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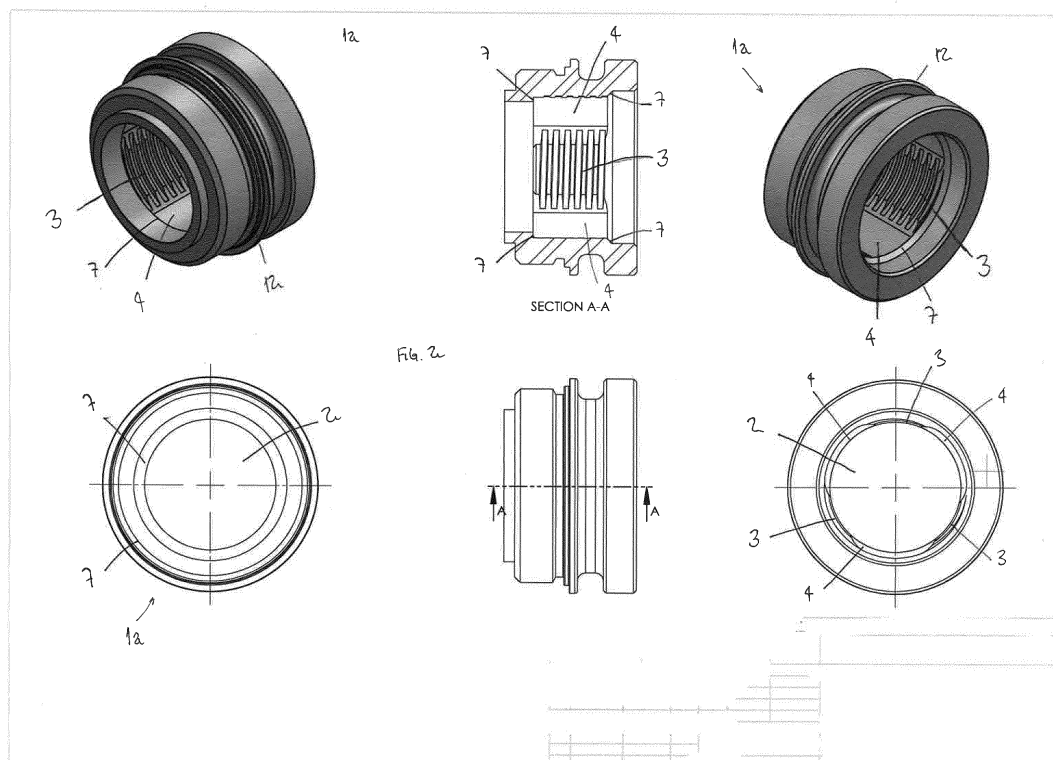
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**(54) A COUPLING MEMBER**

(57) The present invention relates to a coupling member for quick and easy attachment and detachment of a firearm accessory to a muzzle of the firearm, the coupling member comprising a female member (1a) and a male member (1b), wherein the female member is provided with a throughgoing bore (2), the female member

further being provided with a number of successive threaded portions (3) and unthreaded portions (4) around a circumference of the throughgoing bore and wherein the male member around an outer circumference is provided with the same number of successive threaded portions and unthreaded portions as the female member.

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## Description

**[0001]** The present invention relates generally to firearms, accessories and accessory mounts for firearms, and particularly to muzzle end accessories and accessory mounts for firearms.

**[0002]** The term "firearms" includes hand guns (including revolvers and pistols), long guns (including rifle and shotguns), automatic weapons (including machine guns, submachine guns and automatic rifles), and air-operated firearms.

**[0003]** It is often desirable to mount an accessory such as a flash suppressor or muzzle brake, silencer, grenade launcher, blank adapter, or the like, upon the muzzle or end of gun barrels. Such accessories are usually mounted upon an adapter which constitutes a coupling for attaching the accessory to the gun barrel.

**[0004]** Muzzle end mounted firearm accessories are available for attachment to the barrel of firearms to obtain various effects when the firearm is operated. Silencers are an example of such an accessory and include baffled chambers to slow the release of pressure from the barrel of the firearm. The slowed release of pressure reduces the audible report during firing. Flash hidere are another type of muzzle end accessory that include features to mix unburnt gunpowder and air in a manner that reduces the overall brightness of a flash that may occur during firing. Generally speaking, silencers and flash hidere may be mounted to the muzzle end of a firearm barrel in different rotational orientations without affecting the operation of the accessory.

**[0005]** Some muzzle end mounted accessories are designed for mounting to a firearm barrel in one or more particular rotational orientations to accomplish a desired effect. Muzzle brakes redirect a portion of combustion gases sideways or rearward, with respect to the firing direction, as the gases escape from a barrel when a shot is fired. As the gases are redirected, the firearm is pushed forward in a manner that counteracts recoil of the firearm. Muzzle brakes are typically mounted to a firearm barrel in a particular rotational orientation, so as to prevent gases from being redirected upward into the line of sight of the firearm operator. The manner of rotationally orienting a muzzle end accessory on the barrel is often referred to as timing the accessory to the barrel.

