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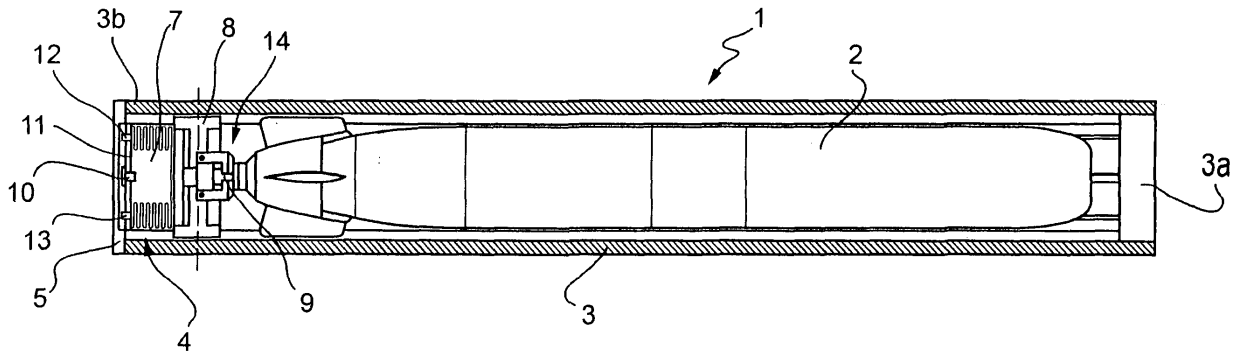
(54) **Torpedo lauch device**

(57) A device for launching a torpedo (2), the device having a launch tube (3) for housing the torpedo (2); and a firing device (4) having an inflatable bag (7), and an explosive device (10) for producing a gas by which to inflate the bag (7) and generate thrust on, to launch, the torpedo (2).

FIG. 1



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Description

[0001] The present invention relates to a torpedo launch device, in particular for launching torpedoes from a surface vessel.

[0002] Pneumatic torpedo launch devices are known which substantially comprise a launch tube, into which the torpedo is inserted; and a system for feeding compressed air into the rear of the launch tube to fire the torpedo. The compressed air is contained in a highpressure cylinder.

[0003] Known devices of the type briefly described above have various drawbacks.

[0004] In particular, compressed air must be made available on the launcher; maintaining the given compressed-air pressure may pose problems; and, finally, the pneumatic system calls for routine maintenance.

[0005] It is an object of the present invention to provide a launch device designed to eliminate the aforementioned drawbacks typically associated with known devices.

[0006] According to the present invention, there is provided a launch device as claimed in Claim 1.

[0007] A preferred, non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows an axial section of a launch device in accordance with the present invention;

Figures 2 and 3 show larger-scale, partly sectioned details in perspective of the Figure 1 device in two different operating conditions;

Figure 4 shows a cross section of a launch tube of the Figure 1 device;

Figure 5 shows a section along line V-V in Figure 4.

[0008] Number 1 in Figure 1 indicates as a whole a launch device for launching a torpedo 2.

[0009] Launch device 1 comprises a substantially cylindrical launch tube 3 having a front muzzle end 3a and a rear end 3b; and a expulsion assembly 4 housed inside launch tube 3, close to rear end 3b.

[0010] In the tube-launch configuration, torpedo 2 is fitted at the rear with a shank 9 with a spherical end 9a.

[0011] Expulsion assembly 4 comprises a base disk 5 connected to rear end 3b of launch tube 3; a thrust disk 8 connectable releasably to shank 9 of torpedo 2 housed inside launch tube 3; and an explosive-actuated bag 7 interposed axially between base disk 5 and thrust disk 8.

[0012] Base disk 5 is preferably connected to rear end 3b of launch tube 3 by a fast-fit, e.g. bayonet, connecting device not shown.

[0013] Bag 7 is substantially cylindrical, and has a rear base wall 11 secured to base disk 5 by fast-fit, e.g. bayonet, connecting means not shown. At rest, as shown in Figure 1, bag 7 is folded accordion-fashion and lashed in place by a calibrated-release binding not shown.

