

Munition module, warhead and munition

The invention relates to a munition module, to a warhead with a munition module and to munition with a warhead.

5 The munition of the type in question requires an explosive and a detonator. For example, the "Sprengsplitter [explosive fragmenter] DM121 IM" cartridge type is known from "Diehl Defence, Insensitive Infanteriemunition [insensitive infantry munition] 40 mm x 53 High Velocity, [http:// www.diehl.com / fileadmin / diehl-defence / user_upload / flyer / Patronen \[cartridges\]_40_ mm _x_53.pdf](http://www.diehl.com/fileadmin/diehl-defence/user_upload/flyer/Patronen[cartridges]_40_mm_x_53.pdf)". The warhead contained therein is detonated by means of the nose fuze, which makes the explosive react.

10 The object of the invention is to improve munition.

The object of the invention is achieved by a munition module according to patent claim 1. Preferred or advantageous embodiments of the invention and other categories of the invention emerge from the further claims, the following description and the
15 accompanying figures.

20 The munition module contains an explosive arrangement, i.e. an explosive in a specific geometrical or spatial arrangement or distribution. The munition module contains a detonator. The explosive arrangement or the explosive can be detonated by the detonator. The detonator is arranged or aligned in relation to the explosive arrangement in such a way that, in the case of a detonation, it ignites at an ignition point. The ignition point is consequently a specific location of the explosive arrangement at which it is detonated by the detonator. The ignition point is positioned
25 at a location within a casing of the explosive arrangement, that is to say not on the surface of the casing. The location is remote from the detonator. The casing contains

the entire explosive and also gaps, indentations and recesses in the explosive arrangement. It is a surface area which at all points has a planar or convex extent. It is also possible that, at least at some points, it has a concave extent, for example in the case of notch charges in the shell.

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10 In an initial state, an ignition channel runs from the detonator to the ignition point. The ignition channel is surrounded at least by part of the explosive arrangement. The ignition channel is formed as a channel that is open in the initial state. The initial state is a state before the beginning of a detonation of the munition module or of the explosive. In an exploded state, which occurs after detonation of the explosive has taken place, the channel is self-sealing. "Sealing" means in particular closing or sealing at least part of the ignition channel. "Self-sealing" means that the sealing of the ignition channel takes place automatically or inevitably after the detonation due to the reaction of the explosive. Before the detonation, the ignition channel is therefore open, after 15 detonation has taken place the channel is sealed, that is to say at least partially closed. The detonation of the explosive by the detonator takes place either directly (the detonator detonates the explosive arrangement) or indirectly (the detonator detonates a lead relay, the lead relay detonates the explosive arrangement). "Within the casing" means that the ignition point does not lie on the surface of the casing of the explosive arrangement that is in particular facing the detonator, but rather lies inside (in particular deep inside) the casing, in particular in the region of the geometrical center or in a region beyond the center of the explosive arrangement, opposite from the detonator. 20 The exploded state is in particular the state when part of the explosive has already reacted, but part has not yet reacted. Then, a munition shell has generally expanded, but is still intact, so that a pressure buildup inside the munition is still underway. This pressure buildup is used in particular for sealing the ignition channel. 25

30 The invention is based on the observation that a warhead is detonated for example by means of a nose fuze, which directly makes the explosive react. There is consequently only a minor effect in the direction of impact, for example of a grenade. The use of a self-sealing ignition channel within the warhead produces an ignition point remote from the detonator side. This ignition channel avoids the loss of power by becoming self-sealing after the detonation of the warhead and prevents the escape of explosion fumes. Fumes are caused during the reaction of the explosive from a solid to a gas. 35 The energy serves for accelerating the main charge. The self-sealing ignition channel allows an optimum ignition point of the warhead to be chosen, without at the same time losing power due to an appreciable pressure loss during the warhead reaction.

According to the invention, it is made possible that a warhead can be detonated as desired, without a decrease in power due to a premature escape of the explosion fumes having to be expected. The invention allows this to be implemented without having to resort to in-line detonating means, such as for example EFIs (Exploding Foil Initiators, which additionally have to be electrically detonated with high energy).