**[0006]** Compensators are another type of muzzle end accessory that is timed to one or more particular rotational orientations when mounted to a firearm barrel. Compensators redirect the flow of gasses that escape from a barrel during firing in an overall upward direction. The resulting force that acts against the firearm counteracts other forces that urge the muzzle end of a rifle upward during firing.

**[0007]** It is known how to utilize firearm accessory adapters which include an opening receiving the end of the gun barrel and lugs, wherein the adapter includes lug retaining recesses which align with and retain the lugs upon relative rotation of the adapter and the gun barrel

occurring after the adapter has been fully axially positioned upon the gun barrel.

**[0008]** US 4.893.426 A relates to a lugged coupling apparatus, where an internally threaded collar having internal lugs is slidably received on a shaft comprising corresponding external lugs and is threadedly engaged on a threaded member and when rotated will engage the lugs and draw the shaft and threaded member together to form a secure, accurately aligned mechanical coupling which may be disassembled by reversing the process. The collar need never to be completely removed from the threaded member to install or remove the shaft.

**[0009]** US 5.433.133 A relates to a quick detachable gun barrel coupling member, where the front end of the coupling member has an internally threaded portion having a left-hand thread. The rear end of the coupling member has a plurality of circumferentially spaced notches that form finger members between them. The finger members have radially inwardly extending lug members. The coupling member is slidably received on the front end of the gun barrel of a firearm and has at least three radially extending lug members and when rotated the respective lug members will engage each other. When a firearm accessory is threaded into the front end of the coupling member, it will form a secure, accurately aligned mechanical coupling which may be disassembled by reversing the process.

**[0010]** US 2008/156183 A relates to an apparatus and method for easily, quickly and reliably attaching a noise suppressor or other auxiliary device to the muzzle end of a firearm barrel and for easily, quickly and reliably removing the noise suppressor or other auxiliary device there from through the novel ideal of providing two or more non-equal relieved areas of thread. My invention also provides an internal O-ring to provide friction between the muzzle adaptor and the thread mount of a noise suppressor or other auxiliary device.

**[0011]** The use of a threaded lock member to maintain the lugs within the adapter lug retaining recesses requires several steps of operation to mount the adapter on the gun barrel. It cannot easily be accomplished with one hand, and the possibility of the adapter loosening on the barrel exists in the event the threaded lug locking member unloosens due to vibration occurring during firearm operation.

**[0012]** It is an object of the invention to provide a coupling for a firearm accessory which may quickly be mounted upon a muzzle or end of barrel of a firearm wherein only axial and rotative one hand movement is required to mount and lock the adapter on the muzzle or the end of the barrel of the firearm.

**[0013]** This object is achieved according to the invention by means of the features indicated in the following independent claim, where further features of the invention will become apparent from the dependent claims and the description below.

**[0014]** The present invention relates to a coupling member for quick and easy attachment and detachment

of a firearm accessory to a muzzle of the firearm, where the firearm accessory, for instance, may be a flash suppressor or muzzle brake, a silencer, a grenade launcher, blank adapter, or the like.

**[0015]** The coupling member according to the present invention comprises a female member and a male member, where the female member is provided with a throughgoing bore and a number of successive threaded portions and unthreaded portions around a circumference of the throughgoing bore, and where the male member is provided with the same number of successive threaded portions and unthreaded portions as the female member around its outer circumference.

**[0016]** Each of the threaded portions and unthreaded portions provided around the circumference of both the female and male member are equally displaced relative each other, whereby the threaded and unthreaded portions will have the same arc length.

**[0017]** Each of the female and male members must be provided with the same numbers of threaded and unthreaded portions, and where the number of threaded portions (and thereby also the number of unthreaded portions) may be two or more. In one embodiment, each of the female and male members may be provided with three threaded portions and three unthreaded portions, where the threaded portions may be arranged 60 degrees displaced relative each other, whereby also the unthreaded portions are arranged 60 degrees displaced relative each other.

**[0018]** If the female member and the male member are provided with two threaded portions, the threaded portions may be arranged 90 degrees displaced relative each other, whereby the unthreaded portions are arranged 90 degrees displaced relative each other. If the female member and the male member are provided with four threaded portions, the threaded portions may be arranged 45 degrees displaced relative each other, whereby the unthreaded portions are arranged 45 degrees displaced relative each other.

**[0019]** In one exemplary embodiment, the coupling member according to the present invention may be used to attach a silencer directly to the muzzle of the firearm, or indirectly via a flash suppressor or muzzle brake. If the silencer is attached directly to the muzzle of the firearm, then the muzzle of the firearm is formed to be and to function as the male member, while the silencer is formed to be and to function as the female member. Alternatively, an adapter may be connected to the silencer, the adapter then being formed to be and to function as the female member, whereby the adapter is provided with a threaded portion around its outer circumference in order to be connected to the silencer through a corresponding internal threaded portion provided in the silencer.

