



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.02.2009 Bulletin 2009/07

(51) Int Cl.:
F42B 6/08 (2006.01)

(21) Application number: **07425524.1**

(22) Date of filing: **10.08.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

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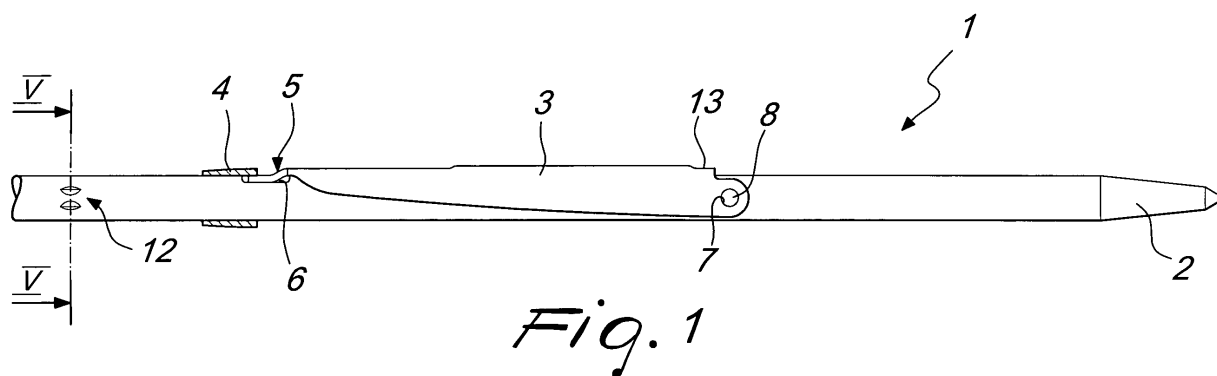
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(54) **Shaft head for speargun**

(57) A shaft head for a speargun, comprising at least one tip (2) and at least one barb (3) which is pivoted so that it can rotate about a substantially transverse axis of rotation from a closed configuration, in which it is substantially adjacent to the head (1), to an open configuration, in which it is adapted to retain the prey; the head further comprises retention means (4), which are detachably engageable with at least one free end (5) of the barb (3), and the retention means (4) are movable from a con-

figuration for locking the barb (3) in the closed configuration to a configuration for disengaging the free end (5) so as to allow the opening of the barb (3), at least the free end (5) having a shape and dimensions which are substantially complementary to those of a respective receptacle (6) provided on the head (1), so as to provide minimum space occupation following the engagement of the free end (5) in the receptacle (6) with consequent optimum hydrodynamic behavior of the shaft (A).



Description

[0001] The present invention relates to a shaft head for a speargun.

[0002] Shafts for spearguns, both elastic-powered and pneumatic, notoriously comprise a head which is provided with a tip and with at least one barb which is pivoted so that it can rotate about a substantially transverse axis of rotation from a closed configuration, in which it is adjacent to the head, to an open configuration, in which it is adapted to retain the prey.

[0003] At the opposite end, shafts comprise an engagement shank (which is specific depending on the type of speargun) which can engage elements for engaging and disengaging the speargun, which are actuated by a provided trigger.

[0004] However, in known types of head the barb is free to rotate about the transverse axis and therefore it can open undesirably during fishing, for example when, during descent, the spearfisher holds the speargun in a substantially vertical position or when the speargun is moved vigorously or turned during normal use.

[0005] Moreover, some users prefer to use shafts in which the barb is mounted in a lower region, and in this case the barb would remain open simply by keeping the speargun in a substantially horizontal position.

[0006] The unwanted opening of the barb can affect the trajectory of the shaft, deflecting it negatively, once it has been fired from the speargun, and in some situations it can prevent correct aiming and even alarm possible prey.

[0007] It is therefore known to resort to accessories which are adapted to prevent opening and are deformable, for example O-rings and the like, which have a suitable diameter and which, arranged on the head so as to surround the barb, keep it adjacent to said head, preventing its accidental opening.

[0008] After firing the shaft, the ring retracts along the shaft due to hydrodynamic drag during its motion, releasing the barb and allowing it to open to retain the prey during retrieval.