According to the invention, the detonation can be implemented without electrical energy. According to the invention, an effect in the direction of the detonator (in particular a fragmenting effect, not a hollow charge) can be achieved with a warhead, without using a SAD (Safety and Arming Device) outside the detonator.

In a preferred embodiment, in the exploded state the ignition channel is at least partially closed or sealed by at least one sealing element. The sealing element has been introduced into the ignition channel by the at least partially reacted explosive (in particular its pressure effect). The sealing element is therefore a means for sealing or at least partially closing the ignition channel or a (detonator-side) ignition channel opening. A corresponding sealing element allows the ignition channel to be sealed or closed particularly effectively. The sealing element may be a multipart element, or multiple sealing elements may be present in the munition module or else be combined, each bringing about a sealing of the ignition channel or the elements acting together to produce the sealing.

In a preferred variant of this embodiment, the sealing element is formed by a body which in the initial state has an initial form. In the exploded state, the body has been deformed into a closed form. At least part of the deformed body is the sealing element. Alternatively or additionally, in the initial state the body does not lie in the ignition channel and is introduced - in the initial form or in the closed form or an intermediate state - into the ignition channel by the at least partially reacted explosive in order to seal it. The body may therefore also only be brought into the ignition channel by the at least partially reacted explosive, in order that at least part of the body in the undeformed form or in some other form forms the sealing element. Thus, a sealing element in the form of a body may be provided in the munition module and then brought into the ignition channel by the reaction of the explosive in order to seal it. Particularly effective and simple sealing of the ignition channel is possible in this way.

In a preferred variant of this embodiment, the body in the initial form is a shell surrounding the ignition channel. The shell is in particular a case, a tube or a liner of the ignition channel, for example in the form of a lateral surface of a circular cylinder.

Since the shell surrounds the ignition channel and the ignition channel in turn is surrounded by the explosive, the reaction of the explosive leads to a compression of the shell, and consequently to a deformation of the body to form the sealing element. Particularly effective and simple sealing of the ignition channel is achieved in this way.

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In a preferred variant of this embodiment, the body is a metal body. In the case of an explosive action, the metal behaves rather like a liquid, and consequently can be deformed particularly easily. The metal is in particular a relatively soft metal, for example copper.

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In a preferred embodiment, the ignition channel in the initial state is an unfilled cavity. The cavity is therefore merely filled with air or a protective gas or the like, but is unfilled with respect to other materials. Such an ignition channel is particularly suitable for use with flyer-forming detonators, the ignition channel then being the flying channel for the flyer from the detonator to the ignition point.

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In a preferred variant of this embodiment, the detonator is therefore a flyer-forming booster detonator. The ignition channel is then a flyer channel. A lead relay for detonating the explosive arrangement is then arranged at the end of the ignition channel opposite from the detonator. During the detonation, the flyer therefore passes through the unfilled cavity of the ignition channel to the lead relay, in order to ignite it, the lead relay serving for the detonation of the explosive. Such an arrangement can be implemented particularly easily, since it is especially possible for "long" ignition channels to be realized, and thus the ignition point can be chosen to be particularly "deep" within the explosive arrangement, that is to say far away from the detonator.

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In an alternative embodiment, the ignition channel in the initial state is not an unfilled cavity, but contains a pyrotechnic material. After the detonation of the explosive arrangement, the pyrotechnic material has been converted into a residual material. The pyrotechnic material allows in particular the detonation to be transferred from the detonator to the ignition point.

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In a preferred variant of this embodiment, the sealing element is formed by at least part of the residual material. In particular, a sealing element may for example take the form of a compressed metal tube, which is then also combined with the residual material as a further sealing filling, in order to achieve particularly effective sealing of the ignition channel.

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In a preferred embodiment, the residual material is slag. Slag is particularly well-suited for forming a corresponding sealing element.

