(12) **Oversettelse av europeisk patentskrift**

(11) **NO/EP 3003853 B1**

NORGE

(19) NO

(51) Int Cl.

B63G 8/32 (2006.01)

Patentstyret

(21)	Oversettelse publisert	2017.07.03
(80)	Dato for Den Europeiske Patentmyndighets publisering av det meddelte patentet	2017.03.01
(86)	Europeisk søknadsnr	14730495.0
(86)	Europeisk innleveringsdag	2014.06.06
(87)	Den europeiske søknadens Publiseringsdato	2016.04.13
(30)	Prioritet	2013.06.07, FR, 1355270
(84)	Utpekte stater	AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
(73)	Innehaver	DCNS, 40-42 rue du Docteur Finlay, 75015 Paris, FR-Frankrike
(72)	Oppfinner	BLANC, Johnathan, 10 Rue Brueys, F-13100 Aix en Provence, FR-Frankrike FAYOLET, Alain, 7 Chemin des VirgilesRésidence Lou Paradou E.248, F-83120 Sainte Maxime, FR-Frankrike
(74)	Fullmektig	Tandbergs Patentkontor AS, Postboks 1570 Vika, 0118 OSLO, Norge

(54) Benevnelse **DEVICE FOR LAUNCHING A DECOY FOR A SUBMARINE VEHICLE**

(56) Anførte publikasjoner

EP-A1- 1 950 521

DE-C- 161 759

Vedlagt foreligger en oversettelse av patentkravene til norsk. I hht patentloven § 66i gjelder patentvernet i Norge bare så langt som det er samsvar mellom oversettelsen og teksten på behandlingsspråket. I saker om gyldighet av patentet skal kun teksten på behandlingsspråket legges til grunn for avgjørelsen. Patentdokument utgitt av EPO er tilgjengelig via Espacenet (http://worldwide.espacenet.com), eller via søkemotoren på vår hjemmeside her: https://search.patentstyret.no/

The present invention relates to the field of single-use projectile launching devices for a submarine vehicle. More particularly, the invention relates to a member for obturating a discharge outlet aperture of a launching tube of such a launching device.

An example of a single-use projectile (also known as a « one-shot » projectile) is a decoy, i.e. a countermeasure system, intended for deflecting a threat (for example a torpedo or guided missile) to a submarine vehicle, in order to redirect this threat onto the decoy.

Thus certain submarine vehicles are equipped with at least one decoy, this decoy being housed in a suitable projectile-launching device for this purpose.

Such a launching device usually includes a projectile-launching tube, extending in the direction of a longitudinal axis between a proximal end and a distal end. The proximal end is equipped with means for ejecting the projectile housed in the launching tube, and the distal end has an outlet mouth through which the projectile may be launched. This outlet mouth is closed by an obturation member.

This obturation member is notably intended for ensuring the seal of the launching tube as long as the projectile is housed therein, while maintaining this projectile in this launching tube. Moreover, the obturation member is able to allow the passage of the projectile during its launching. Finally, the obturation member is preferably flush with the hull of the submarine vehicle, so as to ensure shape continuity of this hull.

The document DE161759 C is considered as the closest prior art, and it discloses the preamble of claim 1.

In the state of the art, a member for obturating a launching tube mouth added onto the launching tube by means of breakable attachment means is already known. Upon launching the projectile, the latter exerts a thrust force on the obturation member, then causing the breaking of the breakable attachment means, so that the obturation member longitudinally releases the projectile with view to its ejection, and thus does not hamper the launching of this projectile.

In this case, following the launching of the projectile, the obturation member remains flattened against the front end of this projectile under the effect of large hydrodynamic forces related to this launching.

Now, such an obturation member does not have a profiled shape, it causes considerable slowing down of the projectile and therefore limits its distance from the submarine vehicle.

This implies various security risks both for the submarine vehicle and for the projectile. Indeed, when a projectile, notably a decoy, is positioned at a too small distance away, it risks a collision with the submarine vehicle, notably with sensitive elements of this submarine vehicle (such as flank antennas) or being sucked up by the propeller of available, which may thus cause significant damages on this vehicle. Further, a collision with the vehicle implies an early end of mission for the decoy.

The object of the invention notably is to find a remedy to this drawback by providing an obturation member not limiting the distance of a launched projectile, while remaining economical to apply and robust.

For this purpose, the object of the invention is notably a launching device according to claim 1.