[0014] Bag 7 is fitted with and inflated by an explosive gas generator 10.

[0015] Bag 7 also comprises a relief valve 12 and a safety valve 13 housed in respective seats in base disk 5 to communicate with the outside of launch tube 3.

[0016] Thrust disk 8 is connected releasably to torpedo shank 9 by a lock device 14 shown in Figures 2 and 3.

[0017] Lock device 14 substantially comprises a gripper 16 having a central body 18 housed in axially sliding manner inside a central cavity 17 of thrust disk 8, and to which are hinged two substantially L-shaped jaws 19, which cooperate with shank 9 of torpedo 2 and are held in the closed position gripping the shank by the walls of cavity 17. Central body 18 has an axial push-rod 22 which cooperates with spherical end 9a of shank 9 of torpedo 2; and central body 18 is connected, by an actuating rod 20 fitted through thrust disk 8, to a pressure sensor plate 21 facing bag 7. A first spring 48, externally coaxial with actuating rod 20, is compressed between plate 21 and thrust disk 8; and a second spring 49, externally coaxial with push-rod 22, is compressed between central body 18 and jaws 19 (when closed) of gripper 16, so as to push the jaws into the open position.

[0018] Lock device 14 also comprises a number of stop assemblies 24 housed in respective radial holes 23 formed in, and communicating with central cavity 17 of, thrust disk 8.

[0019] Each stop assembly 24 substantially comprises a rod 25 which interacts with central body 18 of gripper 16; and a push-rod 26 connected telescopically to rod 25, and which clicks inside a respective seat 27 in launch tube 3 to axially lock thrust disk 8.

[0020] More specifically, rod 25 comprises a tubular portion 28 (partly removed in Figure 2) housing in sliding manner one end of push-rod 26 forming a plate 29. Push-rod 26 is subjected to the action of two counteracting springs 30, 31 : spring 30 is compressed axially between rod 25 and plate 29 of push-rod 26 to push push-rod 26 outwards, i.e. towards the wall of launch tube 3, and rod 25 inwards, i.e. towards cavity 17; and spring 31 is compressed between an inner shoulder of hole 23 and plate 29 to hold push-rod 26 in the withdrawn position inside hole 23.

[0021] Rods 25 of stop assemblies 24 and central body 18 of gripper 16 have respective bevels 34, 35, which interact with one another, when central body 18 is inserted inside cavity 17, to push rods 25 outwards.

[0022] Thrust disk 8 and torpedo 2 are guided inside launch tube 3 by a number of inner longitudinal guides 40, 41 inside the tube (Figure 4). More specifically, launch tube 3 has four grooves 40 spaced 90° apart and engaged in sliding manner by respective fins 42 on torpedo 2, and by respective guide fins 44 on thrust disk 8; and four grooves 41 spaced 45° from grooves 40 and engaged in sliding manner by respective outer radial projections 45 on thrust disk 8 (Figure 5).

[0023] As shown in Figures 4 and 5, grooves 41 dead-end on the side facing end 3a of tube 3; and shock-absorbing stop devices 46 are provided at the end of

grooves 41 to arrest thrust disk 8.

[0024] Close to front end 3a, a bayonet system (not shown) conveniently permits extraction of thrust disk 8 from end 3a of launch tube 3.

[0025] Launch device 1 operates as follows.

[0026] Firstly, torpedo 2 is configured for launching from the tube by fitting on interface shank 9.

[0027] Thrust disk 8 is then fixed onto shank 9 of torpedo 2 by means of lock device 14.

[0028] In Figure 2, lock device 14 is shown in the deactivated position. When inserted between jaws 19, shank 9 pushes push-rod 22 of central body 18 axially to back up central body 18 inside cavity 17; jaws 19 close onto shank 9 by interaction with the walls of cavity 17; and bevels 34, 35 push stop assemblies 24 outwards.