[0009] However, resorting to such accessories has some drawbacks: the elastic ring arranged on the head increases the front cross-section which contrasts the advancement of the shaft, negatively affecting the hydrodynamic behavior of the shaft; it is also rather laborious to position correctly, and further, after firing the ring often retracts along the entire length of the shaft and beyond, until it remains on the line that connects the shaft to the speargun, with consequent waste of time to reposition it around the barb. Moreover, it is likely to break with normal use and is lost easily, and therefore it is necessary to replace it rather frequently and to carry spares.

[0010] The aim of the present invention is to solve the above mentioned problems, by providing a shaft head for a speargun which allows to block detachably the barb rapidly and simply, while maintaining optimum hydrodynamic behavior of the shaft.

[0011] Within this aim, an object of the invention is to provide a shaft head for a speargun which, by way of its particular constructive characteristics, is capable of giving the greatest assurances of reliability and safety in use.

[0012] Another object of the present invention is to provide a shaft head for a speargun which has a simple structure, is relatively easy to provide in practice, effective in operation, and further competitive from an economic standpoint.

[0013] This aim and these and other objects which will become better apparent hereinafter are achieved by a shaft head for a speargun, of the type which comprises at least one tip and at least one barb which is pivoted so that it can rotate about a substantially transverse axis of rotation from a closed configuration, in which it is substantially adjacent to said head, to an open configuration, in which it is adapted to retain the prey, characterized in that it comprises retention means which are detachably engageable with at least one free end of said barb, said retention means being movable from a configuration for locking said barb in said closed configuration to a configuration for disengaging said free end so as to allow the opening of said barb, at least said free end having a shape and dimensions which are substantially complementary to those of a respective receptacle provided on said head, so as to provide minimum space occupation following the engagement of said free end in said receptacle with consequent optimum hydrodynamic behavior of the shaft.

[0014] Further characteristics and advantages of the invention will become better apparent from the following detailed description of a preferred but not exclusive embodiment of a shaft head for a speargun according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a side view of a shaft head for a speargun according to the invention, with means for retaining a barb in the locked configuration;

Figure 2 is a side view of a shaft head for a speargun according to the invention, with the retention means in the configuration for disengaging the barb;

Figure 3 is a detail top view of a barb of the shaft head according to the invention;

Figure 4 is an enlarged-scale sectional side view of means for retaining the shaft head according to the invention;

Figure 5 is a detail sectional view taken along the line V-V of Figure 1;

Figure 6 is a schematic top view of a shaft head without a barb;

Figure 7 is a schematic side view of a shaft for a speargun of the elastic-powered type provided with a head with a single barb which is mounted in a lower region, according to the invention;

Figure 8 is a schematic side view of a shaft for a speargun of the elastic-powered type provided with a head with two barbs mounted in mutually opposite

positions, according to the invention.

[0015] With reference to the figures, the reference numeral 1 generally designates a shaft head for a speargun according to the invention.

[0016] The head 1 of a shaft A for a speargun is of the type which comprises at least one tip 2 and at least one barb 3 which is pivoted so that it can rotate about a substantially transverse axis of rotation from a closed configuration, in which it is substantially adjacent to the head 1, to an open configuration, in which it is adapted to retain the prey.

[0017] Advantageously, the head 1 comprises retention means 4 which can be engaged detachably with at least one free end 5 of the barb 3, and the retention means 4 can move from a configuration for locking the barb 3 in said closed configuration to a configuration for disengaging the free end 5 so as to allow the opening of the barb 3. Effectively, the free end 5 has a shape and dimensions which are substantially complementary to those of a respective receptacle 6 which is provided on the head 1, so as to provide minimal space occupation following the engagement of the free end 5 in the receptacle 6, with consequent optimum hydrodynamic behavior of the shaft A.

[0018] In greater detail, the barb 3 is constituted by a folded plate which is affected in a front region by two mutually opposite lateral holes 7 for the passage of an articulation pivot 8, which can engage within a respective transverse through hole 9 of the head 1 and is affected by a front recess 10, which is adapted to allow the opening of the barb 3 by a preset maximum angle. Further, the free end 5 of the barb 3 is tapered and folded toward the axis of the head 1, so as to engage within the receptacle 6.

