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(54) Benævnelse: **PROJEKTIL**

(56) Fremdragne publikationer:

EP-A1- 0 328 877
FR-A1- 2 975 482
FR-B1- 2 617 586
GB-A- 2 052 694
US-A- 2 413 008
US-A- 4 515 083

The invention relates to a projectile, which has a projectile body comprising a recess for receiving an explosive, wherein the projectile body comprises a cylindrical shell surface, at least in sections, which is surrounded, at least in sections, by several ring-shaped elements provided with predetermined break points, wherein fragments formed upon breakup of the elements are predefined via the predetermined break points, said fragments being connected to one another in a ring-shaped connecting portion for forming the ring-shaped element.

During explosions of projectiles, fragments having different masses are formed upon natural breakup. A disadvantage here is that fragments of a very low mass have only little effect while fragments of high mass have a very large range of effect which often exceeds the desired range of effect. As a consequence, fragments of high mass may cause undesired collateral damage outside of the target area whereas the fragments of low mass do not contribute to the effect in the target area. This means that both fragments of high mass and of low mass do not contribute to the effect in the desired target area, and are thus lost for the target area. For harmonising masses, various approaches are already known from the prior art.

A projectile of the initially mentioned type, in which ring-shaped (annular) elements have predetermined breaking points in order to produce fragments of a predefined size and mass upon explosion of the projectile, is known from EP 0 328 877 A, for example. Here, a plurality of rings is arranged on top of each other in order to form a shell made of fragments, with the rings comprising gaps having cylindrical insides or triangular cross-sections to determine the desired size of the fragments.

Further known from US 4 515 083 A is a ring-shaped fragment element for a hand grenade, the outside of which fragment element has two continuous V-shaped recesses.

A similar design using substantially gear-shaped rings is known from FR 2 523 716 A, for example.

Furthermore, EP 273 994 B1 discloses a projectile having a plurality of rings comprising triangular gaps in their insides.

Known from GB 2 052 694 A is a projectile with a housing composed of rings, wherein the rings in one embodiment have parallel surfaces angled relative to the longitudinal axis of the projectile.

Comparable designs are further known from DE 37 216 19 A1, US 2 413 008 A, or also US 8,276,520 B1.

A disadvantage of these projectiles known in the prior art is, however, that the fragments - even if they have the desired mass and/or size - are propelled substantially perpendicularly to the longitudinal axis of the rotation-symmetrical section of the projectile, so a great number of the fragments is not propelled into the desired target area.

Accordingly, it is the object of the present invention to provide a projectile of the initially mentioned type, in which the fragments are propelled from the projectile in such a way that the range in which the fragments have an effect is enlarged.

According to the invention, this is achieved by arranging the freely projecting ends of the fragments at least partially in a common orthogonal plane to a longitudinal axis of the ring-shaped element, wherein this orthogonal plane is arranged diverging from an orthogonal plane defined by the ring-shaped connecting portion, and the ring-shaped elements are divided into two groups, wherein the fragments of the ring-shaped elements each are bent in a direction with respect to the orthogonal plane defined by the ring-shaped connecting portion, and the ring-shaped elements of the two groups are pushed onto the cylindrical shell surface in a different spatial orientation.

In projectiles known up to now, the ring-shaped elements have been formed substantially disc-shaped, i. e. the freely projecting ends of the predefined fragments and the opposite end of the ring-shaped element where the fragments are connected to one another have been arranged in the same orthogonal plane. Due to this disc-shaped design known in the prior art, fragments are propelled substantially perpendicularly to the longitudinal axis of the usually cylindrical section of the projectile body upon explosion of the explosive received in the projectile body. As a consequence, provided that the projectile hits the ground in an angle of, for example, 45° and thus the explosive is ignited in this angular position, for instance when using a direct-action fuse, a considerable share of the fragments received on the projectile body is misdirected towards the ground, so the projectile has a comparably small range of effect and/or the scattering effect is inefficient.

Because of the inclination and/or curvature of the fragments according to the invention with respect to the longitudinal axis of the ring-shaped element and/or the longitudinal axis of the rotation-symmetrical section of the projectile body and the different spatial orientation, the propelling direction is changed with respect to known projectiles, so the scattering effect and/or the range in which the fragments are efficient is enhanced considerably.

A particularly simple and efficient design with regard to the determination of the trajectory as well as to the production is obtained if the upper surface and the lower (under) surface of at least a number of fragments are formed substantially smooth (flat) and parallel to one another, wherein the two surfaces include an angle other than 90° with respect to the orthogonal plane, defined by the ring-shaped connecting portion, to the longitudinal axis. In such a design, at least a subset of the fragments is formed substantially rectilinearly, i. e. not curved, in their cross-sections, so the trajectory may be determined well; on the other hand, the production of the ring-shaped elements may be done in a simple manner by pre-manufacturing initially ring-shaped discs in which at least a subset of the fragments is then bent out from the plane of the ring-shaped connecting portion connecting the fragments.

Provided that all fragments include substantially the same angle of inclination with respect to an orthogonal plane, defined by the ring-shaped connecting portion, to the longitudinal axis, a particularly efficient design with regard to the production techniques is obtained, wherein all ring-shaped elements have substantially the same design. However, this does not mean that all ring-shaped elements are arranged in the same angle to the longitudinal axis of the cylindrical section of the projectile body, since preferably the arrangement of the ring-shaped elements is divided into at least two sections, wherein the arrangement and/or orientation of the ring-shaped elements in the first section is reversed with respect to the arrangement of the ring-shaped elements in the second section, and/or the ring-shaped elements in the two sections may be arranged mirrored about an orthogonal plane to the longitudinal axis of the rotation-symmetrical section of the projectile body.