[0029] Torpedo 2 and thrust disk 8 as a whole are then inserted inside launch tube 3 through rear end 3b, and are locked inside the tube by the ends of push-rods 26 clicking inside respective seats 27.

[0030] Base disk 5, already fitted with bag 7, is fitted inside rear end 3b of launch tube 3, as shown in Figure 1.

[0031] At which point, launch tube 3 is ready for launching.

[0032] To launch the torpedo, gas generator 10 is activated by a control signal.

[0033] The gas produced inflates bag 7, which snaps off the calibrated-release binding holding it in the folded position, begins to expand, and presses on plate 21 to move gripper 16 axially and so release body 18 from rods 25.

[0034] Push-rods 26 are thus withdrawn by springs 31 to release thrust disk 8 from launch tube 3.

[0035] As bag 7 continues inflating, thrust disk 8 advances to expel torpedo 2 from launch tube 3, and comes to rest against shock-absorbing stop devices 46 at the end of launch tube 3.

[0036] Once the torpedo is launched, launch device 1 is restored by :

- deflating bag 7 by means of relief valve 12 on base disk 5;
- extracting thrust disk 8 from front end 3a of tube 3 by means of the bayonet connector;
- removing base disk 5 by means of the bayonet connector, and extracting bag 7 connected to it;
- repeating the operations described above to replace the base disk 5/explosive-gas generator 10/bag 7 assembly with a new or reconditioned one. The used one may be reconditioned by replacing the explosive-gas generator and restoring bag 7 if still serviceable.

[0037] The advantages of launch device 1 according to the present invention will be clear from the above description.

[0038] Using an explosive-gas generator eliminates the need for compressed air and the drawbacks this entails.

[0039] Clearly, changes may be made to device 1 as described herein without, however, departing from the protective scope as defined in the accompanying Claims.

Claims

1. A device for launching a torpedo (2), the device comprising a launch tube (3) for housing said torpedo (2); and a device (4) for generating thrust on, to launch, the torpedo (2); **characterized in that** said firing device (4) comprises an inflatable bag (7); and an explosive device (10) for producing a gas by which to inflate said bag (7).

2. A device as claimed in Claim 1, **characterized in that** said bag (7) is interposed between a base member (5) fixed to a rear end (3b) of said launch tube (3), and a thrust disk (8) connected releasably to said torpedo (2).

3. A device as claimed in Claim 2, **characterized by** comprising a lock device (14) in turn comprising jaw means (16) associated with said thrust disk (8), and a shank (9) carried by said torpedo (2) and cooperating with said jaw means (16).

4. A device as claimed in Claim 3, **characterized in that** said lock device (14) comprises stop means (24) for releasably locking said thrust disk (8) with respect to said launch tube (3).

5. A device as claimed in Claim 4, **characterized in that** said lock device (14) comprises pressure sensor means (21) for deactivating said jaw means (16) and said stop means (24); said pressure sensor means (21) being controlled by said bag (7) when inflated.

6. A device as claimed in one of Claims 2 to 5, **characterized by** comprising shock-absorbing stop means (46) located close to a front end (3a) of said launch tube (3) to arrest said thrust disk (8) after the launch.

7. A device as claimed in one of Claims 2 to 6, **characterized in that** said bag (7) is fitted to said base member (5).

8. A device as claimed in Claim 7, **characterized in that** said bag (7) is fixed releasably to said base member (5).

9. A device as claimed in Claim 7 or 8, **characterized by** comprising a relief valve (12) and a safety valve (13) on said base member (5).