**[0020]** If the silencer is attached indirectly to the muzzle of the firearm through the flash suppressor, then the silencer is formed to be and to function as the female member, while the flash suppressor is formed to be and to function as the male member. The flash suppressor is

then provided with a threaded portion around an inner circumference of a throughgoing bore in order to be connected to the muzzle of the firearm.

**[0021]** In another exemplary embodiment, the coupling member according to the present invention may be used to attach a flash suppressor to the muzzle of the firearm, whereby the muzzle of the firearm is formed to be and to function as the male member, while the flash suppressor is formed to be and to function as the female member.

**[0022]** As flash suppressors and silencers may be designed and formed in many ways known to a person skilled in the art, these are not described any further herein, but a person skilled in the art would know how these should be formed to obtain their function as a flash suppressor or silencer.

**[0023]** When the female member and the male member of the coupling member according to the present invention are to be attached to each other, the male member is inserted into the female member in such a way that the unthreaded portions of the male member are aligned with the threaded portions of the female member, whereafter the male member is rotated anticlockwise in order to bring the threaded portions of the male member into contact with the threaded portions of the female member, thereby locking the female member and the male member of the coupling member. When the female member and the male member of the coupling member are to be detached, the male member is rotated clockwise, such that the threaded portions of the male member are brought out of contact with the threaded portions of the female member. When the male member is rotated a certain distance, the unthreaded portions of the male member are aligned with the threaded portions of the female member, whereby the male member can be removed from the female member.

**[0024]** The female member of the coupling member may be provided with at least one abutment shoulder around the circumference of the throughgoing bore, where the at least one abutment shoulder will cooperate with at least one abutment shoulder provided around an outer circumference of the male member. The abutment shoulders will then restrict the distance the male member can be moved along a longitudinal direction of the female member and further provide a correct adjustment or setting of the threaded portions of the female and male members, such that male member can be rotated without further adjustment. The abutment shoulders of the female and male members will also form a tight connection in the coupling device when the female and male members are locked together.

**[0025]** The at least one abutment shoulder of the female member may be arranged to be perpendicular to an axis extending in a longitudinal direction of the female member, or the at least one abutment shoulder may be arranged to form an angle relative said axis extending in a longitudinal direction of the female member. If, for instance, each of the female and male members is provided with two abutment shoulders, one abutment shoulder

may be arranged at the beginning and at the end of the threaded portions, both abutment shoulders may be arranged to be perpendicular to the axis, both abutment shoulders may be arranged to form the same or different angles relative the axis, or one abutment shoulder may be arranged to be perpendicular to the axis while the other abutment shoulder may be arranged to form an angle relative the axis.

**[0026]** In one embodiment, the female member of the coupling member may be provided with a groove extending around the outer periphery of the female member, where the groove furthermore is provided with two throughgoing holes and at least one throughgoing recess. The groove is adapted to accommodate a spring element. The spring element is provided with two bent end terminations and at least one bead. The spring element will be held in the groove by arranging the bent end terminations of the spring element into the throughgoing holes, and the bead will then be arranged in the throughgoing recess. The bead will have a form and a size that will allow the bead to protrude into the throughgoing bore of the female member. The throughgoing recess will be arranged in such a way that it covers a part of the threaded portion and a part of the adjacent unthreaded portion. As the bead protrudes into the throughgoing bore, a certain force must be applied to the male member when the male member is rotated relative the female member in order to lock the female and male members together, and the bead will also prevent the male member from unlocking unintentionally from the female member.

**[0027]** In one embodiment, the female member may be provided with an external threaded portion, for instance when the female member is an adapter that is intended to be connected to a silencer, where the silencer is provided with an internal threaded portion on an inside of the throughgoing bore.

**[0028]** The female member may have a circular cross-section, but it could be envisaged that the female member could have other cross-sections, such as polygonal cross-section, an oval cross-section or the like.

**[0029]** In one embodiment, the male member may be provided with a throughgoing bore.

**[0030]** In one embodiment, the male member may be provided with an internal threaded portion.

**[0031]** The male member may, over at least a part of its longitudinal length, be provided with a substantially triangular form, where the acute angles of the triangle is rounded.

**[0032]** Further objects, structural embodiments and advantages of the present invention will be clearly shown in the following detailed description, the attached drawings and the following claims.

**[0033]** The invention will now be explained with reference to the attached figures in which;

Figure 1 illustrates in a schematic way a coupling member according to the present invention which is used to connect an accessory to a muzzle of a fire-

arm,

Figure 2 shows a female member of the coupling member according to figure 1, from front, from behind, in a cross-section and in perspective views,

Figure 3 shows a male member of the coupling member according to figure 1, from front, from behind, in a cross-section and in perspective views,

Figure 4 shows an alternative embodiment of a female member of a coupling member according to figure 2, from front, from behind, in a cross-section and in perspective views, and

Figure 5 shows a spring element that is used with the coupling member according to the present invention.

**[0034]** Figure 1 shows in a schematic way how a coupling member 1 according to the present invention is used to connect an accessory to a muzzle M of a firearm F, where the accessory is a silencer S. However, the accessory could also be a flash suppressor or muzzle brake, a grenade launcher, a blank adapter or the like.

