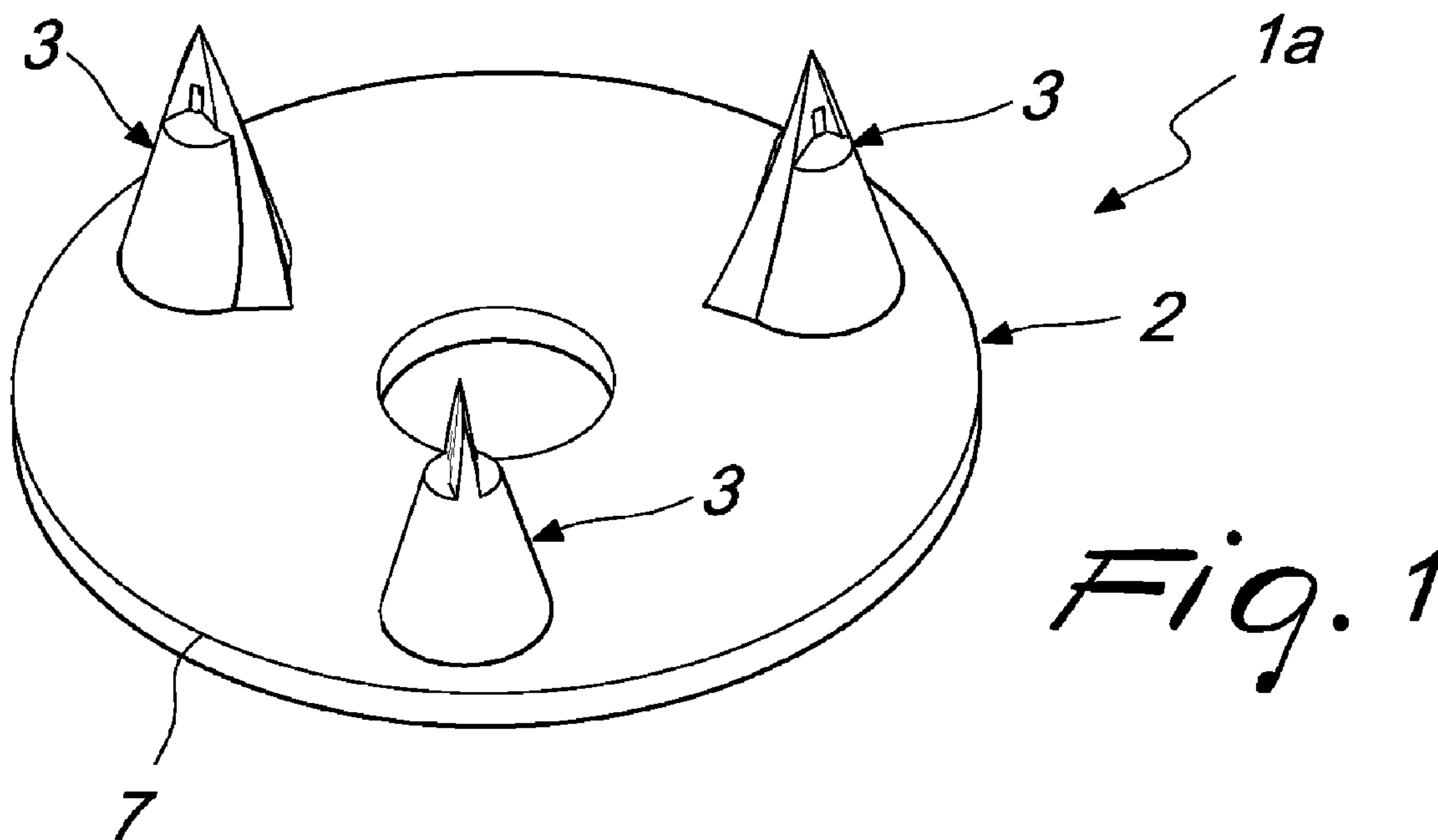




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(54) Titre : DISPOSITIF DE PERCAGE, EN PARTICULIER POUR DES CAPSULES POUR LA PREPARATION DE BOISSONS ET ANALOGUES
 (54) Title: PIERCING DEVICE, PARTICULARLY FOR CAPSULES FOR PREPARING BEVERAGES AND THE LIKE



(57) **Abrégé/Abstract:**

A piercing device (1a, 1b, 1c, 1d, 10a, 10b, 10c, 10d), particularly for capsules for preparing beverages and the like, comprising a plate (2, 11) that can be associated with a capsule (100) for infusions and the like and at least one penetrator (3, 12) that protrudes substantially at right angles from the plate (2, 11) toward the capsule (100) and is provided with at least one external cutting edge (4, 13) for the penetration of at least part of the penetrator (3, 12) into the capsule (100) as a consequence of the mutual approach of the plate (2, 11) and the capsule (100); a passage duct (5, 14) is defined in the penetrator (3, 12) that terminates, at its ends, in a passage hole (6, 15) provided on the face (7, 16) of the plate (2, 11) that lies opposite the face provided with the penetrator (3, 12), and at least one aperture (8, 18) provided in the part of the penetrator (3, 12) that can penetrate into the capsule (100) for the passage of fluid from the face (7, 16) to the capsule (100) or vice versa, the external cutting edge (4, 13) extending laterally to the penetrator (3, 12) along a helical profile.