As an alternative to the design of ring-shaped elements in which all fragments have the same angle of inclination, it is also possible for a subset of the fragments to include a first angle other than 90° with respect to the orthogonal plane defined by the ring-shaped connecting portion, and another subset to include a second angle, also other than 90° with respect to the orthogonal plane defined by the ring-shaped connecting portion. Preferably, the value of the second angle here equals that of the first angle, but the inclination of the fragments is mirrored about a plane extending through a ring-shaped connecting portion. This results in each ring-shaped element comprising two groups of fragments having different angles of inclination with respect to the plane defined in the ring-shaped connecting portion, so upon explosion of the explosive, fragments are propelled in a different direction in each ring-shaped element.

Tests showed that a particularly efficient propelling direction, in which the effective range of the projectile may be improved considerably with respect to previously known projectiles, is obtained if the upper surface and the lower surface of the fragments include an angle between 5° and 70°, preferably between 15° and 45°, in particular between 25° and 35°, with respect to a plane defined by the ring-shaped connecting portion. This advantageous inclined arrangement of the fragments is based on the fact that the projectile is usually activated in an angle between 45° and 85° with respect to the ground by means of either a direct-action fuse or a delay-action fuse. This means that the projectile usually has an angle of inclination of approx. 45° to 85° with respect to the ground when it is activated. Advantageously, the inclination of the fragments between 5° and 70° makes it possible to propel especially those fragments, which are usually (mis)directed towards the ground because of the inclination of the projectile upon ignition of the explosive and, consequently, do not make a useful contribution, in an angle other than 90° with respect to the shell surface of the projectile body, thus improving the scattering effect considerably.

Regarding a simple and efficient production of the ring-shaped elements in terms of manufacturing techniques, it is advantageous for each of the ring-shaped elements to comprise a plurality of grooves (slots) representing predetermined break points. Here, a substantially disc-shaped, ring-shaped element may initially be produced, in which grooves are then made by punching, milling, lasing or, if desired, (wire) erosion in order to establish a controlled fragmentation of the ring-shaped elements.

In order to predefine fragments the main extension direction of which is substantially in the radial direction of the ring-shaped element and, thus, in the direction of the momentum initiated by the explosive, it is favourable for the axes of longitudinal extension of the grooves to be substantially in the radial direction of the ring-shaped element.

Regarding a simple and efficient production it is favourable for the grooves to comprise a substantially rectangular cross-section.

The ground of the substantially rectangular grooves may here have different designs. It is particularly advantageous, for example, if the grooves are made by means of wire erosion since in this case the grooves can have a relatively small width and, as a consequence, comparably low material loss occurs in the production of the predetermined break points. As a result of the typically round cross-section of the wire, the grooves will have a ground (slot base) in the shape of a circular arc.

In order to define the fragmentation of the fragments from the ring-shaped element upon explosion especially accurately, in particular regarding the breakup in the circumferential direction, it is advantageous for the grooves to comprise a ground in the shape of an acute angle.

Provided that the grooves extend outwardly from an inner surface of the ring-shaped elements, the inner surface being defined by an inner radius, ring-shaped elements having grooves and/or predetermined break points which are not visible on the outside of the ring-shaped elements are formed in an advantageous way. Advantageously, this means that providing an outer (protective) cover may be omitted.

In this case, it is particularly favourable for the ring-shaped connecting portion to comprise a substantially full-faced (continuous) outer shell surface, so a substantially closed, preferably cylindrical outer shell surface is obtained without the need to take further precautions for this purpose when arranging said ring-shaped elements on top of one another.

In order to obtain a substantially smooth outer shell surface by means of a plurality of ring-shaped elements arranged on top of one another, it is favourable for the respective outer shell surface of the ring-shaped elements to comprise an angle other than 90° towards both an upper surface and a lower surface of the ring-shaped connecting portion, so the shell surface extends substantially parallel to the cylindrical shell surface of the projectile body.

Due to this substantially smooth-faced design of an outer shell surface by means of a plurality of ring-shaped elements, the deposition of dirt and/or a forming of contact corrosion or the like may be avoided in an advantageous manner, in particular when gluing the ring-shaped elements to one another and/or applying a coating such as a layer of paint.

Regarding the method, such ring-shaped elements are produced, in particular, as follows:

First, substantially planar ring-shaped discs are produced, in which predetermined break points are then made by the aforementioned steps (eroding, punching, milling, etc.), leaving a ring-shaped connecting portion. Then, the freely projecting ends of the predefined fragments are bent out from the plane defined by the ring-shaped connecting portion, thus defining the desired propelling direction.

As a result, however, the outer shell surface of the previously disc-shaped elements is then located vertically with respect to the inclined fragments and/or the ring-shaped connecting portion, so that when arranging such ring-shaped elements on top of one another, each element forms a sharp-edged protrusion having a substantially triangular cross-section. This is disadvantageous with regard to the forming of corrosion and the possibility for applying a (tight) protective cover and/or coating, and ballistic disadvantages will occur in conjunction with this as well.

Therefore, in order to obtain a substantially closed, smooth outer shell surface in which ring-shaped elements are arranged on top of one another, the sharp-edged triangular protrusions of the ring-shaped elements are removed in an advantageous manner, preferably by a turning method and after gluing the ring-shaped elements to one another, so the desired substantially smooth outer shell surface is obtained. Afterwards, it may be provided with a protective paint known from the prior art or the like.