Because of said asymmetrical shape, the hydrodynamic frictional forces applied to the obturation member during the launching of the projectile are not homogeneously distributed on this obturation member.

The obturation member is then able to swing relatively to the projectile, under the effect of a torque due to the non-homogeneous distribution of the forces, thus disappearing from the trajectory of this projectile. The projectile is therefore not slowed down by the obturation member.

Moreover, such an obturation member retains all the advantages of an obturation member of the state of the art as defined earlier, i.e. notably low cost and shape continuity with the hull of the submarine vehicle.

Advantageously, a launching device according to the invention includes one or several of the following features, taken alone or according to all the technically conceivable combinations.

- The first portion has a substantially cylindrical shape around the longitudinal axis, this first portion being provided with sealing means intended to ensure a seal between the obturation member and the launching tube.

- The first portion delimits an inner cavity, in which is housed a supporting element, having a receiving surface for a front end of a project file housed in the launching tube.

- The supporting element is a ring, with a general axisymmetrical shape around the longitudinal axis.

- The receiving surface has a general frusto-conical shape converging towards the inside of the ring.

- The supporting element is in polyoxymethylene, and notably in Delrin®.

- The obturation member includes an attachment portion, intended to receive breakable attachment means with the launching tube.

- The launching device includes means for rejecting a project file houses in the launching tube, laid out at its proximal end, for example comprising a pneumatic rammer, a pyrotechnic blow-out device, or a high pressure gas or liquid fluid blow-out device.

- A projectile, notably a decoy, is housed in the launching tube, said projectile extending in the direction of the longitudinal axis between a rear end, and a front end, of a substantially ovoidal shape, for example spherical or hemispherica shape, in contact with the supporting element so as to form a ball-joint connection.

Finally, the invention relates to a submarine vehicle, including a structure bearing a hull, characterized in that it includes a launching device as defined earlier, and wherein:

- the launching tube is secured to the structure,

- the hull is provided with an aperture having a shape mating that of the second portion of the obturation member, the obturation member being at least partly housed through this aperture so that said second portion is flush with the hull, so as to have shape continuity.

The invention will be better understood upon reading the description which follows, only given as an example and made with reference to the appended figures, wherein:

- Fig. 1 is a longitudinal sectional view of a device for launching projectiles from a submarine vehicle, according to an exemplary embodiment of the invention;

- Fig. 2 is a front view of an obturation member of the launching device of Fig. 1, as seen from the outside of the submarine vehicle;

- Fig. 3 is a perspective view of the obturation member of Fig. 2, as seen from the inside of the submarine vehicle;

- Fig. 4 is a similar view to Fig. 1 of the launching device, during a projectile-launching operation.

In Fig. 1, a device 10 for launching a projectile 11 is illustrated, intended to equip a submarine vehicle.

For example, the projectile 11 is a decoy, having a general elongated shape along a longitudinal axis X, between a rear end 11A and a front end 11B. in the present description, the terms of « front » and « rear » refer to the normal displacement direction of the decoy 11 when it is launched.

Conventionally, the submarine vehicle includes a bearing structure 12, also called a « bearing keelson ». The submarine vehicle also includes an outer hull 13, borne by the structure 12.

The launching device 10 includes a tube 14 for launching the decoy 11, secured to the structure 12 of the submarine vehicle.

The launching tube 14 extends in the direction of a longitudinal axis X between a proximal end 14A and a distal end 14B. Conventionally, this launching tube 14 has a general cylindrical shape around the longitudinal axis X.

The decoy 11 is housed and maintained in position in this launching tube 14 upon awaiting its launching. Customarily, the longitudinal axis X of the launching tube 14 then coincides with the longitudinal axis of the decoy 11.

The launching tube 14 has an outlet mouth 18 of the decoy 11, made at its distal end 14B. The hull 13 is then provided with an aperture 19 made facing this mouth 18, in order to allow passing of the decoy 11 upon its launching.

Moreover, the launching tube 14 includes means 20 for ejecting the decoy 11 housed in this launching tube 14. These ejection means 20 are laid out at the proximal end 14A of the launching tube 14. These ejection means 20 are of a conventional type, and are intended to apply a longitudinal thrust force on the rear end 11A of the decoy 11 in order to initiate its launching. For this purpose, the ejection means 20 for example include a pneumatic rammer, a pyrotechnic blow-out device, or a high pressure gas or liquid fluid blow-out device.