**[0035]** Figure 2 shows a female member 1a of the coupling member 1 according to the present invention, where the female member 1a is provided with a throughgoing bore 2. A diameter of the throughgoing bore 2 will vary over the longitudinal length of the female member 1a, as will be described below.

**[0036]** Three threaded portions 3 and three unthreaded portions 4 are provided around a circumference of the throughgoing bore 2, where the threaded portions 3 and the unthreaded portions 4 are arranged in turns, i.e. a threaded portion 3 is followed by an unthreaded portion 4 and an unthreaded portion 4 is followed by a threaded portion 3. Each of the threaded portions 3 and each of the unthreaded portions 4 are displaced 60 degrees relative each other.

**[0037]** The threaded portions 3 of the female member 1a are provided with a number of corresponding "threads", such that a first "thread" of a threaded portion 3, when counting the "threads" from one end of the female member 1a, will correspond to a first "thread" of each of the remaining threaded portions 3, a second "thread" from the threaded portion 3 will correspond to a second "thread" of each of the remaining threaded portions 3 etc.

**[0038]** Furthermore, the "threads" of the threaded portions 3 are arranged in such a way that an entry, i.e. a beginning, of each corresponding "thread" is located in a first plane arranged perpendicularly to a longitudinal axis extending through the female member 1a, and an exit, i.e. an ending, of each corresponding "thread" is located in a second and spaced apart plane arranged perpendicularly to the longitudinal axis extending through the female member 1a.

**[0039]** Furthermore, the female member 1a is provided

with two abutment shoulders 7 extending around the whole circumference of the throughgoing bore 2, where the first abutment shoulder 7 is arranged in front of the threaded and unthreaded portions 3, 4 and the second abutment shoulder is arranged behind the threaded and unthreaded portions 3, 4. The first abutment shoulder defines a first diameter within the throughgoing bore 2, where the first diameter will extend to the second abutment shoulder 7, where the second abutment shoulder 7 will define a second diameter within the throughgoing bore 2. The area of the first diameter is formed to receive and accommodate a part of a male member 1b of the coupling member 1.

**[0040]** Figure 4 shows an alternative embodiment of a female member 1a of the coupling member 1 according to the present invention, where the female member 1a is designed with a throughgoing bore 2, where a diameter of the throughgoing bore 2 will vary over the longitudinal length of the female member 1a.

**[0041]** Three threaded portions 3 and three unthreaded portions 4 are provided around a circumference of the throughgoing bore 2, where the threaded portions 3 and the unthreaded portions 4 are arranged in turns, i.e. a threaded portion 3 is followed by an unthreaded portion 4 and an unthreaded portion 4 is followed by a threaded portion 3. Each of the threaded portions 3 and each of the unthreaded portions 4 are displaced 60 degrees relative each other.

**[0042]** The female member 1a is furthermore provided with two abutment shoulders 7 extending around the whole circumference of the throughgoing bore 2, and where the first abutment shoulder 7 is arranged in front of the threaded and unthreaded portions 3, 4 and the second abutment shoulder is arranged behind the threaded and unthreaded portions 3, 4. The first abutment shoulder defines a first diameter within the throughgoing bore 2, where the first diameter will extend to the second abutment shoulder 7, where the second abutment shoulder 7 will define a second diameter within the throughgoing bore 2. The area of the first diameter is formed to receive and accommodate a part of a male member 1b of the coupling member 1.

**[0043]** In this embodiment, the female member 1a is also provided with a groove 8 around the outer circumference of the female member 1a, where the groove 8 is provided with two throughgoing holes 10 and a throughgoing recess 11, in which groove 8 a spring element 9 is to be arranged.

**[0044]** As can be seen from figure 5, the spring element 9 is provided with two end terminations 9a that are bent and a bead 9b. Through the form of the spring element 9 the spring element 9 can be arranged in the groove 8 provided in the female member 1a, where the bent end terminations 9a are used to hold the spring element 9 in place in the groove 8. When the spring element 9 is arranged in the groove 8, the bead 9b will be arranged in the throughgoing recess 11, and through its form and size, the bead 9b will extend or protrude into the through-

going bore 2 of the female member 1a.

**[0045]** Figure 3 shows a male member 1b of the coupling member 1 according to the present invention, where the male member 1b is provided with a throughgoing bore 13.

**[0046]** In a similar way as the female member 1a, the male member 1b is also provided with three threaded portions 5 and three unthreaded portions 6 around its circumference, where the threaded portions 5 and unthreaded portions 6 are arranged successively each other.

**[0047]** The male member 1b is also provided with a first abutment shoulder 8 and a second abutment shoulder 18.

**[0048]** The threaded portions 5 of the male member 1b are provided with a number of corresponding "threads", such that a first "thread" of a threaded portion 5, when counting the "threads" from one end of the male member 1b, will correspond to a first "thread" of each of the remaining threaded portions 5, a second "thread" from the threaded portion 5 will correspond to a second "thread" of each of the remaining threaded portions 5 etc.