Regarding the increase of the effective range of the projectile, it is favourable for the ring-shaped elements close to the ground to be propelled at a different angle than the ring-shaped elements far from the ground, so it is advantageous to arrange a positioning ring between a first subset and a second subset of the ring-shaped elements. Using the positioning ring, the ring-shaped elements may thus be divided into at least two subsets, which preferably have different propelling directions, in a simple manner.

In order to here obtain a compact positioning of these ring-shaped elements in a substantially mirrored arrangement, it is favourable for the positioning ring to comprise an upper and a lower contact surface extending inclined with respect to an orthogonal plane of the longitudinal axis of the rotation-symmetrical section of the projectile body, with the positioning ring preferably designed as a mirror image about a central orthogonal plane of the longitudinal axis of the rotation-symmetrical section.

The object according to the invention is also achieved, in particular, by a ring-shaped element for a projectile according to any one of the preceding claims, comprising several predetermined break points, at least in sections, the predetermined break points defining fragments formed upon breakup of the element, wherein the freely projecting ends of the fragments are arranged, at least partially, in a common orthogonal plane to a longitudinal axis of the ring-shaped element and this orthogonal plane is arranged diverging from an orthogonal plane defined by the ring-shaped connecting portion.

The invention is discussed in more detail by means of preferred exemplary embodiments, however without in any way being limited to them, below. In the individual drawings:

Fig. 1 shows a cross-section of a projectile according to the invention;

Fig. 1a shows a cross-section of an alternative exemplary embodiment of a projectile according to the invention;

Fig. 2 shows a perspective view of a ring-shaped element;

Fig. 3 shows a side view of the ring-shaped element according to Fig. 2;

Fig. 4 shows a plan view of the ring-shaped element according to Figs. 2 and 3;

Fig. 5 shows a plan view of an alternative design of the ring-shaped element;

Fig. 6 shows a plan view of a further alternative design of the ring-shaped element;

Fig. 7 shows a plan view of a further alternative design of the ring-shaped element;

Fig. 8 shows a perspective view of a ring-shaped element having fragments projecting in different directions;

Fig. 9 shows a side view of the ring-shaped element according to Fig. 8.

In Fig. 1 a projectile 1 according to the invention can be seen, comprising a projectile body 2 having a rear part 3 and a blasting pipe 4. The blasting pipe 4 here has a recess 5 for receiving the explosive and an adjoining recess 6 for receiving a fuse (not shown). A direct-action fuse or a delay-action fuse may here be provided, in particular.

As can be seen in the cross-sectional view according to Fig. 1, the blasting pipe 4 in the exemplary embodiment shown comprises a substantially cylindrical shape, so in a section of the projectile 2 a rotation-symmetrical, in the present case cylindrical, shell surface 7 (wall surface) is formed, on which a plurality of ring-shaped (annular) elements 8 may be received in a simple manner. The outer diameter of the cylindrical shell surface 7 and the inner diameter of the ring-shaped elements 8 are here chosen such that the ring-shaped elements 8 may be pushed and/or threaded over the substantially cylindrical pipe element with play in a simple manner. As a consequence, in assembled state, a longitudinal axis 7' of the cylindrical shell surface 7 of the blasting pipe 4 substantially coincides with a longitudinal and/or rotational axis 8' of the ring-shaped elements 8.

Furthermore, it can be seen in Fig. 1 that the ring-shaped elements 8 are divided into two groups and/or subsets 10, 10' by means of a positioning ring 9. In the exemplary embodiment shown all ring-shaped elements 8 are here of the same design, but the spatial arrangement of the ring-shaped elements 8 in the first group 10, which is located closer to the fuse receiving portion 6, is in opposition to the arrangement of the ring-shaped elements 8 in the second subset and/or group 10'. By this, the scattering angle of the fragments upon explosion is further improved, as described in more detail below.

In Fig. 1a an alternative exemplary embodiment of projectile 1 according to the invention can be seen, which here provides for a throughout convex shape of the outer shell surface 16. The shell surface 16 is achieved in a central section by providing ring-shaped elements 8 having substantially the same inner diameter, but different outer diameters on the cylindrical shell surface 7 of the blasting pipe 4. The outer diameters of the ring-shaped elements 8 are here selected such that in the area of the positioning ring 9 advantageously projectile 1 has the largest diameter.

By way of this convex shape of the outer shell surface 16 advantageously particularly favourable aerodynamics are achieved, which substantially correspond to the aerodynamic shape of other projectiles (without ring-shaped fragmented elements). Furthers by way of this arrangement additionally the enlargement of the scattering angle as aimed by the invention is further promoted.

Figs. 2 to 4 show a first possible design of the ring-shaped elements 8 according to the invention.

As can be seen, a ring-shaped (annular) connecting portion 11 is formed on the outside here, from which a plurality of fragments 12, each having a freely projecting end 13, extends to the inside.

As can be seen in particular in the side view according to Fig. 3, the orthogonal plane 11', defined by the ring-shaped connecting portion 11, to the longitudinal axis 8' is arranged diverging from the orthogonal plane 13' defined by the freely projecting ends of the fragments 12. As a result, the ring-shaped elements 8 designed according to the invention are - in contrast to what is known from the prior art - not formed as substantially flat, disc-shaped elements, but according to the invention the ring-shaped elements 8 have fragments 12 inclined with respect to the orthogonal plane 11' and/or the shell surface 7 of the blasting pipe 4 in order to change the propelling direction of the fragments 12 upon ignition of the explosive provided in the recess 5 in such a way that the number of the effective fragments 12 is increased due to their propelling direction.