The launching device 10 moreover includes an obturation member 22, intended to obturate the outlet mouth 18 of the launching tube 14, so as to maintain the decoy 11 in the launching tube 14. This obturation member 22 is illustrated in more detail in Figs. 2 and 3.

The obturation member 22 includes a first portion 24, notably illustrated in Fig. 3, having a general axisymmetrical shape around a longitudinal axis X.

This first portion 24 is intended to cooperate with the distal end 14B of the launching tube 14, for closing its mouth 18. When this first portion 24 cooperates with the distal end 14B, the longitudinal axis of this first portion 24 coincides with the longitudinal axis X of the launching tube 14.

In the illustrated example, the first portion 24 has a substantially cylindrical shape around the longitudinal axis X. This first cylindrical portion 24 has an outer diameter slightly less than an inner diameter of the launching tube 14, so as to be able to be inserted inside this launching tube 14.

Advantageously, the first portion 24 is provided with sealing means 26, for example including at least one O-ring gasket 26 surrounding an outer surface of this first portion 24. This O-ring gasket 26 is intended to ensure a seal between this first portion 24 and the distal end 14B of the launching tube. In the illustrated example, the first portion 24 includes two O-rings, aligned in the longitudinal direction X, each being pinched between the outer surface of the first portion 24 and an inner surface of the launching tube 14.

Alternatively, the first portion 24 may be provided with any other conceivable sealing means.

The first cylindrical portion 24 is advantageously hollow, so as to delimit an inner cavity 28, in which is housed an element 30 4 maintaining the decoy 11, intended to cooperate with the front end 11B of the decoy 11 in order to longitudinally immobilize this decoy 11 in the launching tube 14.

The supporting element 30 is preferably formed with a ring 30, secured to the first portion 24 in the inner cavity 28, and having a general axisymmetrical shape around the longitudinal axis X.

This supporting ring 30 has a surface 32 for receiving the front end 11B of the decoy 11. For example, the receiving surface 32 has a general frusto-conical shape converging towards the inside of the ring 30. This frusto-conical shape mates the shape of the front end 11B of the decoy 11, so that this front end 11B rests on this receiving surface 32 as this is illustrated in Fig. 1. Indeed, the front end 11B of the decoy 11 generally has a substantially ovoidal shape, for example substantially hemispherical shape.

Because of this shape mating between the receiving surface 32 and the front end 11B, a thrust force of the decoy 11 on the obturation member 22 is homogeneously distributed over the whole of this receiving surface.

Advantageously, the ring 30 is made in a material having good resistance to forces, and a low friction coefficient, for example in polyoxymethylene, notably in Delrin®. Thus, the ring 30 is able to slide over the front end 11B of the decoy 11, thereby forming a ball-joint connection between the decoy 11 and the obturation member 22.

The obturation member 22 moreover includes an attachment portion 34, intended to receive breakable means 35 for attachment with the launching tube 14.

This attachment portion 34 notably includes a shoulder in tended to rest on an additional receiving surface provided on the launching tube 14. Thus, forces due to underwater pressure, applied on the obturation member 22 from the outside to the inside of the vehicle, are absorbed by the launching tube 14.

Moreover, the breakable attachment means 35 are able to be broken when a thrust force greater than a predetermined value is applied to the obturation member 22, from the inside to the outside of the launching tube 14, in the direction of the longitudinal axis X. typically, said predetermined breaking value is provided in order to be less than a thrust force applied by the ejection means 20 on the decoy 11.

The attachment portion 34 is for example made with the first portion 24 in the same material. In this case, the first portion 24 and the attachment portion 34 form

together a main body of the obturation member 22. This main body is for example made in stainless steel.

The obturation member 22 finally it includes a second portion 36, secured to the first portion 24, for example added onto this first portion 24 by attachment means 38, for example comprising screws.

As this is notably illustrated in Fig. 2, the second portion 36 has a shape mating the aperture 19 made in the hull 13 of the submarine vehicle. In particular the obturation member 22 is housed through this aperture 19 so that the second portion 36 is flush with the hull 13, so as to exhibit shape continuity.

As this is illustrated in Fig. 2, the second portion 36 has a general shape, the orthogonal projection of which, in a plane perpendicular to the longitudinal axis X, is asymmetrical relatively to this longitudinal axis X. in particular, this shape has a first area 36A, the shape of which substantially coincides with that of the first portion 24, and a second area 36B radially extending on a single side of the first area 36A.