FIG. 1

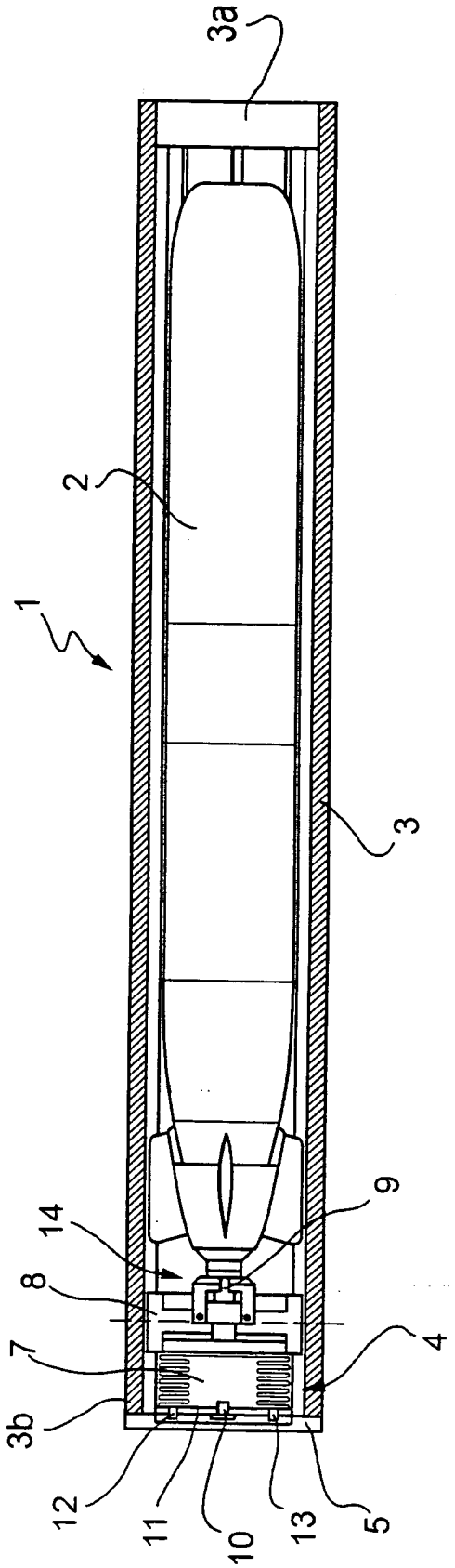

FIG. 2

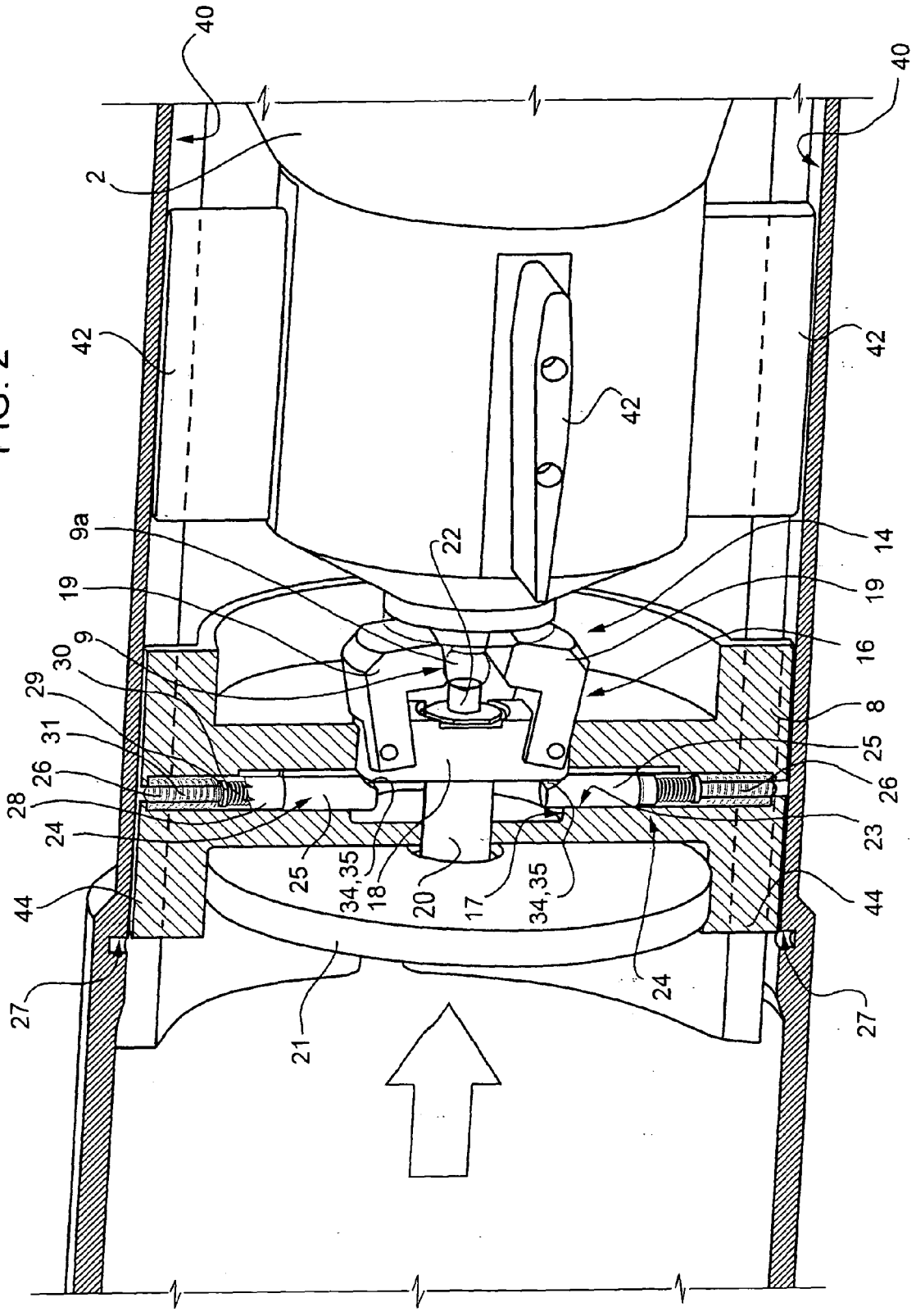