Here, the ring-shaped elements 8 according to the invention are preferably made of ring-shaped discs, which ring-shaped discs are then deformed, preferably by means of a stamping method, in order to determine the inclination of the fragments 12 in the exemplary embodiment shown in an angle α of substantially 30° with respect to an orthogonal plane 11' and/or 13'.

Before this deformation is carried out, preferably by means of stamping, it is advantageous to produce the predetermined break points in the form of grooves 14 in the (yet) ring-shaped discs, which represent an intermediate product in the production of the ring-shaped elements 8 according to the invention.

Depending on the desired design of the grooves 14, different methods may be used for this. In the exemplary embodiment shown in Figs. 2 to 4, the desired shape of the grooves may be produced in a particularly simple and efficient way by punching.

Of course, the possible methods for groove production also depend on the material selection for the ring-shaped elements 8; preferably, a suitable iron material meeting the desired requirements in conjunction with the forming of fragments in terms of hardness and toughness is selected for the design according to the invention. Such an iron material has good basic punching capabilities, too.

Moreover, the dimensions of the ring-shaped disc element, which serves as an intermediate product for the ring-shaped elements according to the invention, are selected such that a cuboid-shaped fragment design, in particular a cubist fragment design, is obtained.

As shown in Figs. 2 to 7, milling or punching allow to produce grooves 14, in particular of substantially rectangular cross-section, in a simple manner, wherein the ground 15' of the grooves may, alternatively, be designed in the shape of a circular arc (cf. Figures 2 to 4), an acute angle (cf. Fig. 5) or, however, rectilinear (cf. Fig. 7).

A particular material-saving production method has been used for element 8 shown in Fig. 6, in which grooves 14 having a comparably small cross-sectional width have been produced using wire erosion. As an alternative to wire erosion and/or milling or punching, the grooves may, of course, also be produced by means of laser.

A further alternative exemplary embodiment of the ring-shaped element 8 is shown in Figs. 9 and 10, wherein the ring-shaped element 8 comprises two groups of fragments 12, with the one group of fragments 12 bent upwards with respect to an orthogonal plane 11' defined by the ring-shaped connecting portion and the other group of fragments 12 bent downwards.

The different alignments of these fragments 12 are here selected alternating in the circumferential direction, so that, advantageously, identically designed ring-shaped elements 8 may be stacked intimately into each other in an alignment turned around a fragment 12.

As shown in Fig. 1, it is also possible, in particular, to allow different propelling directions, using ring-shaped elements 8 in which the fragments 12 are bent in only one direction with respect to the plane 11' defined by the ring-shaped connecting portion 11, by pushing the ring-shaped elements 8 over the cylindrical shell surface 7 in different spatial orientations. The two groups 10, 10' of ring-shaped elements 8 having different orientations are separated by the positioning ring 9, which comprises contact surfaces 9', 9'' that are inclined according to the respective angle of inclination α of the fragments 12.

Tests showed that, depending on the selection of the explosive and the material of the ring-shaped elements 8, those elements 8 of group 10 which are located closer to the fuse, i. e. closer to the ground, are propelled in a scattering angle β of approx. 0° to 70° to the orthogonal plane 13', with the fragments 12 located near the positioning ring 9 and/or a central plane being propelled in a relatively small angle near the lower limit of the scattering angle β. Then, the propelling angle increases for the fragments 12 further away from the positioning ring 9 and/or a central plane, so the fragments 12 further away from the positioning ring 9 – again depending on the selection of explosive and material – are propelled in an angle near the upper limit of the scattering angle β. The ring-shaped elements 8 of group 10', which are located closer to the rear part 3 of the projectile 2, have a scattering angle β' with a value of preferably also approx. 0° to 70° to the orthogonal plane 13', but in the opposite direction. As has been described above, the propelling angle of the fragments 12 increases the further the fragments are away from the positioning ring 9 and/or a central plane here as well, so advantageously there will be an effective propelling angle of up to 140° altogether.

As can be seen in Fig. 1, this leads to a considerably larger scattering angle for the fragments 12 of the ring-shaped elements 8 when compared to a uniformly orthogonal propelling direction, so the efficiency of the projectile 1 is clearly improved when compared to disc-shaped elements extending only in the orthogonal plane to the longitudinal axis 7' and/or 8'.

Furthermore, it can be seen in Fig. 1 and Fig. 1a that the ring-shaped elements 8 in their assembled state form a substantially smooth outer shell surface 16. Since, during stamping, the outer shell surface of the ring-shaped connecting portion 11 is initially also arranged inclined to the desired smooth shell surface 16 for inclining the fragments 12, the ring-shaped elements 8 are preferably glued to one another, and then sharp-edged protrusions having a substantially triangular cross-section are removed by a turning method, so the desired substantially smooth shell surface 16 is obtained. Afterwards, it may be provided with a paint layer or the like with regard to improved protection against corrosion.

Of course, ring-shaped elements 8 having different angles α and/or, to some extent, disc-shaped elements in which the fragments extend substantially in the direction of an orthogonal plane to the longitudinal axis 8' may also be provided in a projectile 2. The only substantial part is that at least some ring-shaped elements 8 are provided, in which the freely projecting ends 13 of the fragments 12 are arranged in an orthogonal plane 13' diverging from the orthogonal plane 11' defined by the ring-shaped connecting portion, so the scattering angle of the fragments 12 is increased.