The launching device 10 is illustrated in Fig. 4 during an operation for launching the decoy 11.

During such a launching operation, the ejection means 20 are enabled, and then exert a thrust force on the decoy 11. This thrust force is retransmitted by this decoy 11 onto the obturation member 22.

As indicated earlier, said predetermined value for breaking breakable attachment means 35 is provided so as to be less than this thrust force. Thus, the breakable attachment means 35 break under the effect of this thrust force, so that the obturation member 22 is disengaged from the launching tube 14.

The decoy 11 is then no longer retained in the launching tube 14, and is launched, by the thrust force, through the mouth 18, and then through the aperture 19 provided in the hull 13.

The obturation member 22 is then found flattened against the front end 11B of the decoy 11, and is therefore driven away in the displacement of this decoy 11. Hydrodynamic pressure forces are then applied to this obturation member 22, notably to its second portion 36, to resist against the displacement of the decoy 11.

Because of the asymmetrical shape of the orthogonal projection of the second portion 36, the hydrodynamic forces applied to this second portion 36 are not homogeneously distributed therein.

Further, the obturation member 22 has a center of inertia which is not positioned on the longitudinal axis X of the launching tube 14.

Thus, upon launching the decoy 11, the combined effect of the thrust force and of the hydrodynamic forces involves the application of a torque on the obturation member 22.

Now, as indicated earlier, the contact between the ring 30 and the front end 11B of the decoy 11 forms a ball-joint connection. Said torque therefore causes swinging of the obturation member 22 with respect to this front end 11B, as illustrated in Fig. 4.

This swinging causes withdrawal of the obturation member 22 relatively to the trajectory of the decoy 11. In other words, the obturation member 22 does not cause slowing down of the decoy 11.

It will be noted that the invention is not limited to the embodiment described above.

In particular, the second portion 36 may exhibit another shape than the one described earlier, as long as the orthogonal projection of the shape on a plane perpendicular to the longitudinal axis X is asymmetrical so as to allow an inhomogeneous distribution of the hydrodynamic forces over the second portion upon launching the decoy.

According to another alternative, the obturation member 22 may be formed in a single part, in which case the first 24 and second 36 portions are at least made in the same material.