**[0049]** Furthermore, the "threads" of the threaded portions 5 are arranged in such a way that an entry, i.e. a beginning, of each corresponding "thread" is located in a first horizontal plane arranged perpendicularly on a longitudinal axis extending through the male member 1b, and an exit, i.e. an ending, of each corresponding "thread" is located in a second and spaced apart horizontal plane arranged perpendicularly on the longitudinal axis extending through the male member 1b.

**[0050]** The coupling member 1 according to the present invention may, for instance, be used to attach a silencer S to a muzzle M of a firearm F. The silencer S can then be attached to the firearm F either directly, or indirectly through use of a flash suppressor.

**[0051]** If the silencer S is attached directly to the firearm F, the muzzle M of the firearm F is designed to be the male part 1b, while the female part 1a is integrated in the silencer S, whereby the silencer S can be connected directly to the firearm F.

**[0052]** It should also be understood that the female member 1a could be provided as a separate adapter, where the adapter is designed to be connected to the silencer S. In this case the female member 1a, in the form of an adapter, must be provided with an external threaded area and the silencer S must be provided with a corresponding internal threaded area, such that the female member 1a and the silencer S could be connected to each other.

**[0053]** If the silencer S is attached indirectly to the firearm F through a flash suppressor, the flash suppressor is designed to be the male member 1b, while the female member 1a is either integrated in the silencer S, or the female member 1a is designed to be a separate adapter. If the female member 1a is a separate adapter, the adapter must be provided with an external threaded area and the silencer S must be provided with a corresponding

internal threaded area, such that the female member 1a and the silencer S could be connected to each other.

**[0054]** Similarly, the flash suppressor must be provided with an internal threaded area and the muzzle M of the firearm F must be provided with a corresponding external threaded area, such that the flash suppressor could be connected to the muzzle M of the firearm F.

**[0055]** The coupling member 1 according to the present invention may also, for instance, be used to attach a flash suppressor to a muzzle M of a firearm F. The flash suppressor can then be attached to the firearm F either directly, or indirectly through use of a female member 1a in the form of a separate adapter.

**[0056]** If the flash suppressor is attached directly to the firearm F, the muzzle M of the firearm F is designed to be the male part 1b, while the female part 1a is integrated in the flash suppressor, whereby the flash suppressor can be connected directly to the firearm F.

**[0057]** If the flash suppressor is attached indirectly to the firearm F through a female member 1a in the form of an adapter, the adapter must be provided with an external threaded area and the flash suppressor must be provided with a corresponding internal threaded area, such that the female member 1a and the flash suppressor can be connected to each other.

**[0058]** When the female member 1a and the male member 1b of the coupling member 1 according to the present invention are to be attached to each other, the female member 1a must be connected to a firearm accessory if the female member 1a is not integrated in the firearm accessory. Thereafter the male member 1b is inserted into the female member 1a in such a way that the unthreaded portions 6 of the male member 1b are aligned with the threaded portions 3 of the female member 1a, whereafter the male member 1b is rotated anti-clockwise in order to bring the threaded portions 5 of the male member 1b into contact with the threaded portions 3 of the female member 1a, thereby locking the female member 1a and the male member 1b of the coupling member 1. If the female member 1a is provided with the spring element 9, an additional force must be applied in order to overcome the effect of the bead 9b. When the female member 1a and the male member 1b of the coupling member 1 are to be detached from each other, the male member 1b is rotated clockwise, such that the threaded portions 5 of the male member 1b are brought out of contact with the threaded portions 3 of the female member 1a. When the male member 1b is rotated a certain distance, the unthreaded portions 6 of the male member 1b are aligned with the threaded portions 3 of the female member 1a, whereby the male member 1b can be removed from the female member 1a.

**[0059]** The present invention has now been explained with reference to embodiments, but a person skilled in the art will appreciate that changes and modifications will be able to be made to these embodiments which lie within the scope of the invention as defined in the following claims.

## Claims

1. A coupling member (1) for quick and easy attachment and detachment of a firearm accessory to a muzzle (M) of the firearm (F), the coupling member (1) comprising a female member (1a) and a male member (1b), **characterised in that** the female member (1a) is provided with a throughgoing bore (2), the female member (1a) further being provided with a number of successive threaded portions (3) and unthreaded portions (4) around a circumference of the throughgoing bore (2) and wherein the male member (1b) around an outer circumference is provided with the same number of successive threaded portions (5) and unthreaded portions (6) as the female member (1a).
2. A coupling member (1) according to claim 1, **characterised in that** the female member (1a) is provided with at least one abutment shoulder (7) around the circumference of the throughgoing bore (2), the at least one abutment shoulder (7) cooperating with at least one abutment shoulder (8) provided around the outer circumference of the male member (1b).
3. A coupling member (1) according to claim 2, **characterised in that** the abutment shoulder (7) is arranged to be perpendicular on an axis (A) extending through the throughgoing bore (2), or form an angle relative the axis (A).
4. A coupling member (1) according to anyone of the preceding claims, **characterised in that** the female member (1a) is provided with a groove (8) extending around the periphery of the female member (1a), wherein the groove (8) further is provided with two throughgoing holes (10) and a throughgoing recess (11) for reception of a spring element (9) provided with end terminations (9a) and at least one bead (9b).
5. A coupling member (1) according to anyone of the preceding claims, **characterised in that** the female member (1a) is provided with an external threaded portion (12).
6. A coupling member (1) according to anyone of the preceding claims, **characterised in that** the female member (1a) has a circular cross-section.
7. A coupling member (1) according to claim 1, **characterised in that** the male member (1b) is provided with a throughgoing bore (13).
8. A coupling member (1) according to claim 7, **characterised in that** the male member (1b) is pro-