5 The object of the invention is also achieved by a warhead according to patent claim 11. The warhead contains a munition module with a detonator and with an explosive arrangement that can be detonated by the detonator. The warhead also contains an active covering, which at least partially surrounds the explosive arrangement. The active covering can be accelerated by the reacted explosive. The munition module is a
10 munition module according to the invention. The detonator is in particular a nose fuze. The warhead and at least some of its embodiments and also the respective advantages have already been explained analogously in connection with the munition module according to the invention. Consequently, a munition of which the active covering is also accelerated in the direction of the detonator through the sealed ignition
15 channel is obtained. In the case of a nose fuze, this is for example an effect that is obtained in the direction of flight or impact of the munition.

 In a preferred embodiment, the active covering is a fragmenting covering. Thus, particularly effective warheads with a fragmenting effect in the direction of the
20 detonator can be produced.

 In a preferred embodiment, at least part of the active covering is provided on the side of the explosive arrangement that is facing the detonator. Thanks to the invention, this active covering is also accelerated sufficiently to take effect (in the direction of the
25 detonator). Thus, a desired effect of the warhead in particular also in the direction of the detonator - as seen from the explosive arrangement - can be achieved with the aid of the active covering. Thus, in particular a nose-side effect, in particular a fragmenting effect, can be achieved in the direction of impact of a warhead with a nose fuze.

30 The object of the invention is also achieved by a munition according to patent claim 14. The munition contains a warhead and an impact detonator. The warhead is a warhead according to the invention. The detonator of the warhead is the impact detonator. The munition and at least some of its embodiments and also the respective advantages have already been explained analogously in connection with the warhead according to
35 the invention and the munition module according to the invention. Thus, munition with an effect in the direction of impact is especially obtained.

The object of the invention is also achieved by a munition in the form of an air-burst munition, with a warhead, the warhead being a warhead according to the invention. In the case of the warhead according to the invention, an effect also in the direction of the detonator is possible; an effect in other directions is in any case conventionally implementable. Thus, air-burst munition with a 360-degree all-round effect can be created. The munition and at least some of its embodiments and also the respective advantages have already been explained analogously in connection with the aforementioned munition according to the invention, the warhead according to the invention and the munition module according to the invention.

The invention is based on the following realizations, observations or considerations. The embodiments referred to below are for simplicity sometimes also referred to as "the invention". The embodiments here may also contain parts or combinations of the aforementioned embodiments or correspond thereto and/or, if appropriate, also include embodiments not mentioned hitherto.

The invention is based on the realization that it is often the case in practice that a nose fuze is used for munition and an adequate effect is not generated in the frontal direction. Therefore, the ignition mechanism for a spherical output is explained below by the example of a nose fuze. However, this can be implemented for any type of detonator (for munition this will however generally be a nose fuze or tail fuze because of the rotational symmetry). The aim is to achieve an effect in the direction of the detonator (in particular a fragmenting effect, not a hollow charge) with a warhead, without using a safety and arming device outside the detonator. It has previously been the practice - in particular in the case of classic munition - generally to dispense with the effect in the direction of the detonator (or to accept significant losses in power).

The invention is based on the observation that the explosive is detonated directly on the detonator side. As a consequence of this, fumes escape and the detonation wave propagates in the wrong direction. For example, the known munition DM121 dispenses completely with front fragmentation. The invention is based on the idea that the explosion fumes can only leave the warhead, for example a grenade, after acceleration of the active covering (generally fragments), since there is otherwise a loss of pressure, and consequently a loss of power (in the energy transfer). The detonation wave must propagate in the desired direction of effect.