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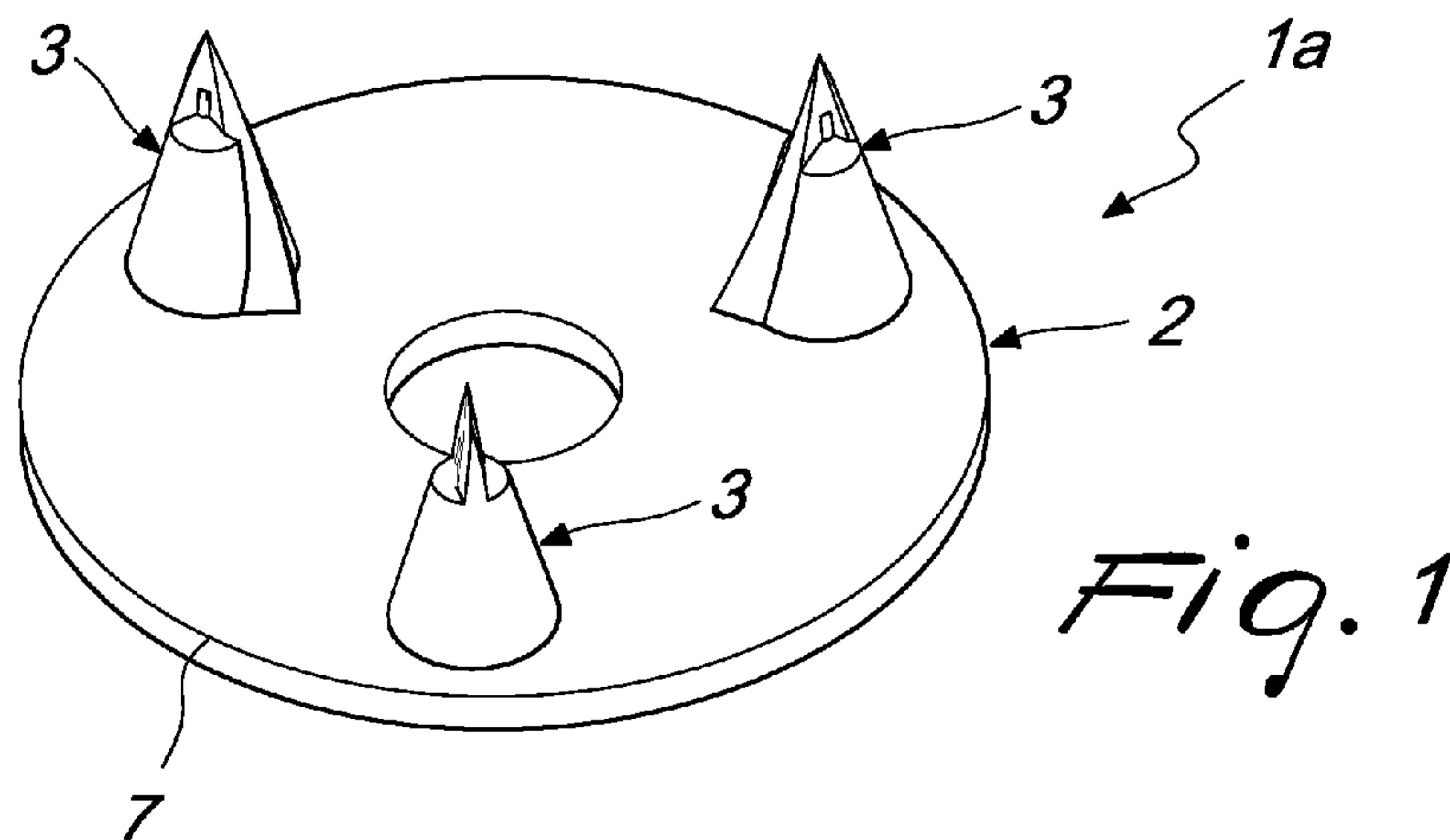


Fig. 1

(57) Abstract: A piercing device (1a, 1b, 1c, 1d, 10a, 10b, 10c, 10d), particularly for capsules for preparing beverages and the like, comprising a plate (2, 11) that can be associated with a capsule (100) for infusions and the like and at least one penetrator (3, 12) that protrudes substantially at right angles from the plate (2, 11) toward the capsule (100) and is provided with at least one external cutting edge (4, 13) for the penetration of at least part of the penetrator (3, 12) into the capsule (100) as a consequence of the mutual approach of the plate (2, 11) and the capsule (100); a passage duct (5, 14) is defined in the penetrator (3, 12) that terminates, at its ends, in a passage hole (6, 15) provided on the face (7, 16) of the plate (2, 11) that lies opposite the face provided with the penetrator (3, 12), and at least one aperture (8, 18) provided in the part of the penetrator (3, 12) that can penetrate into the capsule (100) for the passage of fluid from the face (7, 16) to the capsule (100) or vice versa, the external cutting edge (4, 13) extending laterally to the penetrator (3, 12) along a helical profile.

WO 2010/149496 A1

PIERCING DEVICE, PARTICULARLY FOR CAPSULES FOR PREPARING BEVERAGES AND THE LIKE

Technical Field

The present invention relates to a piercing device, particularly for
5 capsules for preparing beverages and the like.

Background art

In machines for preparing coffee and infusions in general that work
with capsules, piercing devices are known which are adapted to pierce a
capsule that contains substances of various kinds in order to make hot water,
10 cold water, a liquid, a fluid, a beverage and the like filter through said
capsule, so as to obtain the desired infusion.

The piercing operation is therefore very important, since the holes for
the inflow of the hot water and the exit holes of the infusion are formed
during such operation.

15 More particularly, known types of piercing devices generally
comprise an upper plate and a lower plate, which face each other and are
provided, on their mutually facing faces, with wedges adapted to pierce the
capsule.