[0019] In particular, the end portion 5 can be contained completely retractably within the receptacle 6 (as shown in the figures) or, in other exemplary embodiments which are not shown, it may also be contained partially retractably within the receptacle 6.

[0020] The retention means 4 comprise at least one bush, which can slide from said locking configuration, in which it is engaged with the free end 5 inserted in the receptacle 6, to said configuration for disengagement with the free end 5, so as to allow the opening of the barb 3. Positively, the bush 4 comprises a conical inlet 11 which diverges at the front and is adapted to convey in engagement the free end 5 of the barb 3 in the receptacle 6.

[0021] The retention means 4 can move along the head 1 due to hydrodynamic drag during the motion of the shaft A after firing and/or by interference with the target.

[0022] The head comprises suitable elements 12 for stopping the retention means in the disengaged configuration, which can be constituted preferably by at least one protrusion provided on the head for the abutment of the bush and for example by two pairs of mutually opposite protrusions, as shown in the figures, in particular in

Figure 5.

[0023] Conveniently, the barb 3 comprises at least one recessed portion 13 which is adapted to abut, in said closed configuration, against the head 1 so as to keep the barb 3 slightly open with respect to the surface of the head 1, with the free end 5 substantially spaced from the receptacle 6: the barb 3 can therefore be engaged elastically by forcing with the retention means 4 in the locking configuration, so as to then determine its elastic snap opening with the retention means 4 in the disengagement configuration.

[0024] In greater detail, the recessed portion 13 is preferably located at the front in the barb 3, directly downstream of the front recess 10 (conveniently, it can also be provided in other points of the barb 3).

[0025] In another exemplary embodiment of the head 1, not shown in the figures, the transverse axis of rotation of the barb 3 is oblique with respect to the axis of symmetry of the head 1, and therefore the barb 3, in the closed configuration, remains slightly open with respect to the surface of the head 1, with the free end 5 substantially spaced from the receptacle 6: the barb 3 can therefore be engaged elastically by forcing with the retention means 4 in the locking configuration, so as to then determine its elastic snap opening with the retention means 4 in the disengagement configuration.

[0026] Effectively, the inside diameter of the bush 4 is smaller than the sum of the diameter of the head 1 and the thickness of the barb 3, so as to provide minimal space occupation.

[0027] If the free end 5 is contained so that it can retract partially within the receptacle 6 (an exemplary embodiment which is not shown in the figures), the bush can have a substantially ovalized cross-section, and in this case the internal measurement of the major axis is less than the sum of the diameter of the head 1 and the thickness of the barb 3.

[0028] In further exemplary embodiments, the head 1 comprises two barbs 3 which are provided with respective free ends 5, which can engage within at least one respective receptacle 6 provided in the head 1: for example, the two barbs 3 can be mounted so that they are mutually opposite and can rotate on a same pivoting axis, as shown in Figure 8, or can be mounted so that they are mutually opposite and can each rotate about a respective pivoting axis.

[0029] In this case, the inside diameter of the bush 4 is smaller than the sum of the diameter of the head 1 and the thicknesses of the two barbs 3, so as to provide minimal space occupation.

[0030] If the free ends 5 are contained partially retractably in the receptacle 6 (an example which is not shown in the figures), the bush can have a substantially elliptical cross-section, and in this case the inside measurement of the major axis is less than the sum of the diameter of the head 1 and the thickness of the barbs 3.

[0031] Effectively, the head 1 can be provided directly on a shaft for a speargun: it is noted that in Figures 7 and

8, the head 1 (respectively with a single barb 3 mounted in a lower region and with two barbs 3 mounted mutually oppositely) is shown provided directly on shafts A for elastic-powered spearguns (also known as "arbalest", from the French "crossbow"); the head 1 can in any case be provided equally also on shafts A for pneumatic spearguns. The shafts A shown in Figure 7 and in Figure 8 comprise a shank B for engagement with the speargun of a traditional type.

[0032] As an alternative, the head 1 can be provided separately and can be associated with a shaft A for a speargun by way of couplings of a known type, which are threaded, of the bayonet type, and the like.

[0033] The tip 2 can be of any type, for example substantially conical (as shown in the figures) or with a plurality of cusps (for example with three cusps), interchangeable, and of other kinds.