The invention is based on the idea of providing the ignition point sufficiently deep within the warhead. A self-sealing ignition channel is proposed as a solution. In the explosive or warhead there is a channel, at the end of which the warhead is detonated (for example by a lead relay with the aid of a flyer). Lining the channel with a relatively soft metal (for example copper) has the effect that the detonation wave in the explosive closes the channel, so that on the one hand no detonation fumes can escape and on the other hand the detonation wave can act on all the effective surfaces (in particular that in the direction of the detonator). Consequently, in the desired case an effective action in all directions is achieved. The ignition channel with (metal) liner is necessary, since there is otherwise a premature escape of fumes, and consequently a drop in pressure. The detonation principle does not necessarily require a hollow ignition channel that has to be overcome with a flyer. It is equally possible that it is for example filled with a pyrotechnic material or the like (known as slag sealing).

The invention can be applied to fragmentation grenades with "powerful" fragments in the front region, for example a grenade to be used against vehicles, with fragments of a performance category that can for example completely attack the interior of a pickup truck. The invention can also be applied to air-burst grenades (in particular a 40 mm air-burst): a warhead that has a spherical range of action is very desirable in the case of an airburst grenade, since it can be used to attack an area very effectively. By contrast with munition that is currently available, there are no ineffective regions. In comparison with a warhead with a self-sealing ignition channel, without this design there is a premature escape of fumes and the active covering (here fragments) cannot be correspondingly accelerated. This has the consequence that a large part of the explosive energy is no longer available for the (front) fragments. By contrast with this, the pressure chamber is still intact thanks to the self-sealing channel. The warhead still has to break up and the explosive energy can still accelerate the fragments.

The idea of the invention is therefore to achieve a frontal effect for a 40 mm warhead that is detonated by means of a nose fuze, without using a safety and arming device outside the detonator, that is feasible both technically and in terms of cost. The self-sealing ignition channel has the effect of providing an ignition point remote from the tip of the warhead. Fragments can also be accelerated under the detonator. The 40 mm 360-degree warhead can produce fragments in every direction, by contrast with previous warheads of this munition, which for the most part had to dispense with any output in the direction of the detonator. According to the invention, a design for a (40 mm) grenade that makes a spherical effect possible is obtained. In spite of the nose

fuze, targets can be attacked with fragments in the direction of flight. According to the invention, the aim is to obtain a 40 mm warhead that is intended to eliminate a weakness of the currently available fragmentation munition (HE and HE-PFF, High Energy Pre Formed Fragments). This is in particular the inadequate fragmenting effect in the front region, where the nose fuze is provided. According to the invention, standard shells that are also used for other 40 mm projectiles can be used. According to the invention, spherically distributed fragments are obtained, without angular regions that are not covered (360-degree fragmenting effect), in particular in the direction of flight and impact of the grenade. The invention makes a much greater proportion of standard components possible, which lowers the production costs.

The 360-degree fragmenting range offers two advantages for tactical deployment scenarios: fragments in the front region can be used in particular against light and unarmored vehicles in order to attack the occupants. A typical scenario would be a pickup truck. The current munition would in this case direct all of the fragments away from the target object. For air-burst munition, a 360-degree fragmenting effect is a great advantage, since the projectile does not impact on an object but is generally activated in the air. By contrast with the previously available warheads, the warhead presented here would act with fragments in all directions, and consequently attack a much greater area per shot fired on the battlefield. This has the consequence of a much greater effect per shot fired and a lesser effectiveness of cover taken by the enemy. Previously, it was necessary in the case of 40 mm munition to dispense with the fragmenting effect in the direction of the detonator.

In this respect, the starting point of the invention is the realization that 40 mm grenades dispense with the fragmenting effect in the direction of the detonator and thus cannot attack targets in all directions. The aim of the invention is therefore to design a 40 mm warhead that has a 360-degree fragmenting effect, in particular a fragmenting effect in the firing direction, without changing the basic design. The explosion fumes may only leave the warhead after the acceleration of the active covering (generally fragments), since there is otherwise a loss of pressure, and consequently a loss of power (in the energy transfer). The detonation wave should propagate in the desired direction.