Patentkrav

1. Projektil (1) med et projektillegeme (2), der omfatter en udsparing (5) til at modtage sprængstof, hvor projektillegemet (2) har, mindst i sektioner, en cylindrisk vægflade (7), der er omgivet, mindst i sektioner, af en flerhed af ringformede elementer (8) forsynet med forudbestemte brudpunkter, hvor fragmenter (12) som dannes ved nedbrydning af elementerne (8) er foruddefineret ved hjælp af forudbestemte brudpunkter og fragmenterne (12) er forbundet sammen i en ringformet forbindelsessektion (11) til at danne det ringformede element (8), **kendetegnet ved at** de frit udragende ender (13) af fragmenterne (12) er anbragt mindst delvist i et fælles ortogonalplan (13') til en langsgående akse (8') af det ringformede element (8), hvor dette ortogonalplan (13') er anbragt adskillende sig fra et ortogonalplan (11') defineret af den ringformede forbindelsessektion (11), og de ringformede elementer (8) er delt i to grupper (10, 10'), hvor fragmenterne (12) af de ringformede elementer (8) er bøjet i en retning i forhold til ortogonalplanet (11') defineret af den ringformede forbindelsessektion (11) og de ringformede elementer (8) af de to grupper (10, 10') er skubbet på den cylindriske vægflade (7) i forskellige rumlige justeringer.

2. Projektil ifølge krav 1, **kendetegnet ved at** over- og underfladen (8") af mindst et antal af fragmenterne (12) er i det væsentlige plane og parallelle med hinanden, hvor de to flader (8'') definerer en vinkel (α) der adskiller sig fra 90° i forhold til ortogonalplanet (11') defineret af den ringformede forbindelsessektion (11) til den langsgående akse (8').

3. Projektil ifølge krav 2, **kendetegnet ved at** alle fragmenterne (12) definerer i det væsentlige den samme hældningsvinkel (α) i forhold til ortogonalplanet (11') defineret af den ringformede forbindelsessektion (11) i forhold til den langsgående akse.

4. Projektil ifølge krav 2, **kendetegnet ved at** en delmængde af fragmenterne (12) definerer en første vinkel (α) der adskiller sig fra 90° med ortogonalplanet (11') defineret af den ringformede forbindelsessektion (11) og en anden delmængde definerer en anden vinkel (α') der også adskiller sig fra 90° med ortogonalplanet (11') defineret af den ringformede forbindelsessektion, hvor den anden vinkel (α') fortrinsvis spejler den første vinkel (α) omkring et plan der strækker sig gennem en ringformet forbindelsesdel (11).

5. Projektil ifølge et af kravene 2 til 4, **kendetegnet ved at** de øvre og nedre flader (8") af fragmenterne (12) definerer en vinkel (α) mellem 5° og 70°, fortrinsvis mellem 15° og 45°, især mellem 25° og 35°, i forhold til et plan (11') defineret af den ringformede forbindelsesdel (11).

6. Projektil ifølge et af kravene 1 til 5, **kendetegnet ved at** de ringformede elementer (8) hver har en flerhed af udsparinger (14) som udgør de forudbestemte brudpunkter.

7. Projektil ifølge krav 6, **kendetegnet ved at** de langsgående akser af udsparingerne (14) strækker sig i det væsentlige i radial retning af det ringformede element (8).

8. Projektil ifølge krav 6 or 7, **kendetegnet ved at** udsparingerne (14) har et i det væsentlige rektangulært tværsnit.

9. Projektil ifølge et af kravene 6 til 8, **kendetegnet ved at** udsparingerne (14) har en cirkulær hvælvet udsparingsbasis (15').

10. Projektil ifølge et af kravene 6 til 8, **kendetegnet ved at** udsparingerne (14) har en spidsvinklet udsparingsbasis (15').

11. Projektil ifølge et af kravene 7 til 10, **kendetegnet ved at** udsparingerne (14) strækker sig udadtil fra en indre flade af det ringformede element (8) defineret af en indre radius.

12. Projektil ifølge et af kravene 1 til 11, **kendetegnet ved at** den ringformede forbindelsessektion (11) har en i det væsentlige kontinuerlig ydre vægflade (16).

13. Projektil ifølge et af kravene 1 til 12, **kendetegnet ved at** ydervægfladen (16) af de ringformede elementer har en vinkel der adskiller sig fra 90° med en øvre flade og en nedre flade af den ringformede forbindelsessektion (11), hvor vægfladen (16) strækker sig i det væsentlige parallelt til den cylindriske vægflade (7) af projektillegemerne (2).

14. Projektil ifølge et af kravene 1 til 13, **kendetegnet ved at** en positioneringsring (9) er anbragt mellem en første delmængde (10) og en anden delmængde (10') af de ringformede elementer (8).

15. Projektil ifølge krav 14, **kendetegnet ved at** positioneringsringen har en øvre og en nedre anlægsflade (9', 9") der strækker sig skråt i forhold til et ortogonalplan af den langsgående akse af den roterende symmetriske sektion af projektillegemet (2), hvor positioneringsringen (9) er fortrinsvis af spejlsymmetrisk konstruktion omkring et centralt ortogonalplan af den langsgående akse af den rotations-symmetriske sektion.