[0034] Operation is intuitive: with simple and quick manual movements, the user elastically presses the barb 3 (which as mentioned remains slightly open) against the head 1, so as to insert the free end 5 in the receptacle 6, and at that point makes the bush 4 slide into engagement with the free end 5, in the configuration for locking the barb 3. Said barb can no longer open accidentally by turning the speargun, due to sudden movements thereof or if it has not been fitted directly in a lower region on the head 1.

[0035] Once the shaft A has been propelled out of the speargun, the bush 4 retracts into a disengagement configuration due to hydrodynamic drag thereof during the motion of the shaft A and/or due to interference with the target, thus releasing the barb 3, which automatically opens with a snap action, as described, so as to retain the prey.

[0036] In this manner, one avoids resorting to accessories, such as elastic rings, which entail an increase in the front space occupation of the shaft, with negative consequences on the hydrodynamic behavior of said shaft, and a considerable waste of time to then reposition them correctly so as to lock the barb.

[0037] Moreover, the fact that the barb 3, with the bush 4 in the disengagement configuration, remains slightly open, offers extra assurance since it prevents accidental disengagement of the prey from the shaft A, an event which can occur with traditional shaft heads in which the barb can remain closed and adjacent thereto.

[0038] Further, the head 1 advantageously allows the user to extract the shaft A very easily from the prey once it has been retrieved: by repositioning the bush 4 in engagement with the free end 5, and by necessarily having to extract the shaft in the opposite direction with respect to the direction in which the bush 4 is disengaged, the barb 3 remains closed on the head 1 without being able to open and engage/drag on the flesh of the prey (as instead can occur with traditional heads), allowing to extract the shaft A rapidly.

[0039] In practice it has been found that the invention fully achieves the intended aim and objects, since the

head 1 of a shaft A for a speargun according to the invention allows to lock detachably the barb 3 rapidly and simply, allowing its automatic snap opening after firing and maintaining optimum hydrodynamic behavior of the shaft A due to the minimum space occupation achieved.

[0040] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent ones.

[0041] In the exemplary embodiments shown, individual characteristics, given in relation to specific examples, may actually be interchanged with other different characteristics that exist in other exemplary embodiments.

[0042] Moreover, it is noted that anything found to be already known during the patenting process is understood not to be claimed and to be the subject of a disclaimer.

[0043] In practice, the materials used, as well as the shapes and dimensions, may be any according to requirements and to the state of the art without thereby abandoning the scope of the protection of the appended claims.