According to the invention, the warhead has in particular a lead relay (for example of HNS, hexanitrostilbene) that is detonated by means of a flyer-forming booster. The lead relay detonates the main charge. The detonation wave has the effect that the flying channel of the flyer is closed by the self-sealing ignition channel, so that the

power of the warhead in the direction of the detonator is not lost and is available for the acceleration of the fragments. Fragments are accelerated away from the grenade in all directions.

5 Apart from a small amount of fumes that leave the ignition channel during the sealing, consequently almost the entire energy of the explosive is available for the acceleration of the fragments up until the time directly before the rupturing of the shell of the warhead. The invention can be used in particular for a 40 mm 360-degree
10 fragmentation warhead for an HE-PFF munition with an impact detonator. In this case, the fragments in the front region are intended to attack the target on which they impact. The invention may also be used for a 40 mm 360-degree fragmentation warhead for an HE-PFF munition with air-burst munition.

15 The invention is based on the realization that currently the 40 mm warheads dispense with any appreciable fragmenting effect in the direction of the detonator.

20 According to the invention, therefore, the explosion point in an explosive arrangement (in particular as seen from the detonator) is moved "to the rear" or into the center, at least it does not remain "at the front". The ignition of the explosive takes place by a pressure wave. The pressure wave then propagates "forward".

25 According to the invention, therefore, a means for closing the ignition channel opening is obtained. According to the invention, an ignition mechanism for a warhead effect in the direction of the detonator is obtained. The invention allows an ignition mechanism which makes it possible to generate a powerful effect in the direction of the detonator. This relates to the effect of warheads and grenades in principle. The invention describes an ignition mechanism which makes it possible to achieve a uniform spherical effect.

30 According to the invention, in particular a 40 mm 360-degree fragmentation warhead is obtained. The invention describes in particular a 40 mm warhead which, in spite of a nose fuze, has a powerful frontal effect and a spherical effect.

35 Further features, effects and advantages of the invention are obtained from the following description of a preferred exemplary embodiment of the invention and the accompanying figures. In this case, in a basic schematic diagram:

Figure 1 shows a detail of a munition with a detonator in an initial state;

Figure 2 shows the munition from Figure 1 in an exploded state;

5 Figure 3 shows a detail of an alternative munition / an alternative munition concept.

Figure 1 shows a detail or a part of a munition 2, the munition being a 40 mm fragmentation grenade. The munition 2 contains a warhead 4. The warhead 4 contains a munition module 6 with a detonator 8 and an explosive arrangement 10 that can be detonated by the detonator. The explosive arrangement 10 is represented by hatching. The warhead 4 also contains an active covering 12, which surrounds the explosive arrangement 10 and which can be accelerated by reacted explosive of the explosive arrangement 10, or in the case of detonation is accelerated.

15 The detonator 8 is in the present case a nose fuze, since it is located with respect to a direction of flight 14 (in the case of deployment) of the munition 2 "before" the explosive arrangement 10, or in this sense at the "nose" of the munition 2. The active covering 12 is a fragmenting covering; a part 16 of the active covering 12 is provided on the side of the explosive arrangement that is facing the detonator 8.

20 The detonator 8 is arranged in relation to the explosive arrangement 10 such that it can detonate the explosive arrangement at an ignition point 18, or in the case of deployment detonates it. The ignition point 18 lies at a location remote from the detonator 8 within a casing 20 of the explosive arrangement 10. For purposes of illustration, the casing 20 is depicted by dashed lines at a small distance from the explosive arrangement 10. The casing 20 encloses both the explosive of the explosive arrangement 10 and a recess in the form of an ignition channel 22 incorporated or formed in the explosive. The casing has exclusively concave and planar surface regions and, in particular, does not follow the ignition channel, which leads "into the interior" of the explosive arrangement 10. The ignition channel 22 runs from the detonator 8 to the ignition point 18.

35 The ignition channel is lined by a body 26, here a shell in the form of a straight lateral surface of a cylindrical cone, or is surrounded or delimited with respect to the explosive. The body is in this case in an initial form F. The body 26 is a metal body, here of copper.