For obtaining the infusion, the capsule is interposed between the two
20 plates, which are subsequently moved, producing the relative approach of
the two plates, by moving one or both.

In any case, with this movement the wedges of the two plates
penetrate the capsule, piercing it and providing the entry and exit holes
described earlier.

25 In order to optimize and speed up the infusion process, the wedges of
the two plates define in their interior part of the channels for the passage of
the hot water and of the infusion.

More precisely, the hot water, which arrives from an appropriately
provided injection device, flows within the wedges of the upper plate and is
30 injected into the capsule through adapted openings provided in the part of

the wedge that has penetrated said capsule.

Likewise, the infusion generated by the filtration of hot water through the substances contained in the capsule is discharged through the wedges of the lower plate by means of adapted openings provided in the part of the
5 wedge that has penetrated the pod and is discharged into an adapted discharge device, which is connected to an infusion collection element.

These known types of piercing devices are not devoid of drawbacks, which include the fact that the wedges with which the upper and lower plates are provided are not always able to penetrate the capsule correctly,
10 causing fraying and/or penetrations and therefore producing unwanted leaks of water and/or infusion.

In order to obviate this drawback, it is known to provide the wedges with flat fins that form cutting edges adapted to facilitate the penetration of the wedges into the capsule, allowing the correct operation of the machine.

15 Nonetheless, with known types of piercing devices, even if they are provided with wedges that have flat cutting fins, the risk of piercing the capsule incorrectly, causing the leaks cited above, is high.

Disclosure of the invention

The aim of the present invention is to provide a piercing device,
20 particularly for capsules for preparing beverages and the like, that solves the drawbacks of the background art.

This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a piercing device, particularly for capsules for preparing beverages and the like, comprising a plate that can be
25 associated with a capsule and at least one penetrator that protrudes substantially at right angles from said plate toward said capsule and is provided with at least one external cutting edge for the penetration of at least part of said at least one penetrator in said capsule as a consequence of the mutual approach of said plate and said capsule, in said at least one
30 penetrator a passage duct being defined that ends, at its ends, in a passage

hole defined on the face of said plate that lies opposite the face provided with said at least one penetrator, and at least one aperture defined in the part of said at least one penetrator that can penetrate into said capsule for the passage of fluid from said face to said capsule or vice versa, characterized in that said external cutting edge extends laterally with respect to said at least one penetrator along a helical profile.

Brief description of the drawings

Further characteristics and advantages of the present invention will become apparent from the description of preferred but not exclusive embodiments of a piercing device particularly for capsules for preparing beverages and the like, according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of a first embodiment of a piercing device according to the invention;

Figure 2 is a plan view of the piercing device shown in Figure 1;

Figure 3 is a side elevation view of the piercing device shown in Figure 1;

Figure 4 is a sectional view of the piercing device shown in Figure 1, taken along the line IV-IV;

Figure 5 is an enlarged-scale view of a detail of the piercing device shown in Figure 1;

Figure 6 is an enlarged-scale view of a detail of the piercing device shown in Figure 2;

Figure 7 is a perspective view of a variation of the first embodiment of the piercing device according to the invention;

Figure 8 is an enlarged-scale view of a detail of the piercing device shown in Figure 7;

Figure 9 is an enlarged-scale detail plan view of the piercing device shown in Figure 7;

Figure 10 is a sectional view of the piercing device shown in Figure

9, taken along the line X-X;

Figure 11 is a perspective view of a further variation of the first embodiment of the piercing device according to the invention;

Figure 12 is an enlarged-scale view of a detail of the piercing device
5 shown in Figure 11;

Figure 13 is an enlarged-scale plan view of a detail of the piercing device shown in Figure 11;

Figure 14 is a sectional view of the piercing device shown in Figure 13, taken along the line XIV-XIV;

10 Figure 15 is a perspective view of a still further variation of the first embodiment of the piercing device according to the invention;

Figure 16 is an enlarged-scale view of a detail of the piercing device shown in Figure 15;

15 Figure 17 is an enlarged-scale plan view of a detail of the piercing device shown in Figure 15;

Figure 18 is a sectional view of the piercing device shown in Figure 17, taken along the line XVIII-XVIII;

Figure 19 is a perspective view of a second embodiment of the piercing device according to the invention;

20 Figure 20 is an enlarged-scale view of a detail of the piercing device shown in Figure 19;

Figure 21 is an enlarged-scale plan view of a detail of the piercing device shown in Figure 19;

25 Figure 22 is a sectional view of the piercing device shown in Figure 21, taken along the line XXII-XXII;

Figure 23 is a perspective view of a variation of the second embodiment of the piercing device according to the invention;

Figure 24 is an enlarged-scale view of a detail of the piercing device shown in Figure 23;

30 Figure 25 is an enlarged-scale plan view of a detail of the piercing

device shown in Figure 23;

Figure 26 is a sectional view of the piercing device shown in Figure 25, taken along the line XXVI-XXVI;

Figure 27 is a perspective view of a further variation of the second embodiment of the piercing device according to the invention;

Figure 28 is an enlarged-scale view of a detail of the piercing device shown in Figure 27;

Figure 29 is an enlarged-scale plan view of a detail of the piercing device shown in Figure 27;

Figure 30 is a sectional view of the piercing device shown in Figure 29, taken along the line XXX-XXX;

Figure 31 is a perspective view of a still further variation of the second embodiment of the piercing device according to the invention;

Figure 32 is an enlarged-scale view of a detail of the piercing device shown in Figure 31;

Figure 33 is an enlarged-scale plan view of a detail of the piercing device shown in Figure 31;

Figure 34 is a sectional view of the piercing device shown in Figure 33, taken along the line XXXIV-XXXIV;

Figure 35 is a perspective view of a third embodiment of the piercing device according to the present invention;

Figure 36 is a sectional view of the piercing device of Figure 35;

Figure 37 is a schematic sectional view of two piercing devices according to the invention applied to a capsule.