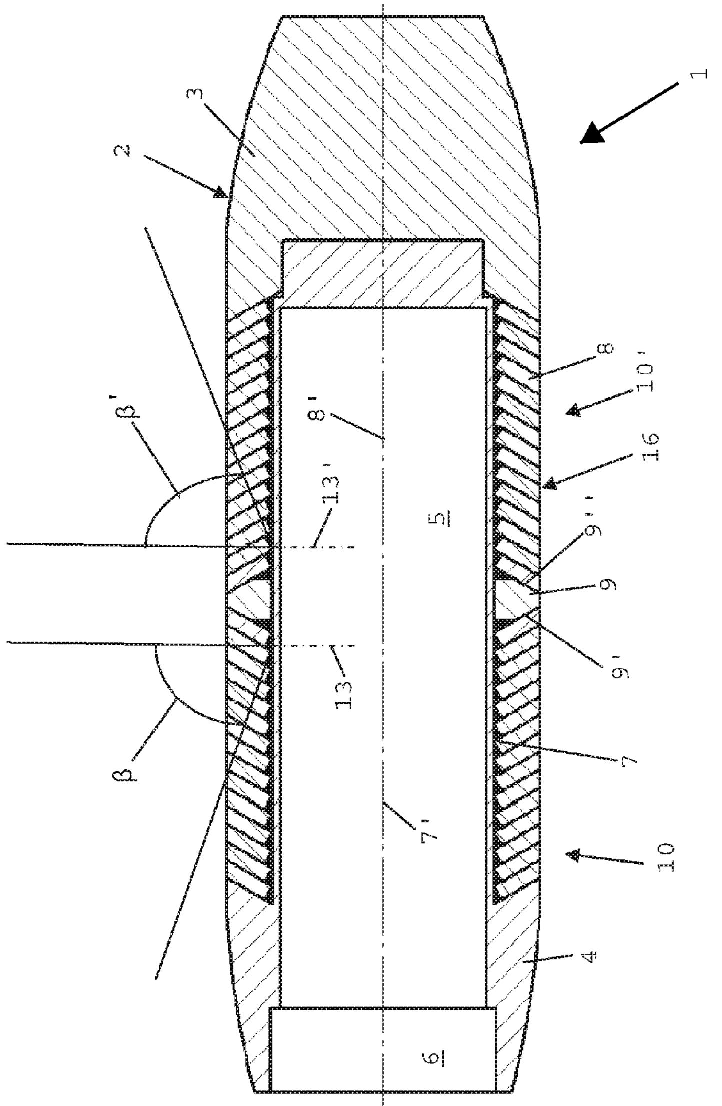

Fig. 1

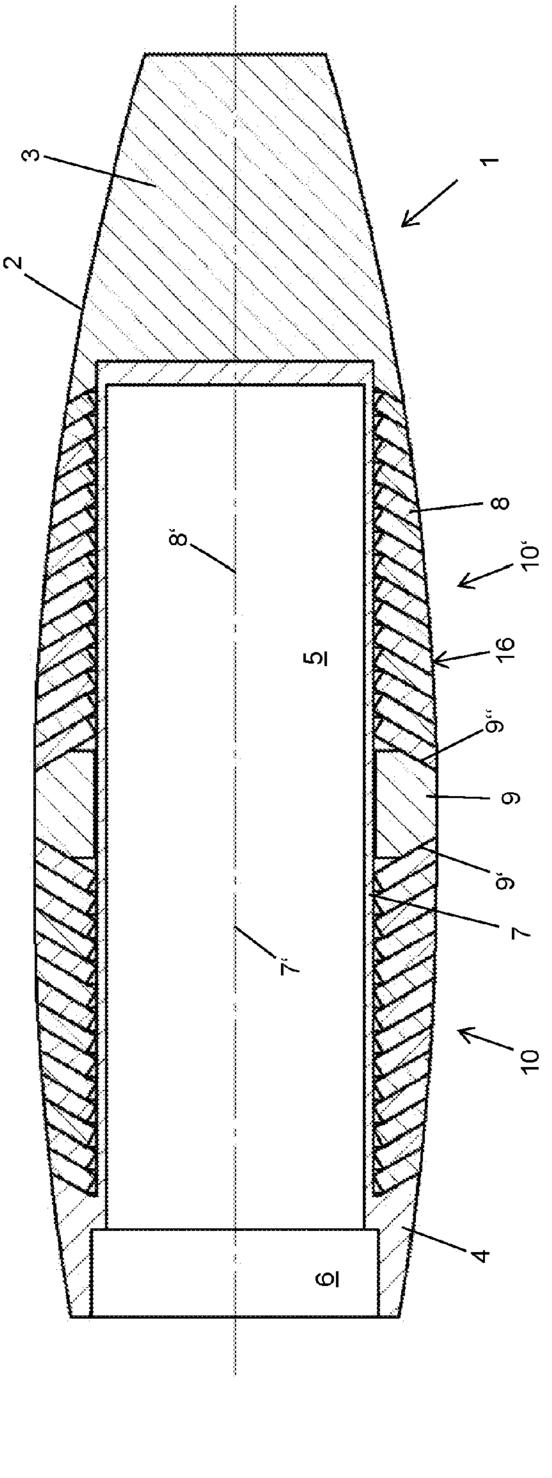

Fig. 1a

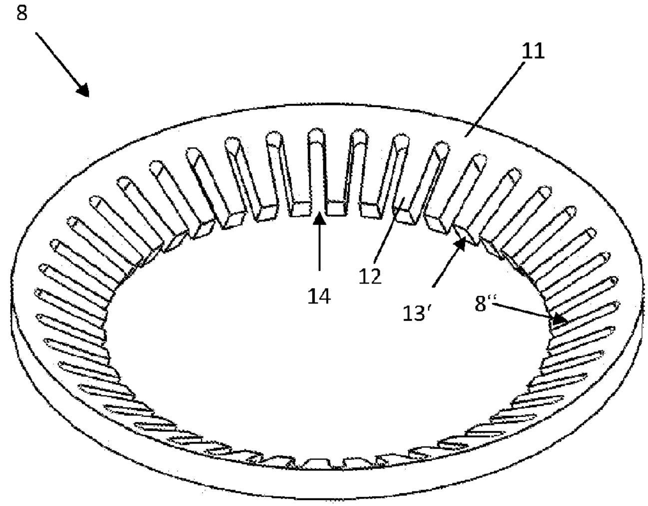

Fig. 2