[0044] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

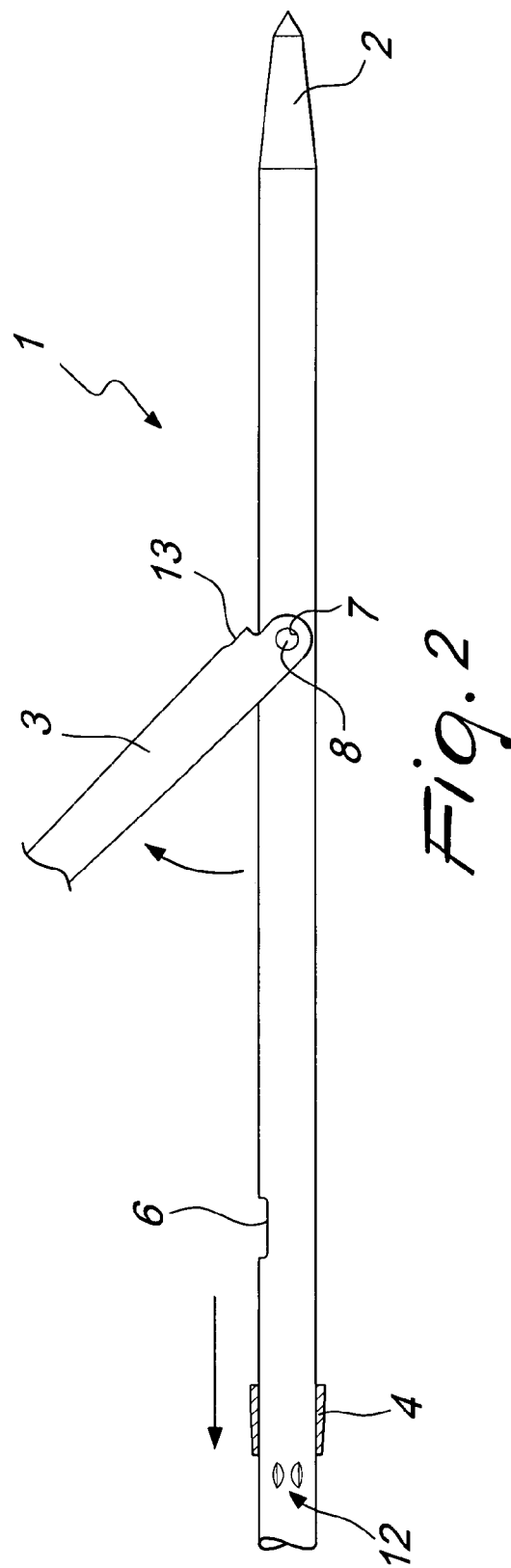
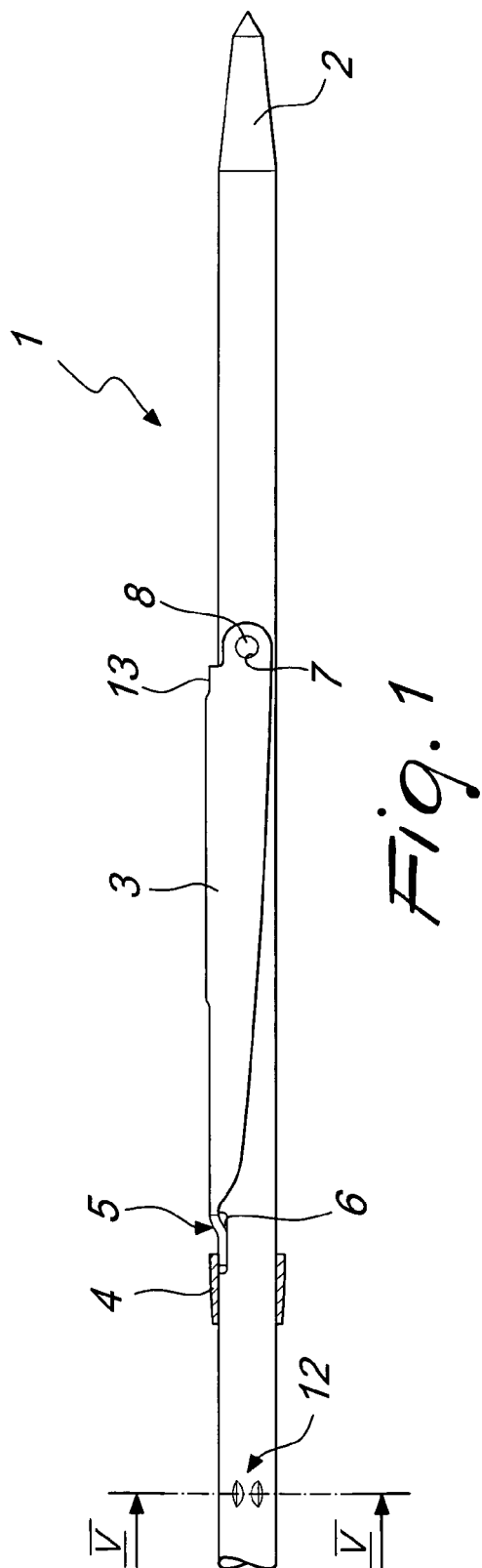
1. A shaft head for a speargun, of the type which comprises at least one tip (2) and at least one barb (3) which is pivoted so that it can rotate about a substantially transverse axis of rotation from a closed configuration, in which it is substantially adjacent to said head (1), to an open configuration, in which it is adapted to retain the prey, **characterized in that** it comprises retention means (4) which are detachably engageable with at least one free end (5) of said barb (3), said retention means (4) being movable from a configuration for locking said barb (3) in said closed configuration to a configuration for disengaging said free end (5) so as to allow the opening of said barb (3), at least said free end (5) having a shape and dimensions which are substantially complementary to those of a respective receptacle (6) provided on said head (1), so as to provide minimum space occupation following the engagement of said free end (5) in said receptacle (6) with consequent optimum hydrodynamic behavior of the shaft (A).
2. The shaft head for a speargun according to claim 1, **characterized in that** said barb (3) is constituted by a folded plate, which is affected at the front by two