vided with an internal threaded area (14).

9. A coupling member (1) according to claim 7 or 8,  
**characterised in that** the male member (1b) over  
 at least of a part of its longitudinal length (L) is pro- 5  
 vided with a substantially triangular form, the acute  
 angles being rounded.
  
10. A coupling member (1) according to anyone of the  
 preceding claims, 10  
**characterised in that** the female member (1a) is a  
 flame suppressor or an adapter/attachment element.
  
11. A coupling member (1) according to anyone of the  
 preceding claims, 15  
**characterized in that** the male member (1b) is a  
 flame suppressor or a muzzle of a firearm.
  
12. A coupling member (1) according to claim 1,  
**characterised in that** the threaded portions (3, 5) 20  
 and unthreaded portions (4, 6) of both the female  
 and male member (1a, 1b) are equally displaced rel-  
 ative each other.
  
13. A coupling member (1) according to claim 1, 25  
**characterised in that** an entry of each correspond-  
 ing thread of the threaded portions (3, 5) is located  
 in a first horizontal plane arranged perpendicularly  
 on a longitudinal axis extending through the female  
 and male member (1a, 1b) and an exit of each cor- 30  
 responding thread is located in a second and spaced  
 apart horizontal plane arranged on the longitudinal  
 axis extending through the female and male member  
 (1a, 1b). 35