25 **Ways of carrying out the invention**

With reference to the Figures 1 to 18 and 37, the first embodiment of the piercing device, particularly for capsules for preparing beverages and the like, generally designated by the reference numerals 1a, 1b, 1c and 1d in the four proposed variations of the first embodiment, comprises a plate 2 which can be associated at one end with a capsule 100 of infusions and the

like and at the other end with a device for injecting hot water in order to let the hot water filter into the capsule 100 and obtain the infusion.

On the plate 2 a plurality of penetrators 3, or at least one of them, are provided, extending substantially at right angles from the plate 2 in the
5 direction of the capsule 100 and provided with a plurality of external cutting edges 4, or at least one of them, for the penetration of at least part of the corresponding penetrator 3 into the capsule 100 after the mutual approach of the plate 2 and said capsule 100.

More particularly, the penetrators 3, which as shown can vary in
10 number from a minimum of one to a maximum of for example four, have a substantially conical, frustum-shaped or pyramid-like shape and are arranged by way of example along a circumference.

According to the invention, each external cutting edge 4 lies laterally to the corresponding penetrator 3 along a helical profile that starts from the
15 tip of the penetrator 3 and extends to the base of the plate 2.

Advantageously, in each penetrator 3 there is a passage duct 5, which terminates, at its ends, in a passage hole 6 that is formed on the face 7 of the plate 2 that lies opposite the one provided with the penetrators 3 and a
20 plurality of slots 8, or at least one of them, arranged between one external cutting edge 4 and the other and defined on the part of the penetrators 3 that can penetrate the capsule 100 for the passage of fluid (hot water, cold water, beverage, liquid, infusion and the like) from the face 7 to the capsule 100.

With reference to Figures 19 to 34 and 37, the second embodiment of the piercing device, particularly for capsules for infusions and the like,
25 generally designated by the reference numerals 10a, 10b, 10c and 10d in the four proposed variants, comprises a plate 11 which can be associated at one end with a capsule 100 for infusions and the like and at the other end with a device for discharging the infusion obtained from the filtration of hot water into the capsule 100.

30 On the plate 11, similarly to the plate 2, a plurality of penetrators 12,

or at least one of them, are provided, which protrudes substantially at right angles to the plate 11 in the direction of the capsule 100 and is provided with a plurality of external cutting edges 13, or with at least one of them, for the penetration of at least part of the corresponding penetrator 12 into the capsule 100 after the mutual approach of the plate 12 and the capsule 100.

More particularly, the penetrators 12, which as shown can vary in number from a minimum of one to a maximum of for example four, have a substantially conical, frustum-like or pyramid-like shape and are arranged, by way of example, along a circumference.

According to the invention, each external cutting edge 13 extends laterally with respect to the corresponding penetrator 12 along a helical profile that starts from the tip of the penetrator 12 and extends to the base of the plate 11.

Advantageously, in each penetrator 12 a passage duct 14 is defined that terminates, at its ends, in a passage hole 15 provided on the face 16 of the plate 11 that lies opposite the face provided with the penetrators 12 and a plurality of apertures 18, or at least one of them, arranged between one external cutting edge 13 and the other and defined on the part of the penetrators 12 that can penetrate the capsule 100 for the passage of fluid (hot water, cold water, beverage, liquid, infusion and the like) from the capsule 100 to the face 16.

Conveniently, for improving the delivery of the infusion into the discharge device through the passage duct 14, each penetrator 12 has finely perforated lateral surfaces 18.

Figures 35 and 36 show a third embodiment of the device according to the invention, in which the apertures 18 are arranged on the lateral surface of the penetrators 12.

Operation of the piercing devices according to the invention is clear and evident from what has been described.

More precisely, during the relative approach of the two plates 2 and

11, the penetrators 3 and 12, thanks to the presence of the external cutting edges 4 and 13 having a helical profile, pierce and penetrate without any problems the capsule 100 that is interposed between the two plates 2 and 11 respectively at the upper and lower surfaces 101 and 102 of the capsule 100.

5 Once penetration from both surfaces 101 and 102 of the capsule 100 has occurred, hot water is introduced by the injection device into the capsule 100 through the passage channels 5 and the apertures 8.

The hot water flows through the substances contained in the capsule 100, generating the infusion, which is discharged through the apertures 18
10 and the passage channels 14 into the discharge device.

Advantageously, the part of the infusion that has accumulated on the bottom of the capsule 100 below the apertures 18 is further discharged through the finely perforated lateral surfaces 18 with which the penetrators 12 are provided.

15 In practice it has been found that the piercing device, particularly for capsules for infusions and the like, according to the present invention, fully achieves the intended aim and objects, since it makes it possible to pierce correctly the capsule that contains the substances through which the hot water is to be filtered, avoiding the formation of leaks of water and of
20 infusion.

The piercing device, particularly for capsules for infusions and the like, thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may further be replaced with other technically
25 equivalent elements.

In practice, the materials used, as long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

The disclosures in Italian Patent Application No. MI2009A001118
30 from which this application claims priority are incorporated herein by

reference.