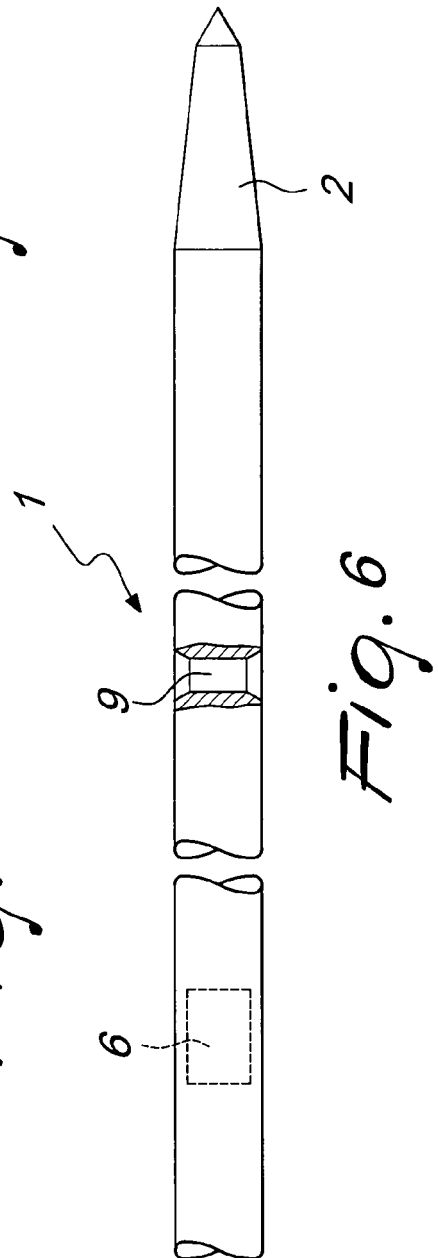
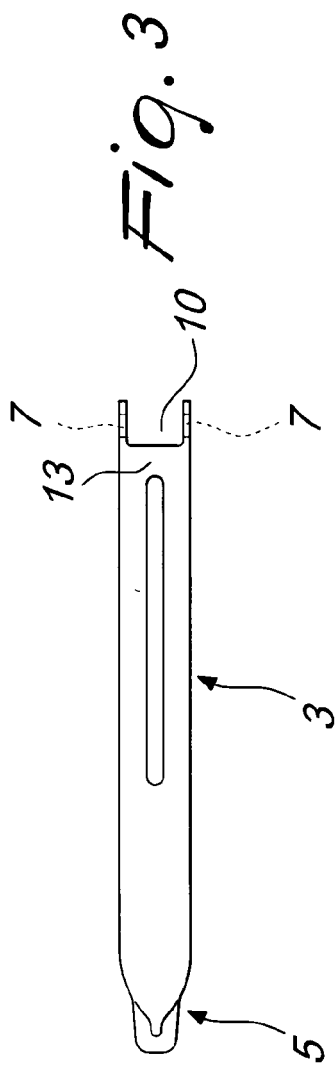
mutually opposite lateral holes (7) for the passage of an articulation pivot (8) which can engage a respective through hole (9) of said head (1) and is affected by a front recess (10) which is adapted to allow the opening of said barb (3) by a preset maximum angle, said barb (3) comprising said free end (5) which tapers and is folded toward the axis of said head (1) so as to engage in said receptacle (6).