Figure 1 shows an initial state A of the munition 2 or of the munition module 6 or of the explosive arrangement 10. In the initial state A, the detonator 8 is not activated or triggered. Consequently, no explosive reaction or the like has begun in the munition 2.

5 In the initial state A, the ignition channel 22 is open, i.e. a channel from the detonator 8 to the ignition point 18 has been opened up. The ignition channel 22 is designed such that, starting from the open initial state A, it seals itself in an exploded state S.

10 In the initial state A, the ignition channel 22 is an unfilled cavity. The detonator 8 is a flyer-forming booster detonator and the ignition channel 22 is a flyer channel for it. At the end of the ignition channel 22 opposite from the detonator 8, a lead relay 28 is arranged (indicated by dashed lines). The lead relay 28 serves for the actual detonation of the explosive arrangement 10 or its explosive. The flying path of the flyer is symbolized by an arrow.

15 Figure 1 alternatively shows an ignition channel 22 that is not an unfilled cavity but instead contains a pyrotechnic material 30 (dashed, hatched). The pyrotechnic material 30 serves here for transmitting the detonating information from the detonator 8 to the ignition point 18.

20 Figure 2 shows the munition 2 from Figure 1 in the exploded state S. The exploded state S exists after detonation of the detonator 8 has taken place. The detonator 8 has already detonated the explosive of the explosive arrangement 10 at the ignition point 18. The explosive 10 is in a reaction phase, i.e. at least part of the explosive has
25 already reacted. A shell of the munition 2 that is not represented any more specifically is in any case deformed, but not yet destroyed and still keeps the reacted explosive within the active covering 12.

30 In the exploded state S, the ignition channel 22 (its initial state A is once again indicated by dashed lines) is at least partially closed by a sealing element 24, the sealing element 24 being introduced into the ignition channel 22 by the at least partially reacted explosive of the explosive arrangement 10.

35 The sealing element 24 is formed here by at least part of the body, which in the exploded state S has been deformed into a closed form V. The part of the body 26, here its compressed end facing the explosion point S, forms the sealing element 24.

In the alternative embodiment, after detonation the pyrotechnic material 30 has been reacted into a residual material 32. This residual material 32 additionally forms a further sealing element 24 and is slag.

5 The original ignition channel 22 is sealed by the sealing elements 24, so that no, or scarcely any, fumes of the reacted explosive can escape. In the situation that is represented in Figure 2, therefore, the entire energy of the reacted explosive is still available for the acceleration of the active covering 12.

10 Figure 3 symbolically shows an alternative munition 2, here in the form of an air-burst munition, with an alternative warhead 4 with an alternative munition module 6 in the initial state A. Here, the ignition point 18 lies approximately at the center of the casing 20 of the explosive arrangement 10. The detonator 8 is again a flyer-forming booster detonator, which interacts with a lead relay 28. The flying path of the flyer is again
15 symbolized by an arrow. The ignition point 18 is extended here and consists of the explosive surrounding the lead relay or adjoining it. Here, too, the sealing 24 is formed by a body 26, here a copper tube, which surrounds the ignition channel 22 in its initial form F in the manner of a straight lateral surface of a circular cylinder. During the reaction of the explosive arrangement 10 in the exploded state, the body 26 is
20 compressed to form the sealing element 24 (represented by dashed lines).

According to Figure 2 and Figure 3 (dashed lines indicated), to sum up it is evident that the self-sealing of the ignition channel 22 has the effect that the reacting explosive of the explosive arrangement 10 can no longer escape, or only slightly, in the form of
25 fumes through the ignition channel 22. The entire explosive energy of the explosive arrangement 10 is consequently used for the respective acceleration of all of the active covering 12. In particular, thus also the part 16 of the active covering 12 that lies "in front of" the explosive arrangement 10, seen in the direction of the detonator, i.e. on the side of the explosive arrangement that is facing the detonator 8.

30 Consequently, in the case of Figure 3, a 360-degree effect of the active covering 12, here a fragmenting covering, is obtained, and in Figure 2 in particular a fragmenting effect in the direction of the arrow 14, that is to say in the direction of flight.