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

CLAIMS

1. A piercing device, particularly for capsules for preparing beverages and the like, comprising a plate (2, 11) that can be associated with a capsule (100) and at least one penetrator (3, 12) that protrudes substantially at right angles from said plate (2, 11) toward said capsule (100) and is provided with at least one external cutting edge (4, 13) for the penetration of at least part of said at least one penetrator (3, 12) into said capsule (100) as a consequence of the mutual approach of said plate (2, 11) and said capsule (100), a passage duct (5, 14) being defined in said at least one penetrator (3, 12) that terminates, at its ends, in a passage hole (6, 15) defined on the face (7, 16) of said plate (2, 11) that lies opposite the face provided with said at least one penetrator (3, 12), and at least one aperture (8, 18) defined in the part of said at least one penetrator (3, 12) that can penetrate said capsule (100) for the passage of fluid from said face (7, 16) to said capsule (100) or vice versa, characterized in that said external cutting edge (4, 13) extends laterally with respect to said at least one penetrator (3, 12) along a helical profile.

2. The device according to claim 1, characterized in that it comprises a plurality of said penetrators (3, 12) that protrude substantially at right angles from said plate (2, 11) in the direction of said capsule (100) and are arranged along a circumference, each of said penetrators (3, 12) being provided with at least one external cutting edge (4, 13) that extends laterally with respect to said at least one penetrator (3, 12) along a helical profile.

3. The device according to one or more of the preceding claims, characterized in that it comprises, for each one of said penetrators (3, 12), a plurality of external cutting edges (4, 13) that extend laterally with respect to said penetrator (3, 12) along a helical profile.

4. The device according to one or more of the preceding claims, characterized in that said penetrators (3, 12) have a substantially conical, frustum-like or pyramid-like shape.