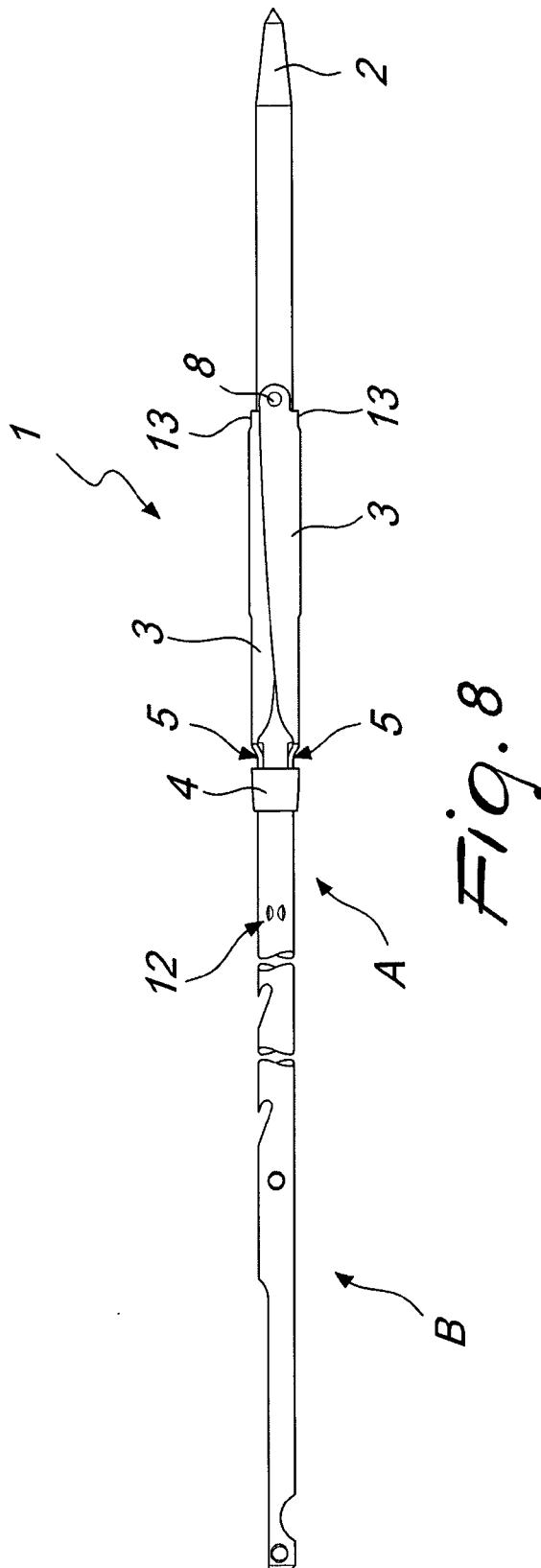
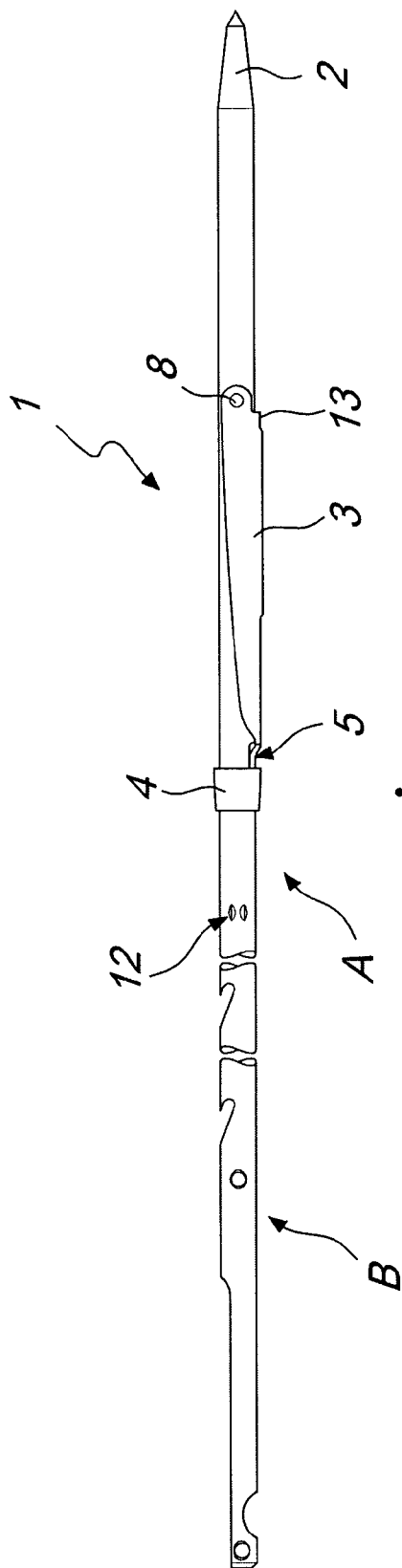
3. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** said retention means (4) comprise at least one bush which can slide from said locking configuration, in which it is engaged with at least said free end (5) inserted in said receptacle (6), to said configuration for disengagement with said free end (5), so as to allow the opening of said barb (3).
4. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** said retention means (4) can move along said head (1) due to hydrodynamic drag during the motion of the shaft (A) and/or due to interference with the target.
5. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** it comprises elements (12) for stopping said retention means (4) in said disengagement configuration.
6. The shaft head for a speargun according to claim 5, **characterized in that** said stop elements (12) comprise at least one protrusion which is provided on said head (1) for the abutment of said bush (4).
7. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** said bush (4) comprises a conical inlet (11) which diverges at the front and is adapted to convey in engagement said free end (5) into said receptacle (6).
8. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** said barb (3) comprises at least one recessed portion (13) which is adapted to abut, in said closed configuration, against said head (1) so as to keep said barb (3) slightly open with respect to the surface of said head (1), with said free end (5) substantially spaced from said receptacle (6), said barb (3) being elastically engageable by forcing with said retention means (4) in the locking configuration, so as to allow the elastic snap opening of said barb (3) with said retention means (4) in the disengagement configuration.
9. The shaft head for a speargun according to claim 8, **characterized in that** said recessed portion (13) is located at the front in said barb (3), downstream of