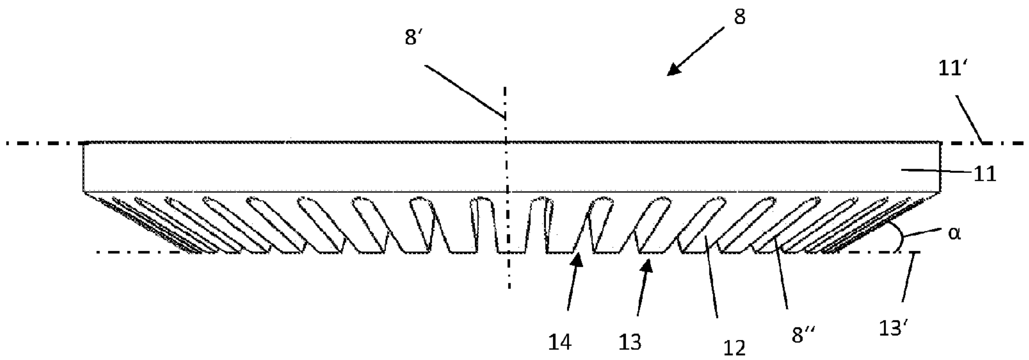

Fig. 3

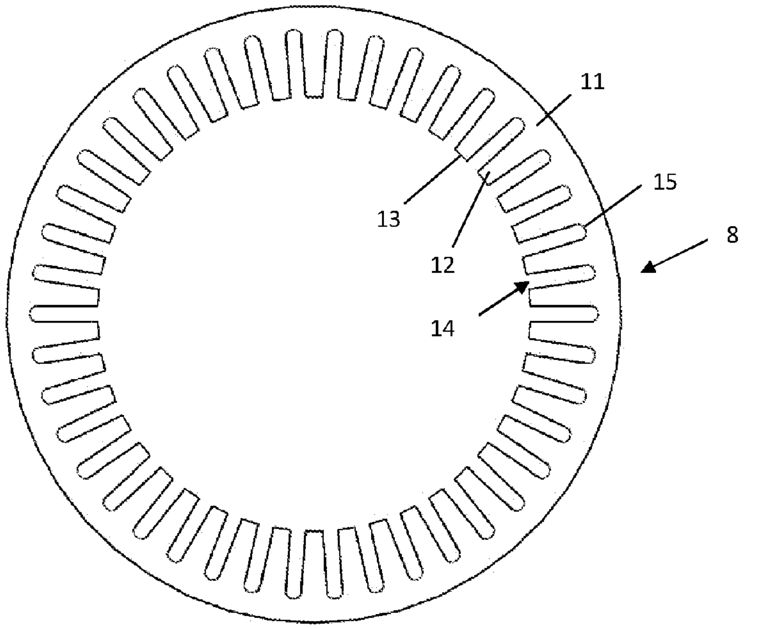

Fig. 4

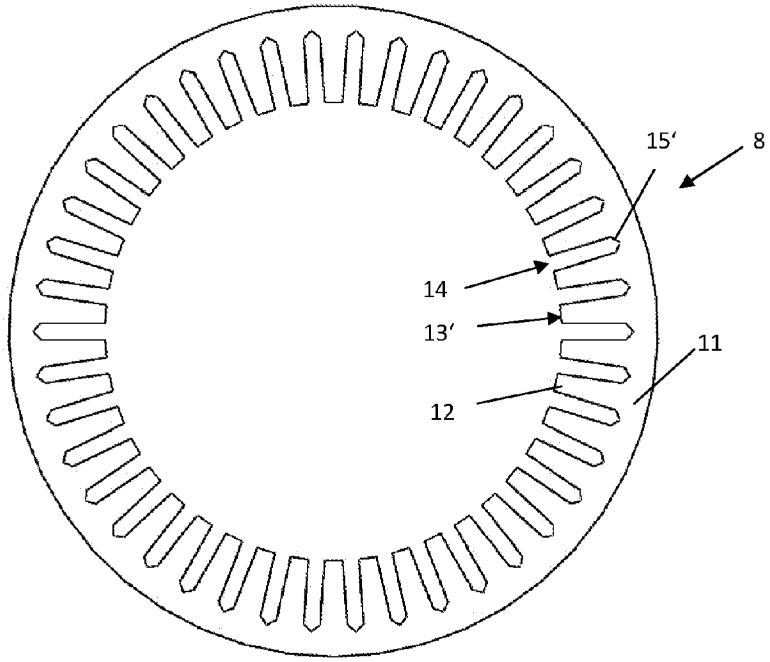

Fig. 5

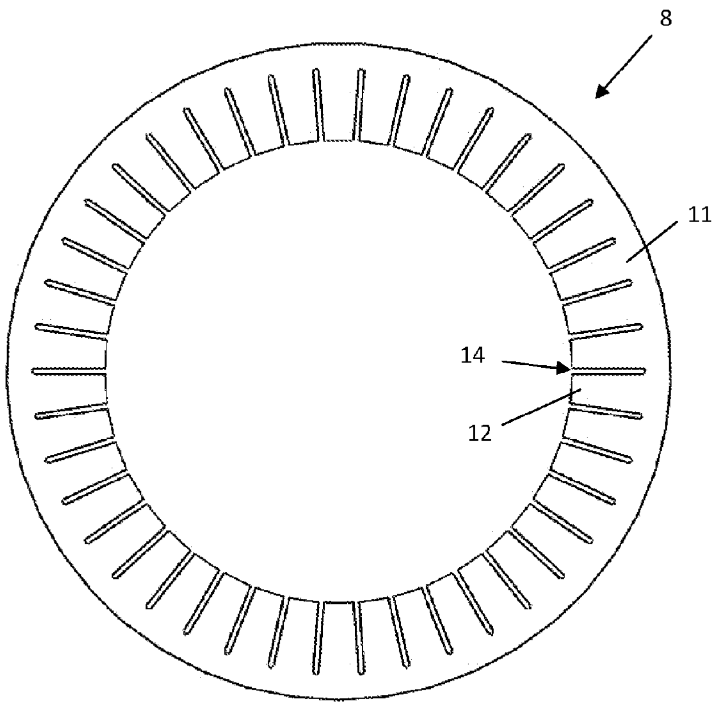