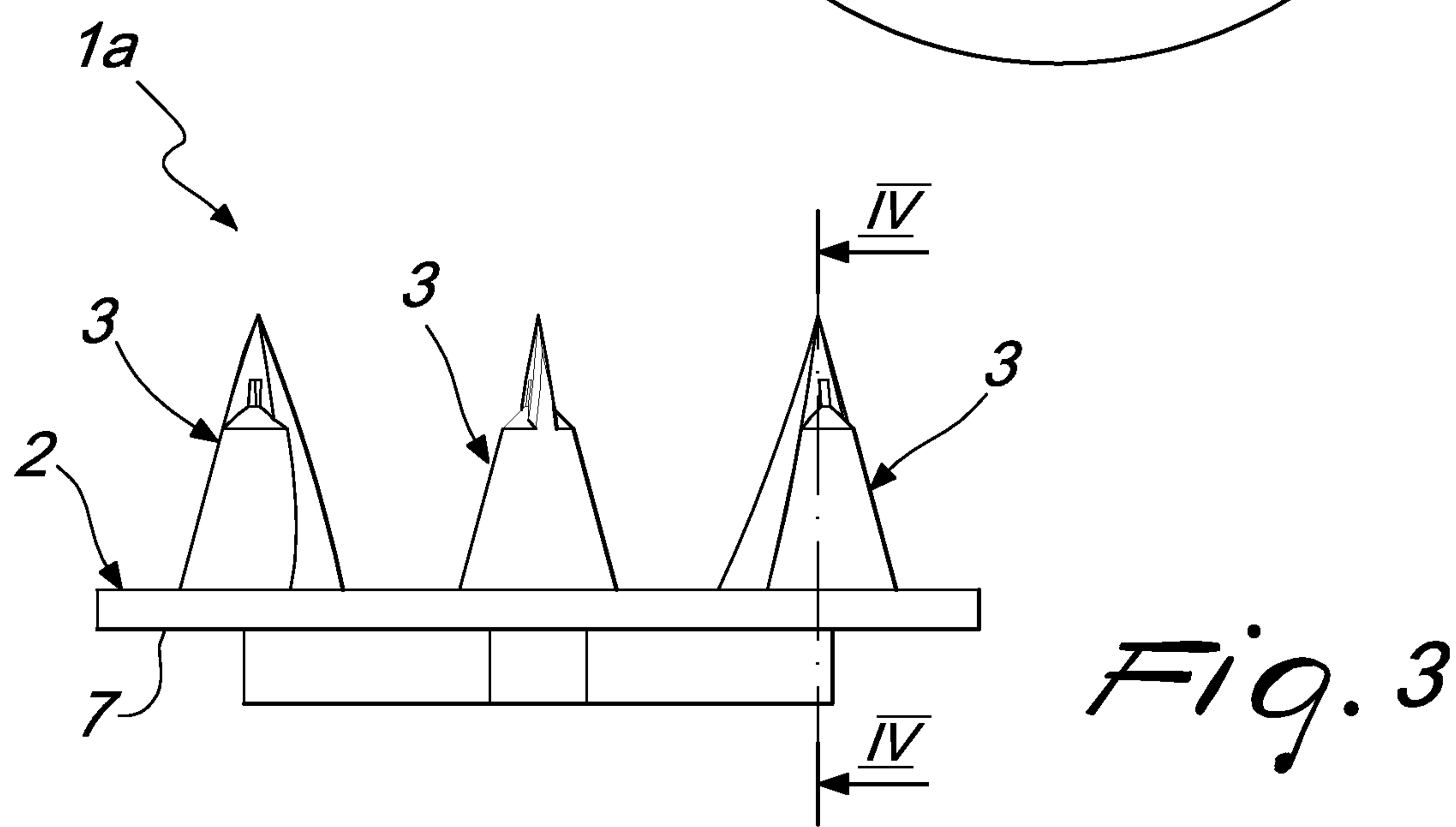
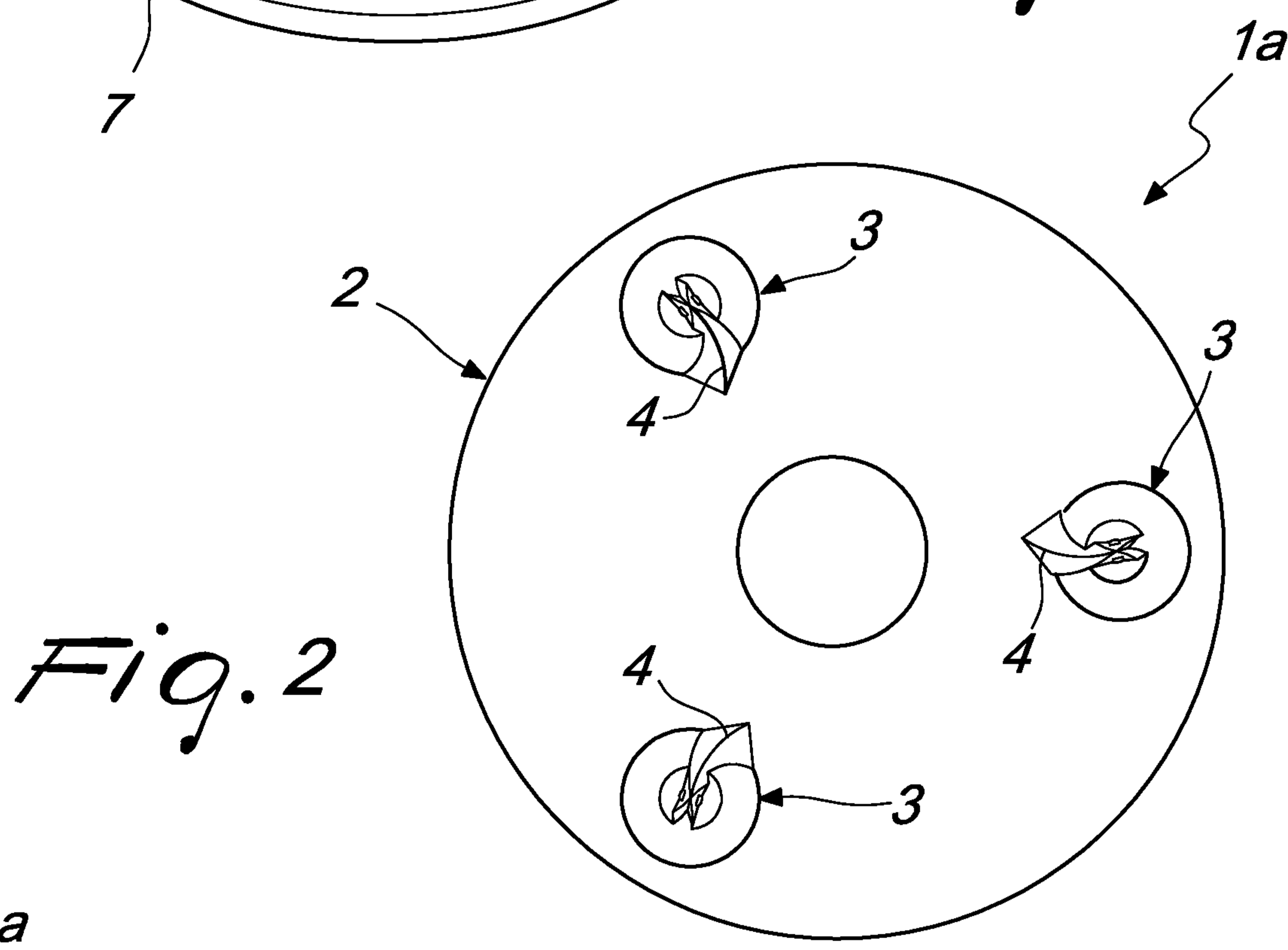
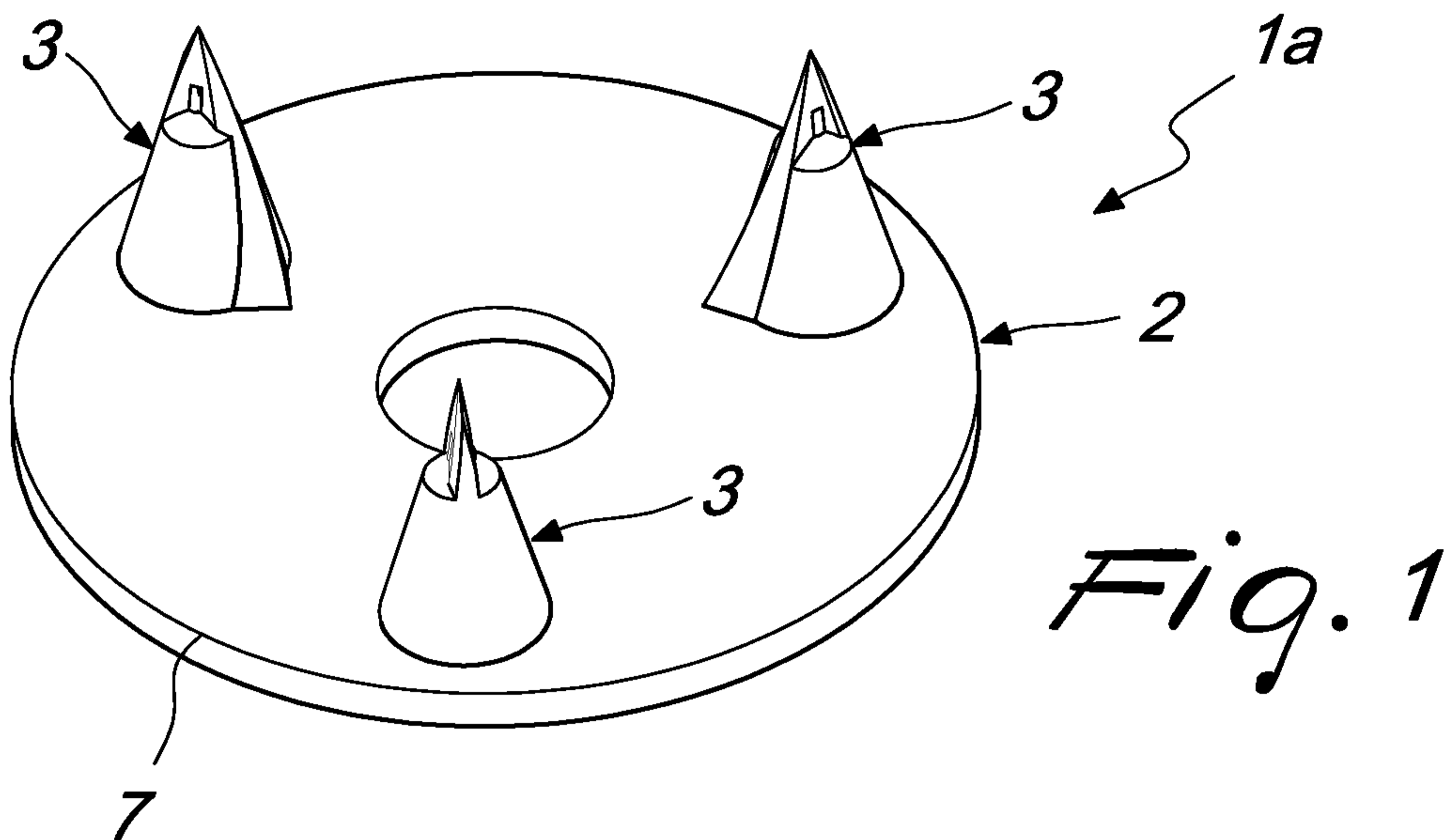
5. The device according to one or more of the preceding claims, characterized in that said plate (2) can be associated with a device for injecting hot water for filtering said hot water into said capsule (100) and for obtaining the infusion.