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FIG. 3

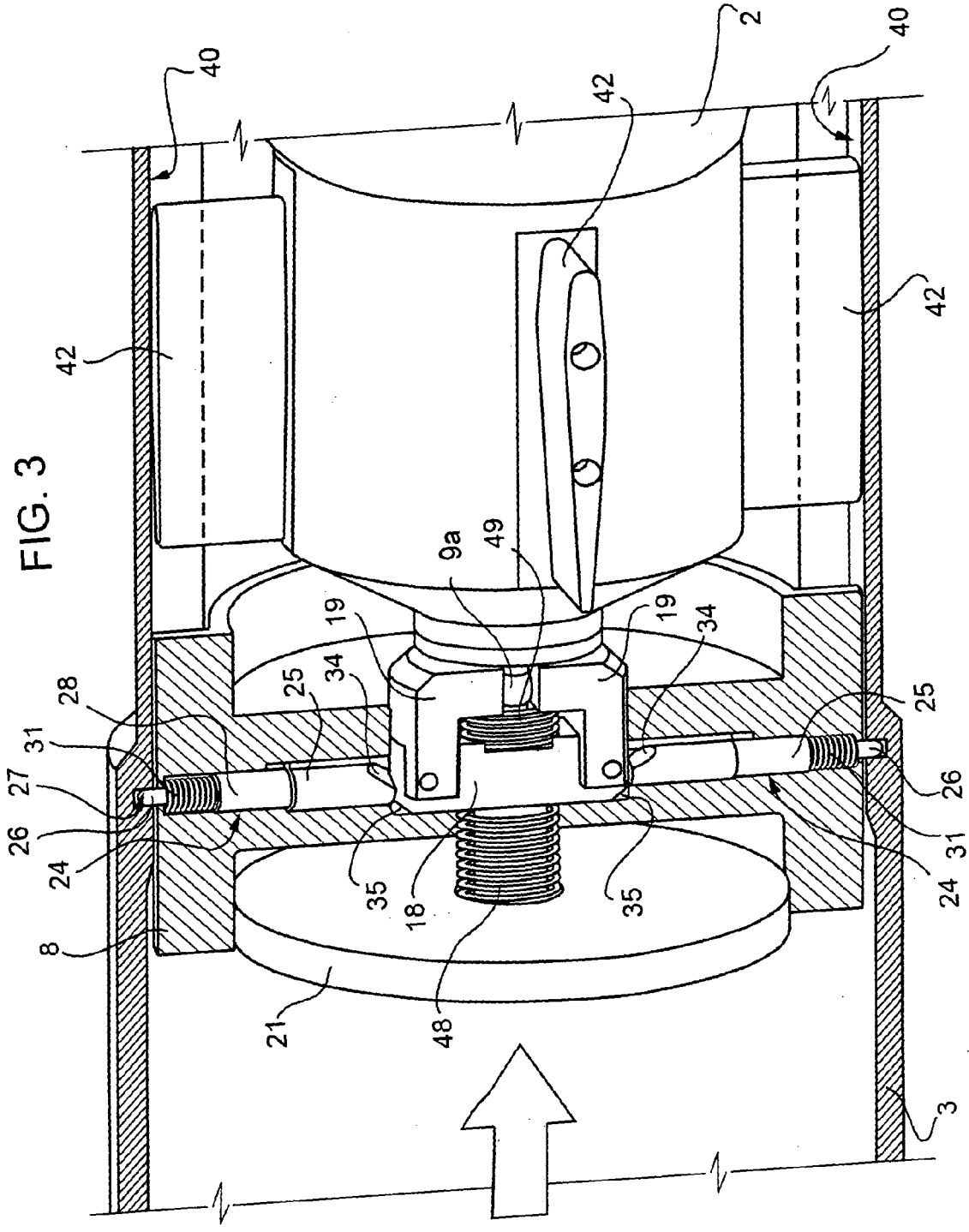
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FIG. 4