said front recess (10).

10. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** the axis of rotation of said at least one barb (3) is oblique with respect to the axis of symmetry of said head (1), said barb (3) in said closed configuration being slightly open with respect to the surface of said head (1), with said free end (5) substantially spaced from said receptacle (6), said barb (3) being engageable elastically by forcing with said retention means (4) in the locking configuration, so as to allow the elastic snap opening of said barb (3) with said retention means (4) in the disengagement configuration.
11. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** the inside diameter of said bush (4) is substantially smaller than the sum of the diameter of said head (1) and the thickness of said barb (3), so as to provide minimal space occupation.
12. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** it comprises two barbs (3) which are provided with respective free ends (5) which can engage in at least one respective receptacle (6) provided on said head.
13. The shaft head for a speargun according to claim 12, **characterized in that** said barbs (3) are mounted so that they are mutually opposite and can rotate about a same pivoting axis.
14. The shaft head for a speargun according to claim 12, **characterized in that** said barbs (3) are mounted so that they are mutually opposite and each can rotate about a respective pivoting axis.
15. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** the inside diameter of said bush (4) is substantially smaller than the sum of the diameter of said head (1) and the thicknesses of said two barbs (3), so as to provide minimal space occupation.
16. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** it is provided directly on a speargun shaft (A).
17. The shaft head for a speargun according to one or more of the preceding claims, **characterized in that** it is associable with a shaft (A) for speargun by way of threaded, bayonet and similar couplings.









European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 42 5524

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 3 340 642 A (VASILJEVIC TOMISLAV P) 12 September 1967 (1967-09-12) * column 2, lines 51-68 * * column 3, lines 20-33 * * figures 2,6,7 * -----	1-6, 11-13, 15-17	INV. F42B6/08
X	US 6 200 237 B1 (BARRIE BRUCE [US]) 13 March 2001 (2001-03-13) * column 3, line 6 - column 4, line 27 * * figures 1-3 *	1,3-5,7, 11,12, 14-17	
X	US 3 014 305 A (YURCHICH FRANK J) 26 December 1961 (1961-12-26) * column 1, line 59 - column 3, line 20 * * figures 1,2 *	1,3-6, 8-12, 15-17	
X	SU 1 021 916 A1 (BUBNOV SERGEJ YU) 7 June 1983 (1983-06-07) * figure 1 * -----	1-5,11, 16,17	TECHNICAL FIELDS SEARCHED (IPC) F42B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 2 January 2008	Examiner Menier, Renan
CATEGORY OF CITED DOCUMENTS 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		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	

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

EP 07 42 5524

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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02-01-2008

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US 6200237	B1	13-03-2001	NONE	
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