List of designations

2	Munition
4	Warhead
6	Munition module
8	Detonator
10	Explosive arrangement
12	Active covering
14	Direction of flight
16	Part
18	Ignition point
20	Casing
22	Ignition channel
24	Sealing element
26	Body
28	Lead relay
30	Pyrotechnic material
32	Residual material
A	Initial state
S	Exploded state
F	Initial form
V	Closed form

Patent claims

1. A munition module (6)
 - with an explosive arrangement (10) that can be detonated by a detonator (8),
 - with the detonator (8), which is arranged in relation to the explosive arrangement (10) in such a way as to ignite it at an ignition point (18),

characterized in that

 - the ignition point (18) is positioned at a location remote from the detonator (8) within a casing (20) of the explosive arrangement (10),
 - in an initial state (A), an ignition channel (22) surrounded by at least part of the explosive arrangement (10) runs from the detonator (8) to the ignition point (18),
 - the ignition channel (22) is formed as a channel that is open in the initial state (A) and self-sealing in an exploded state (S), which occurs after detonation of the explosive has taken place.
2. The munition module (6) as claimed in claim 1,

characterized in that

in the exploded state (S) the ignition channel (22) is at least partially closed by at least one sealing element (24), the sealing element (24) having been introduced into the ignition channel (22) by the at least partially reacted explosive.
3. The munition module (6) as claimed in claim 2,

characterized in that

the sealing element (24) is formed by a body (26) which in the initial state (A) has an initial form (F) and which in the exploded state (S) has been deformed into a closed form (V), at least part of the deformed body (26) being the sealing element (24).
4. The munition module (6) as claimed in claim 3,

characterized in that

the body (26) in the initial form (F) is a shell surrounding the ignition channel (22).

5. The munition module (6) as claimed in either of claims 3 and 4,
characterized in that
the body (26) is a metal body.
- 5 6. The munition module (6) as claimed in one of claims 1 to 5,
characterized in that
the ignition channel (22) in the initial state (A) is an unfilled cavity.
- 10 7. The munition module (6) as claimed in claim 6,
characterized in that
the detonator (8) is a flyer-forming booster detonator and the ignition channel
(22) is a flyer channel, a lead relay (28) for detonating the explosive arrangement
(10) being arranged at the end of the ignition channel (22) opposite from the
detonator (8).
- 15 8. The munition module (6) as claimed in one of claims 1 to 5,
characterized in that
the ignition channel (8) in the initial state (A) contains a pyrotechnic material (30),
which after the detonation of the explosive arrangement (10) has been converted
into a residual material (32).
- 20 9. The munition module (6) as claimed in claim 8,
characterized in that
the sealing element (24) is formed by at least part of the residual material (32).
- 25 10. The munition module (6) as claimed in either of claims 8 and 9,
characterized in that
the residual material (32) is slag.
- 30 11. A warhead (4),
- with a munition module (6) with a detonator (8), and an explosive arrangement
(10) that can be detonated by the detonator (8), and
- with an active covering (12), which at least partially surrounds the explosive
arrangement (10) and can be accelerated by the reacted explosive,
35 **characterized in that**
the munition module (6) is a munition module (6) as claimed in one of claims 1 to
10.

12. The warhead (4) as claimed in claim 11,
characterized in that
the active covering (12) is a fragmenting covering.
13. The warhead (4) as claimed in either of claims 11 and 12,
characterized in that
at least part of the active covering (12) is provided on the side of the explosive
arrangement (10) that is facing the detonator (8).
14. A munition (2) with a warhead (4) with an impact detonator,
characterized in that
the warhead (4) is a warhead (4) as claimed in one of claims 11 to 13 and the
detonator (8) of the warhead (4) is the impact detonator.
15. A munition (2) in the form of an air-burst munition, with a warhead (4),
characterized in that
the warhead (4) is a warhead (4) as claimed in one of claims 11 to 13.