Fig. 6

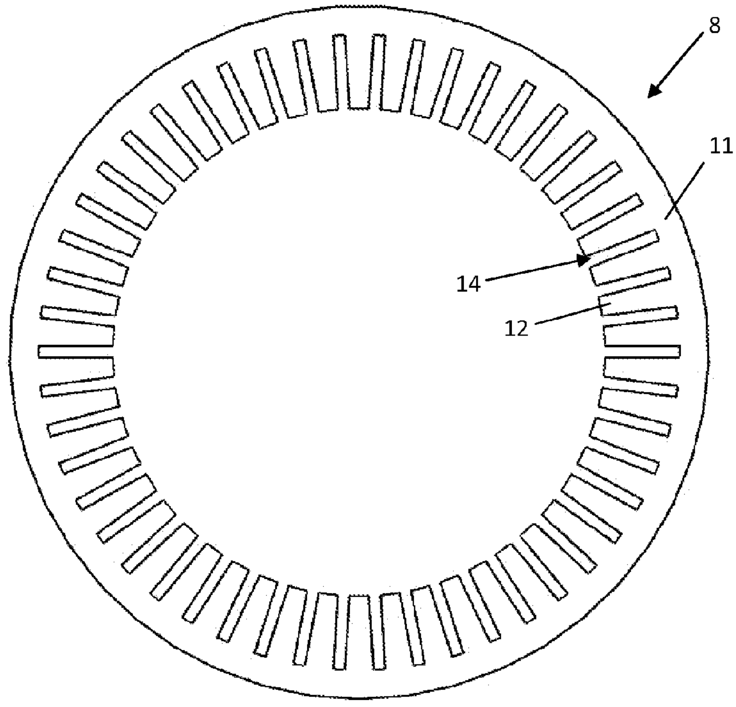

Fig. 7

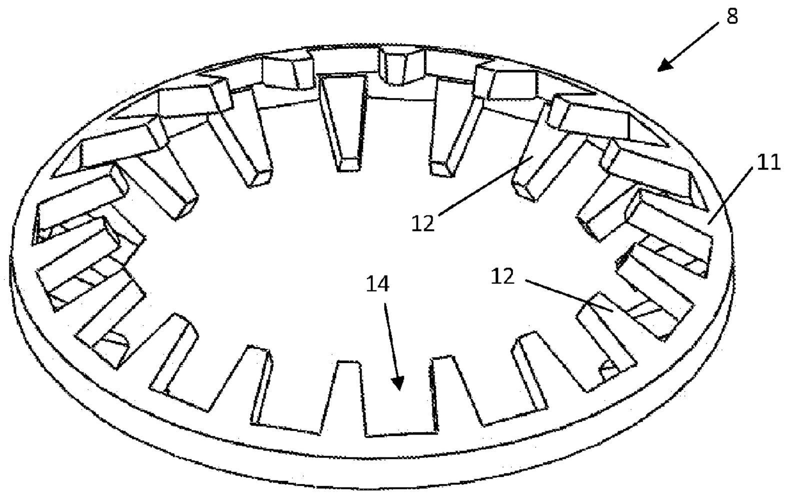

Fig. 8

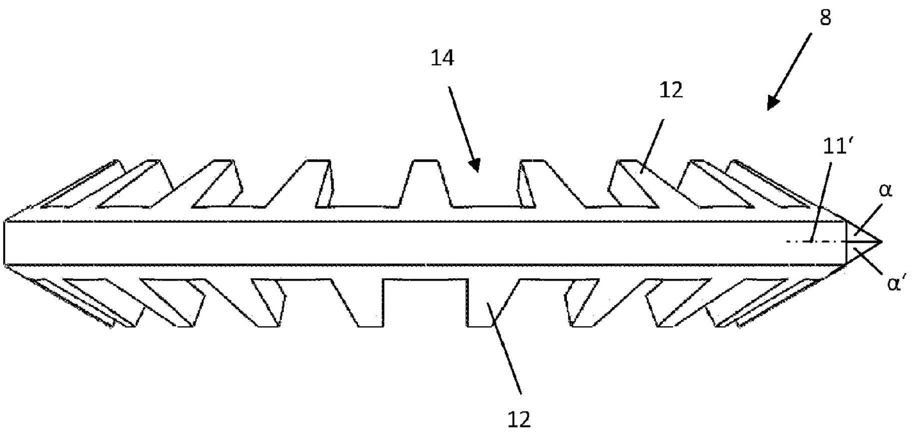

Fig. 9