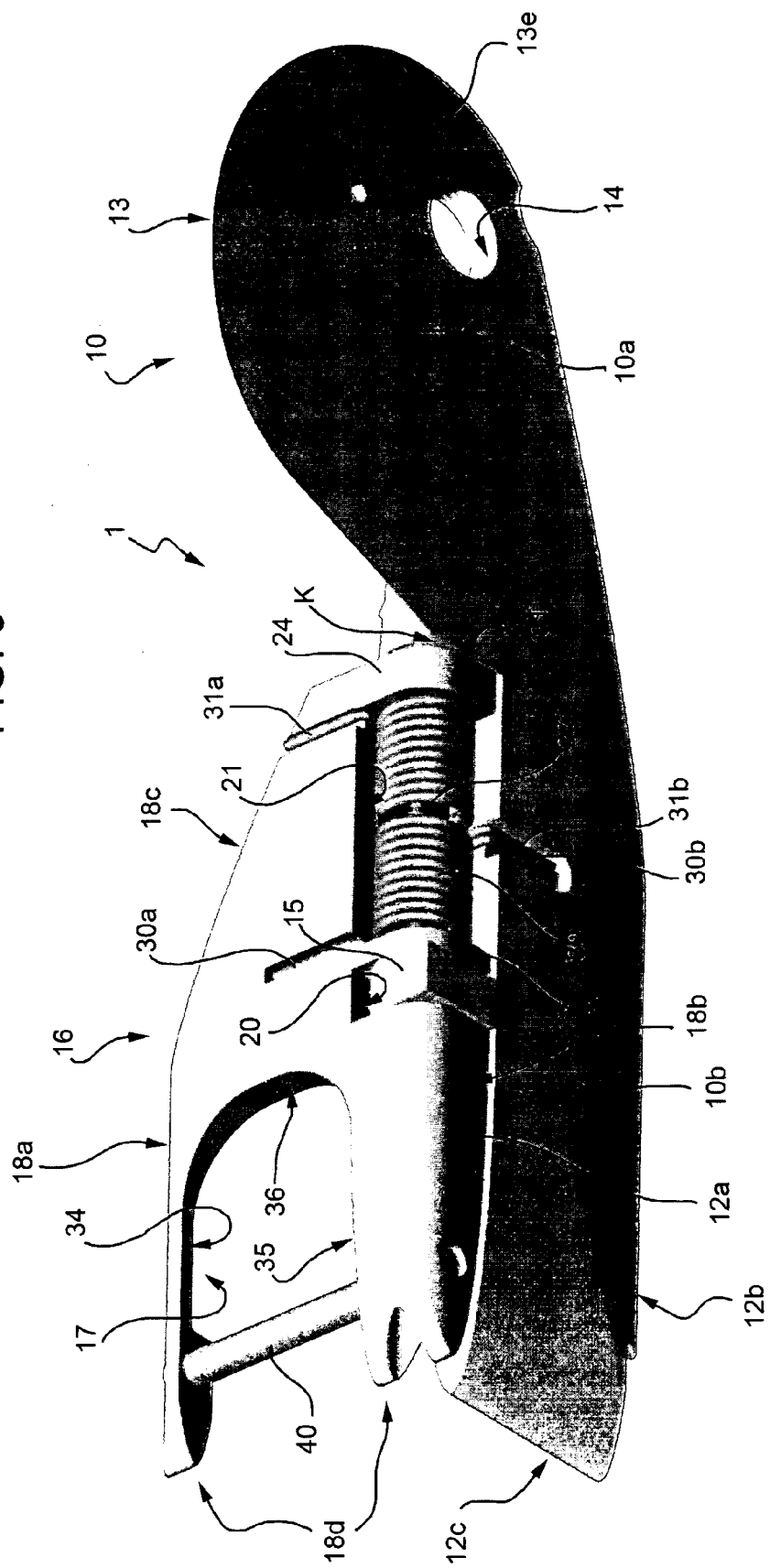


FIG. 3



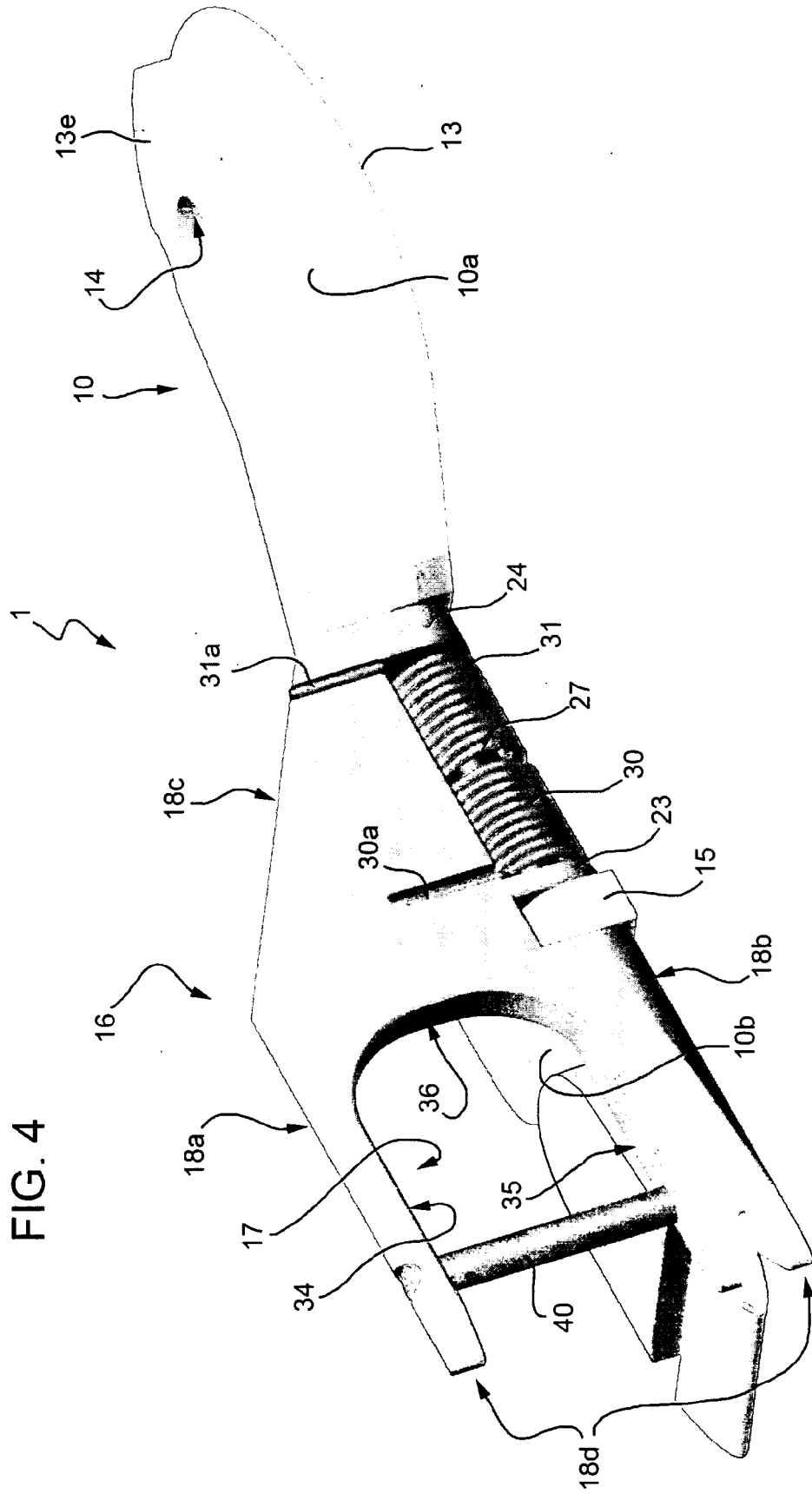
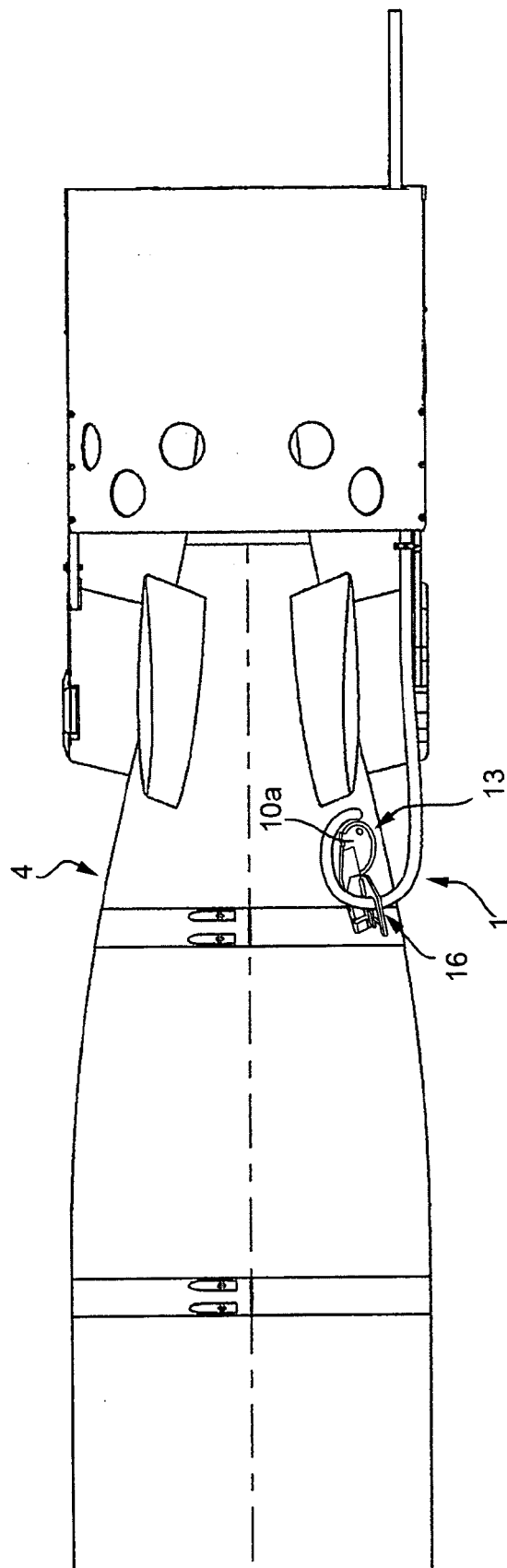


FIG. 4

FIG. 5





EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5334

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			TECHNICAL FIELDS SEARCHED (IPC)
			F41F F42B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 November 2008	Examiner Schwingel, Dirk
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (F04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 42 5334

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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[0007]