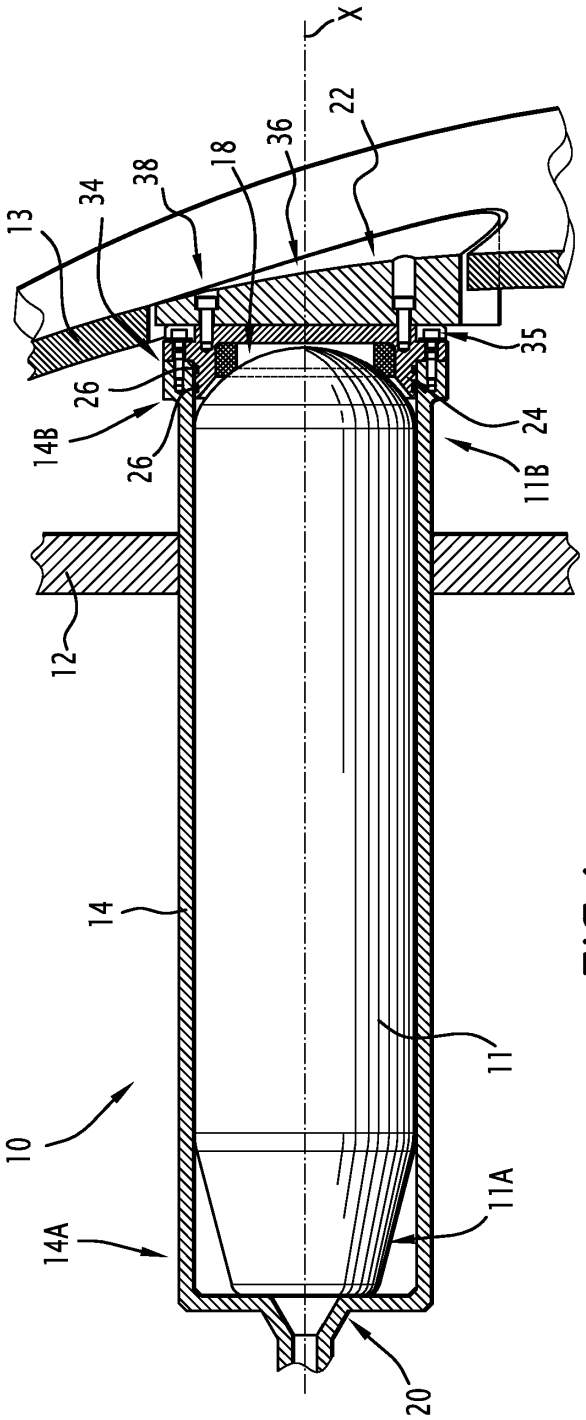

FIG.1

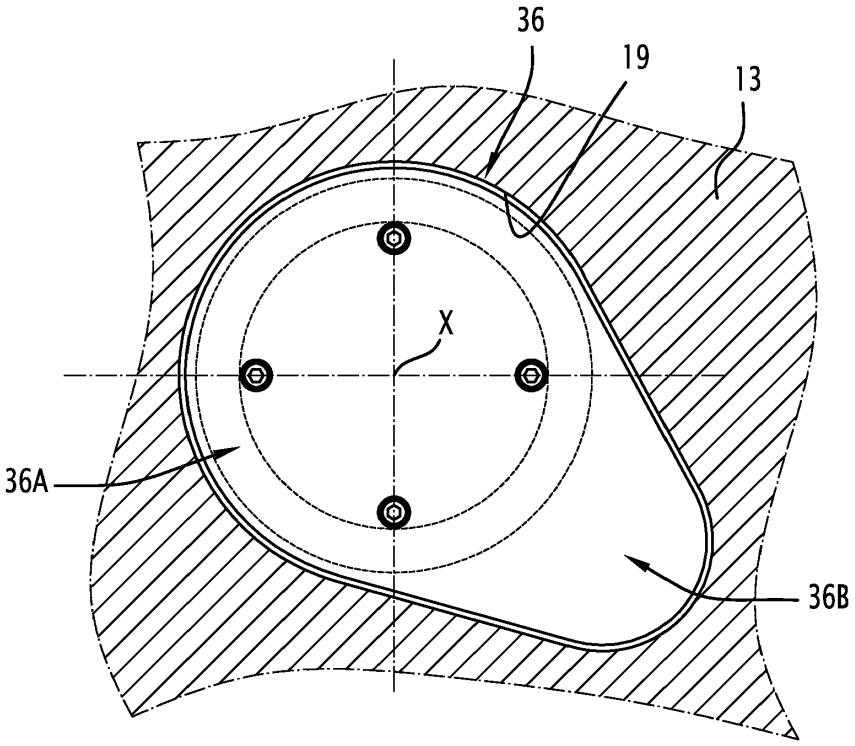

FIG.2

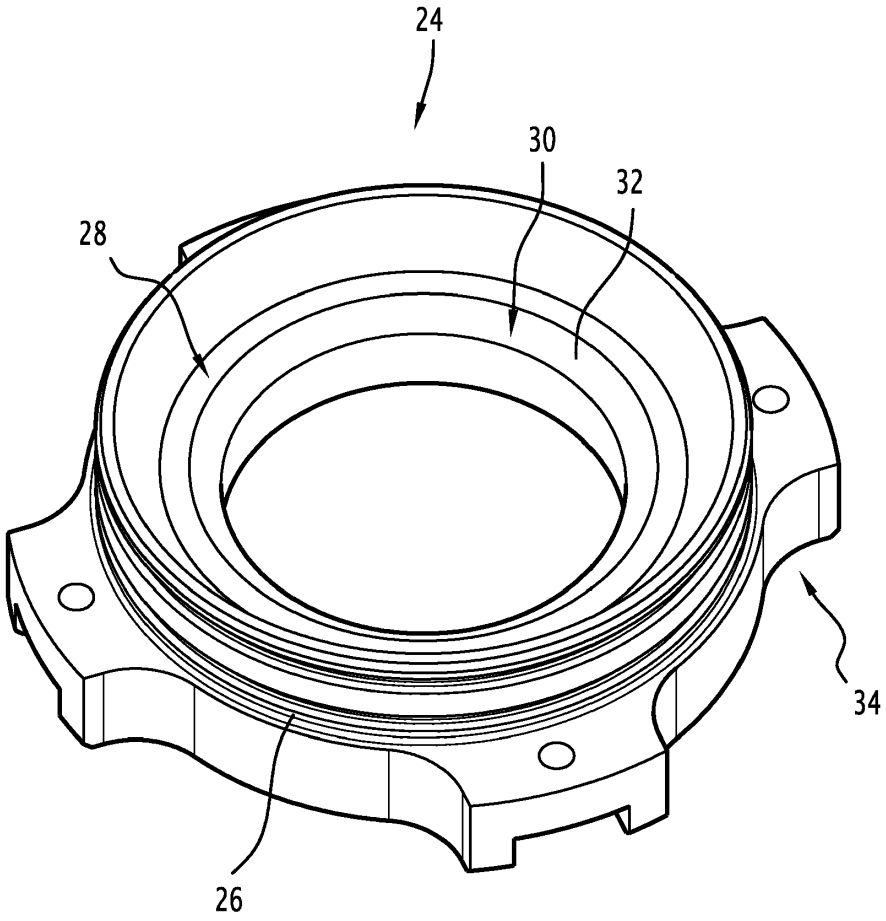

FIG.3

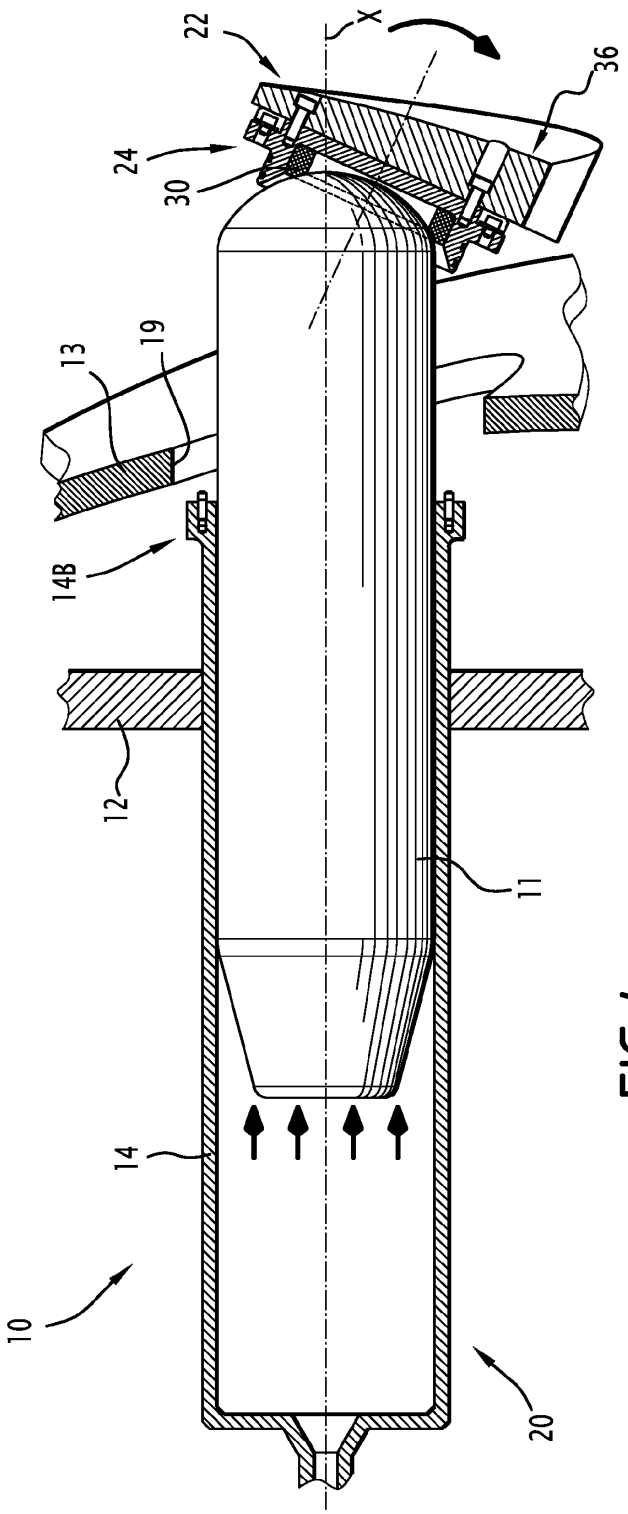

FIG.4

Patentkrav

1. Anordning (10) for utskytning av et prosjektil (11), spesielt et lokkemiddel, for et undervannsfartøy, omfattende et utskytningsrør (14) som strekker seg i retningen til en lengdeakse (X) mellom en indre ende (14A) og en ytre ende (14B), hvor den ytre enden (14B) har en utløpsåpning (18) for prosjektilet (11), omfattende et avsperrings-organ (22) for å stenge en utløpsåpning (18) fra utskytningsrøret (14), hvor avsperringsorganet innbefatter:

- en første del (24), som har en generell rotasjonssymmetrisk form rundt en lengdeakse (X), tilsiktet for å samvirke med en ytre ende (14B) av utskytningsrøret (14) for å lukke dets åpning (18), og

- en andre del (36) fastgjort til den første delen (24), og som har en generell form hvis ortogonalprojeksjon, i et plan vinkelrett på lengdeaksen, (X), er asymmetrisk med hensyn til lengdeaksen (X),

hvor avsperringsorganet (22) er anbrakt på utskytningsrøret (14) slik at den første delen (24) samvirker med den ytre enden (14B), hvor lengdeaksen (X) til denne første delen (24) er i det vesentlige linjeført med lengdeaksen til utskytningsrøret (14),

karakterisert ved at utskytningsanordningen (10) omfatter en sikringsinnretning (35) for innfesting av avsperringsorganet (22) på utskytningsrøret (14), i stand til å brekke når en skyvekraft, påført på avsperringsorganet (22) fra innsiden av utskytningsrøret (14) i retningen til lengdeaksen (X), er større enn en forbestemt verdi.

2. Utskytningsanordning (10) ifølge krav 1, hvor den første delen (24) av avsperringsorganet (22) har en i det vesentlige sylindrisk form rundt lengdeaksen (X), hvor denne første delen er utstyrt med en tetningsinnretning (26) tilsiktet for å sikre en forsegling mellom avsperringsorganet (22) og utskytningsrøret (14).

3. Utskytningsanordning (10) ifølge krav 1 eller 2, hvor den første delen (24) av avsperringsorganet (22) avgrenser et indre hulrom (28), i hvilket det er anbrakt et holdeelement (30) med en mottaksflate (32) for en fremre ende (11 B) av et prosjektil (11) anbrakt i utskytningsrøret (14).

4. Utskytningsanordning (10) ifølge krav 3, hvor holdeelementet (30) er en ring (30) med en generell rotasjonssymmetrisk form rundt lengdeaksen (X).

5. Utskytningsanordning (10) ifølge krav 4, hvor mottaksflaten (32) har en generell stumpkonisk form som smalner av mot innsiden av ringen (30).

6. Utskytningsanordning (10) ifølge ethvert av kravene 3 til 5, hvor holde-elementet (30) er av polyoksymetylen.

7. Utskytningsanordning (10) ifølge ethvert av de foregående krav, hvor avsperringsorganet (22) innbefatter et innfestingsparti (34), tilsiktet for å motta sikringsinnretningen (35) for innfesting på utskytningsrøret (14).

8. Utskytningsanordning (10) ifølge ethvert av de foregående krav, omfattende en innretning (20) for å kaste ut et prosjektil (11) anbrakt i utskytningsrøret (14), anordnet ved dets indre ende (14A), for eksempel omfattende en pneumatisk rambukk, en pyroteknisk drivanordning eller en drivanordning med gass eller væskeformig fluid under høyt trykk.

9. Utskytningsanordning (10) ifølge krav 8, tatt som en kombinasjon med et hvilket som helst av kravene 2 til 5, hvor et prosjektil (11), spesielt et lokkemiddel, er anbrakt i utskytningsrøret (14), hvor prosjektilet (11) strekker seg i retningen til lengdeaksen (X) mellom en bakre ende (11A), og en fremre ende (11B), av en i det vesentlige eggform, for eksempel kule- eller halvkuleform, i kontakt med holde-elementet (30) for å danne en kuleleddforbindelse.

10. Undervannsfartøy, omfattende en struktur (12) som bærer et skrog (13), karakterisert ved at det innbefatter en utskytningsanordning (10) ifølge ethvert av de foregående krav, og hvor:

- utskytningsrøret (14) er fastgjort til strukturen (12),

- skroget (13) er forsynt med en spalte (19) som har en form som passer med den til den andre delen (36) av avsperringsorganet (22), idet avsperringsorganet (22) er i det minste delvis anbrakt gjennom denne spalten (19) slik at den andre delen (36) flukter med skroget (13), slik at det foreligger formkontinuitet.