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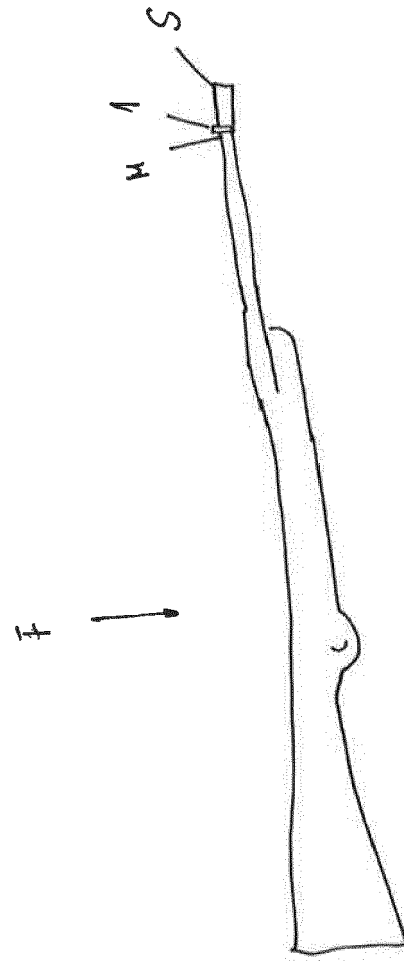
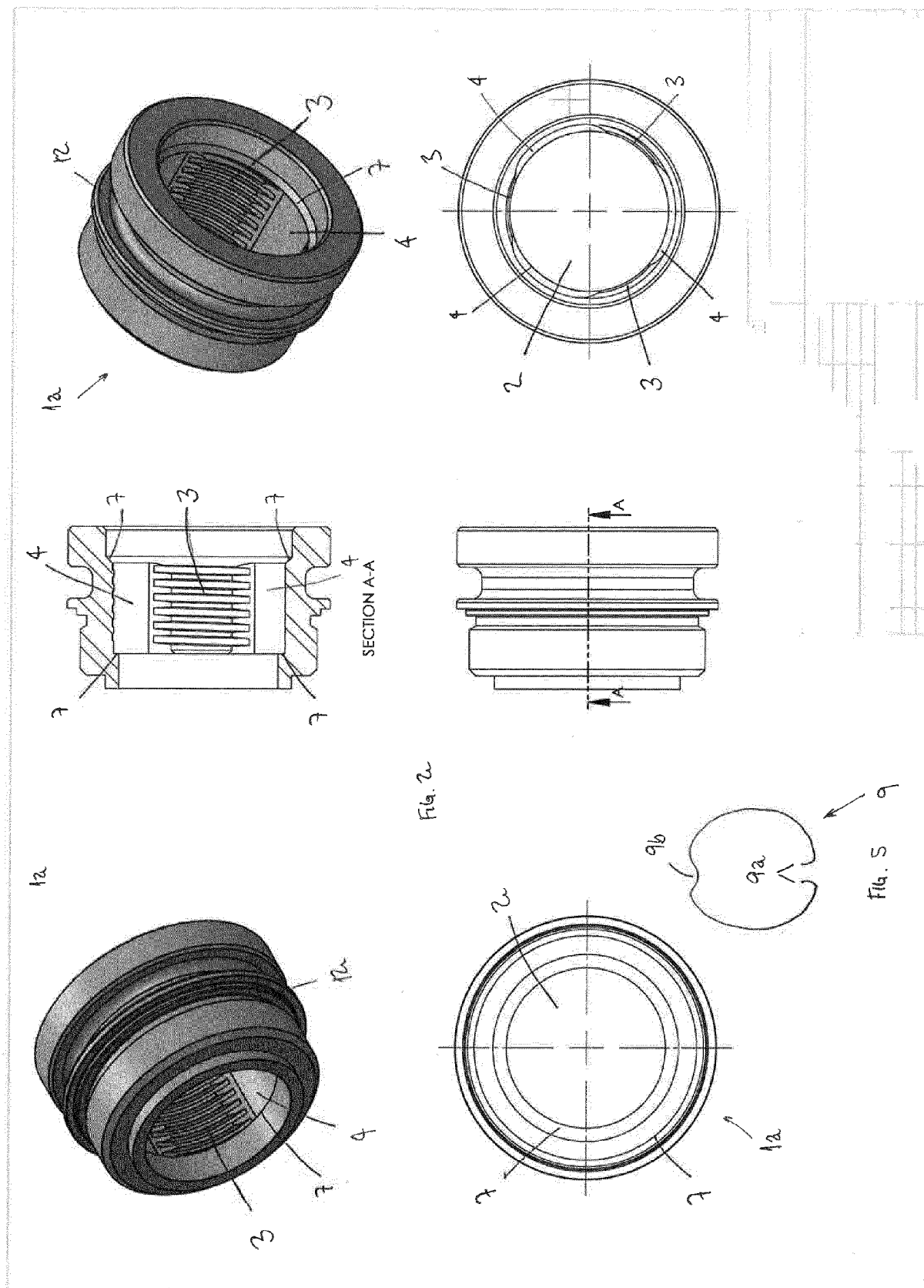
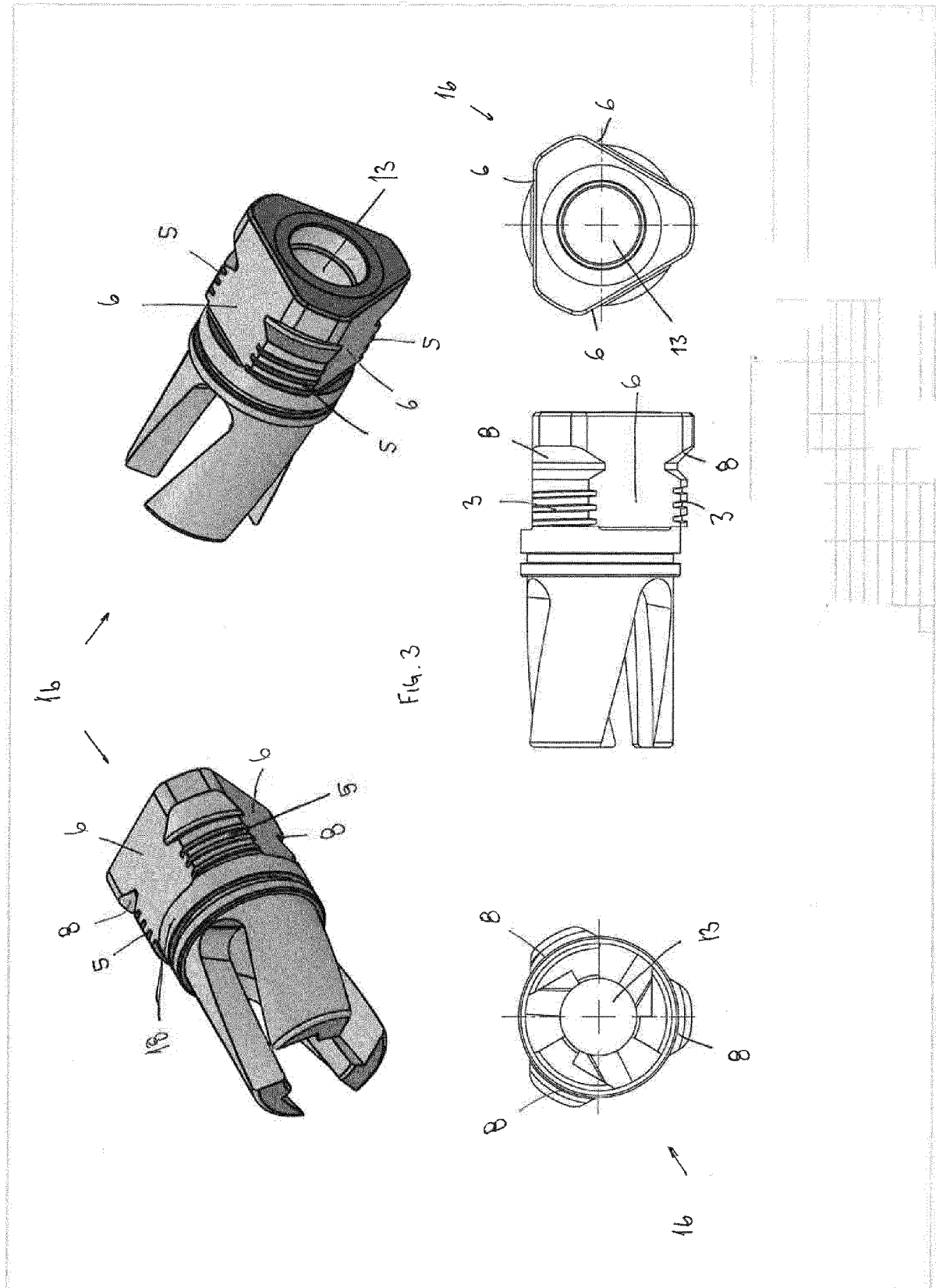
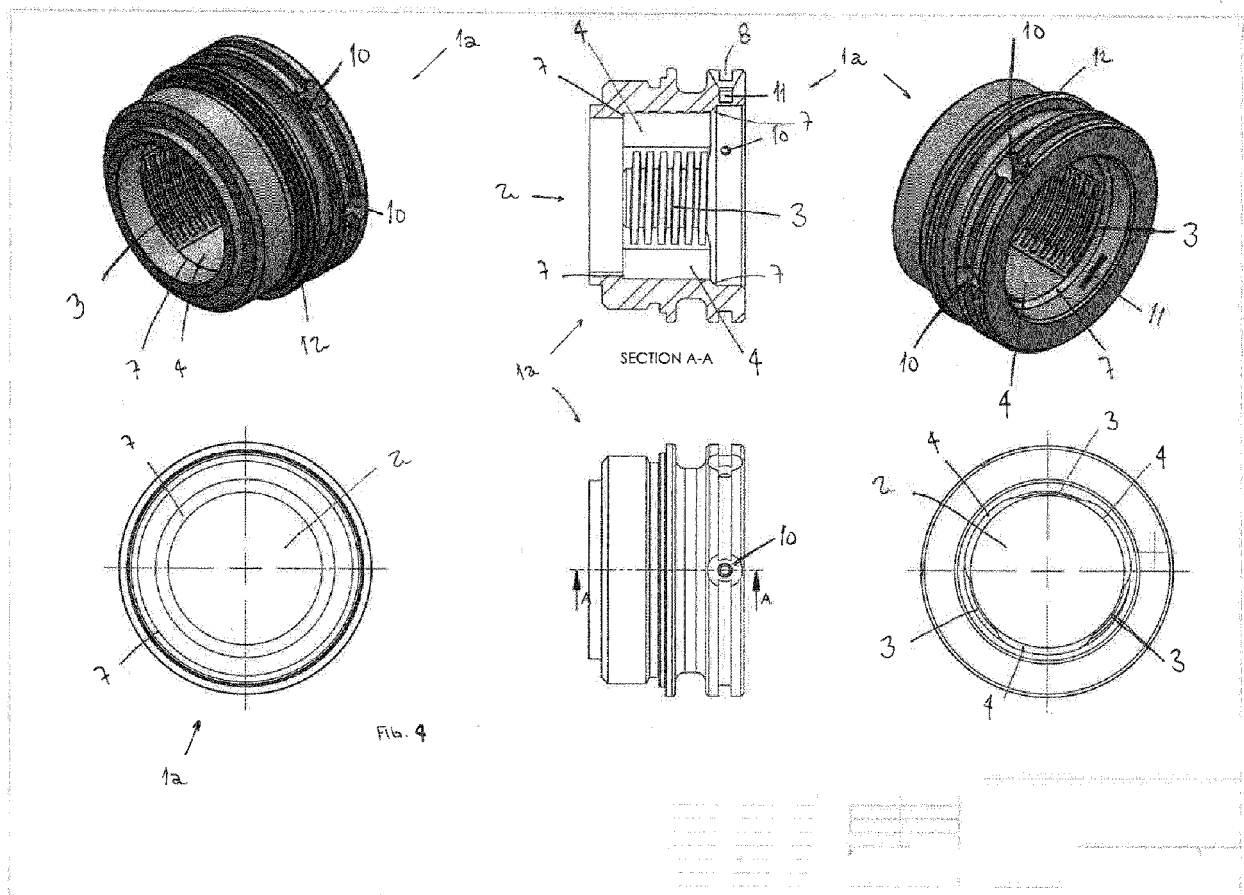


Fig. 1











## EUROPEAN SEARCH REPORT

Application Number  
EP 19 15 3240

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A			
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 6 June 2019	Examiner Vermander, Wim
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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