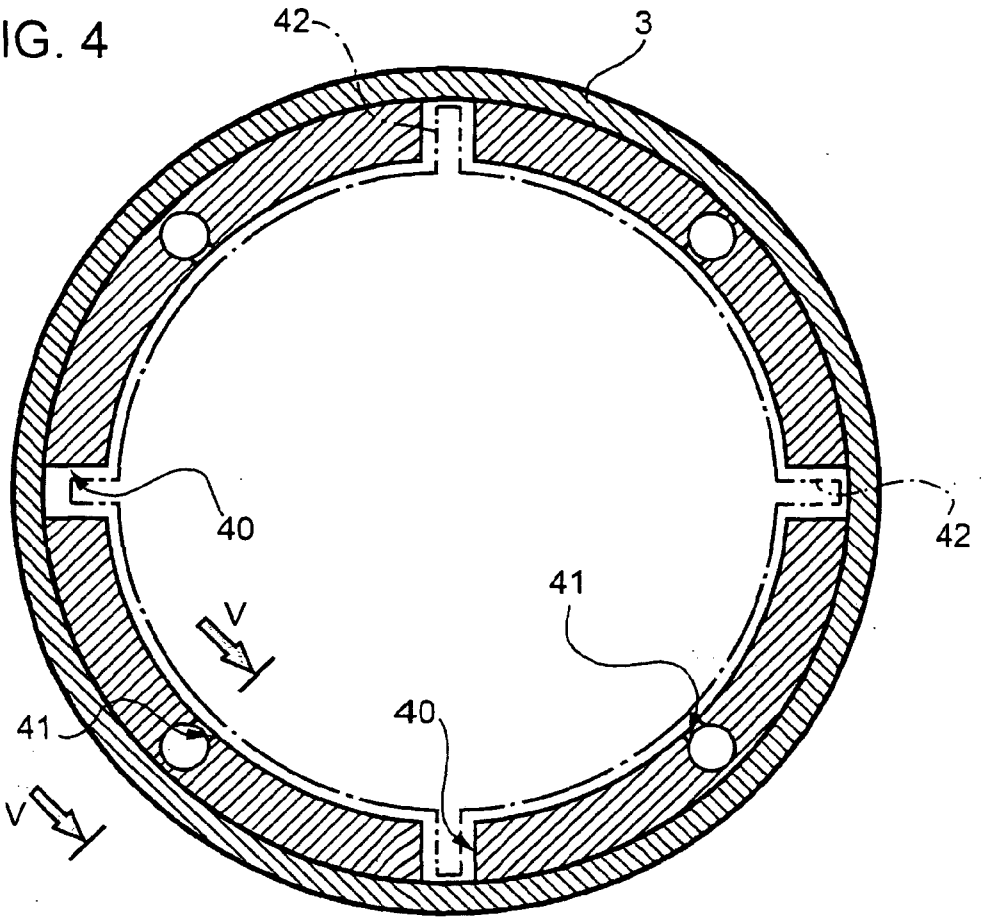
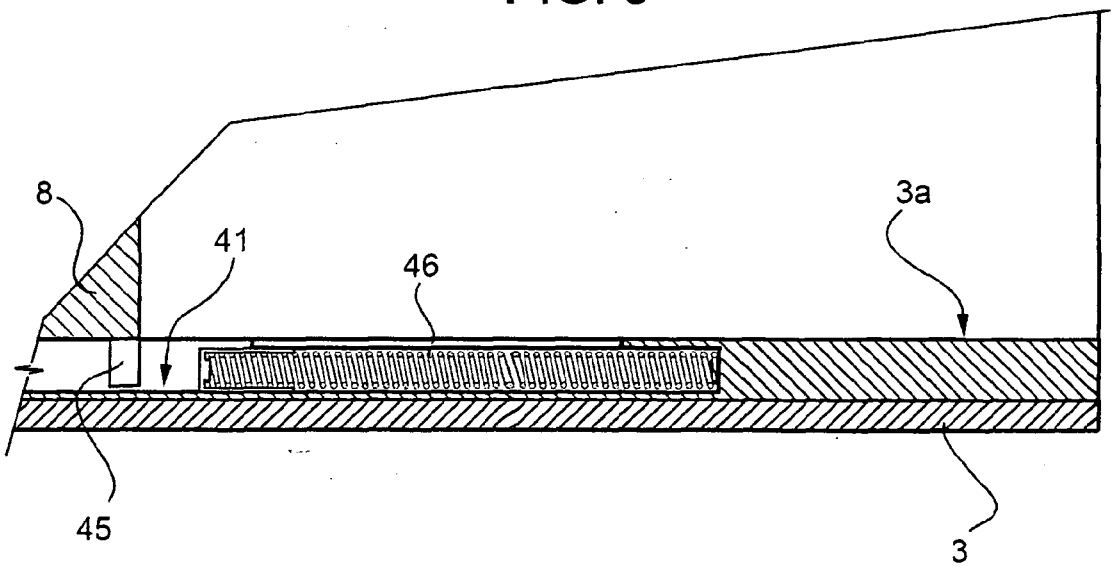


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5224

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	US 4 944 210 A (FLOCK THOMAS G [US] ET AL) 31 July 1990 (1990-07-31) * abstract * * column 2, line 26 - column 4, line 17 * * figures 1-5 *	1,2,6-9 3-5	INV. F41F3/10
Y	WO 01/92095 A (SYSTEMS ENGINEERING ASSOCIATES [US]) 6 December 2001 (2001-12-06) * abstract * * page 1, line 16 - page 3, line 6 * * figure 2 *	3-5	
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A	US 2004/031381 A1 (WILLIAMS MICHAEL W [US] ET AL) 19 February 2004 (2004-02-19) * paragraphs [0015] - [0022] * * figure 1 *		TECHNICAL FIELDS SEARCHED (IPC) F41F F42B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 October 2008	Menier, Renan

CATEGORY OF CITED DOCUMENTS

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