5 6. The device according to one or more of the preceding claims, characterized in that it comprises, for each one of said penetrators (3), a plurality of said apertures (8) defined at the end of said passage duct (5) proximate to the tip of said penetrator (3) for the injection of said hot water into said capsule (100) through said passage duct (5), each one of said
10 apertures (8) being arranged between one or more of said external cutting edges (4).

7. The device according to one or more of the preceding claims 1 to 4, characterized in that said plate (11) can be associated with a device for discharging the infusion obtained from the filtration of hot water into said
15 capsule (100).

8. The device according to claim 7, characterized in that it comprises, for each one of said penetrators (12), a plurality of said apertures (18) formed at the end of said passage duct (14) proximate to the tip of said penetrator (12) for the discharge of said infusion into said discharge device
20 through said passage duct (14), each one of said apertures (18) being arranged between one or more of said external cutting edges (13).

9. The device according to one or more of claims 7 and 8, characterized in that said penetrators (12) are provided with finely perforated lateral surfaces (18) for the discharge of said infusion into said
25 discharge device through said passage duct (14) and terminating in the exit hole (15).



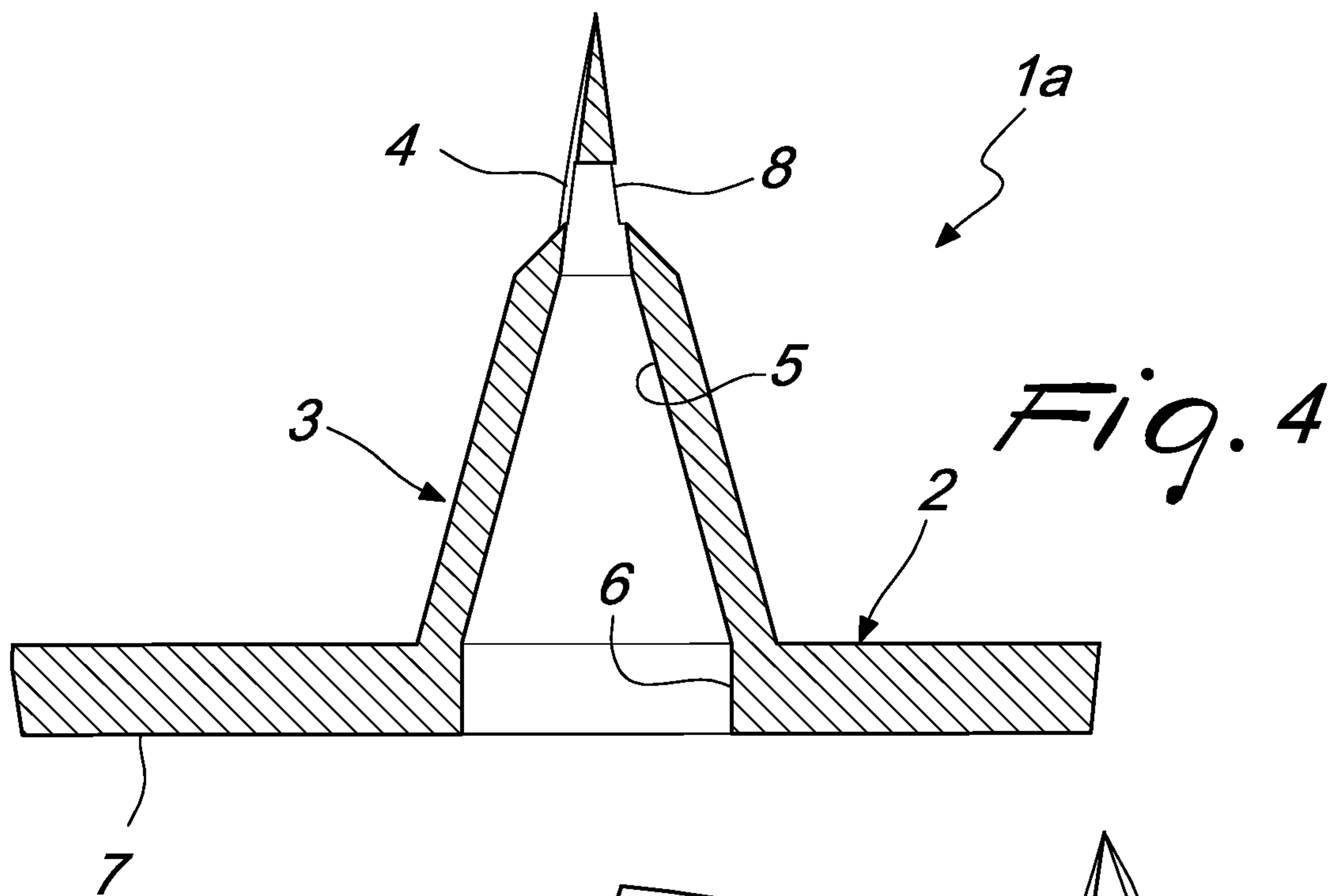


Fig. 5

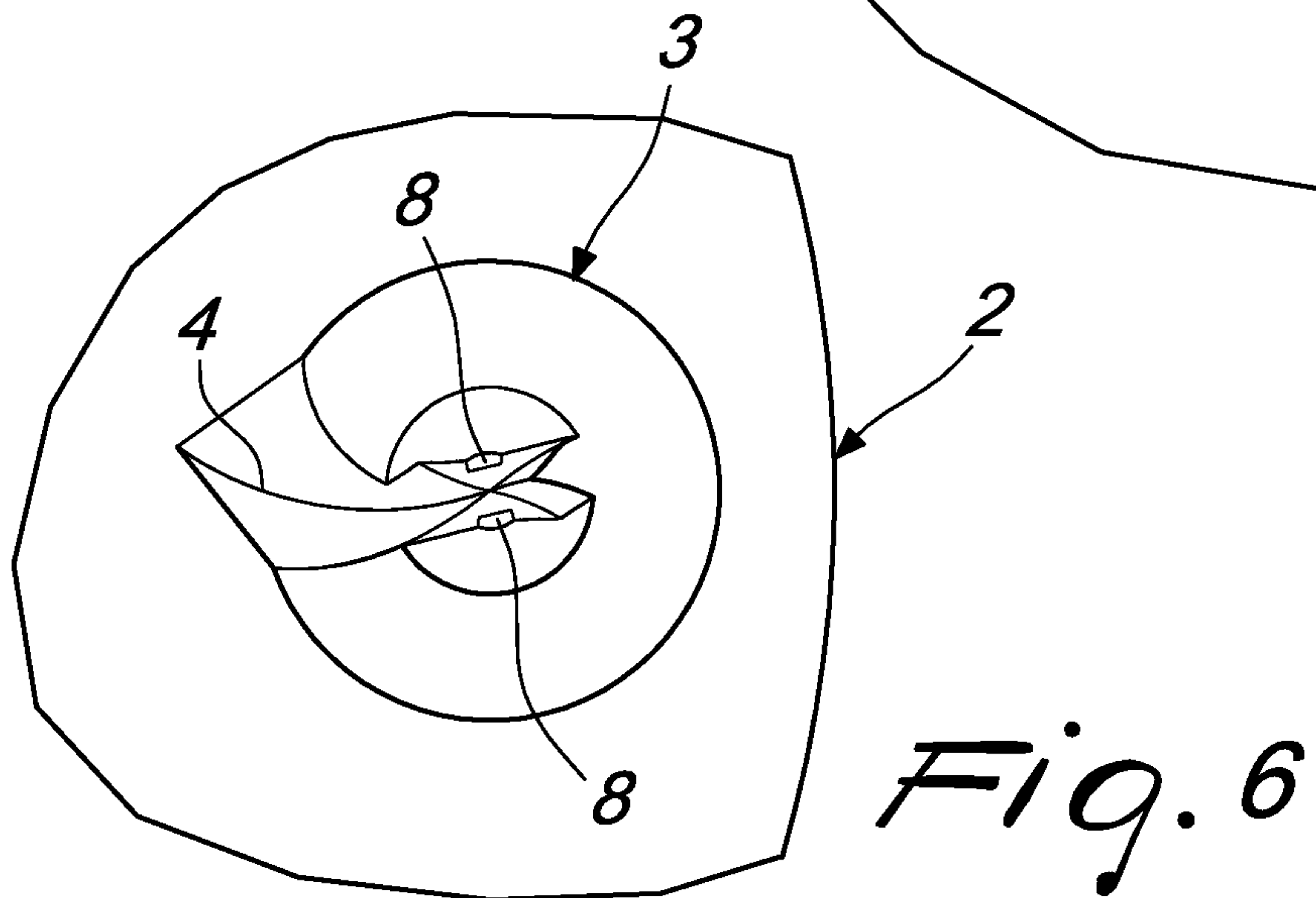
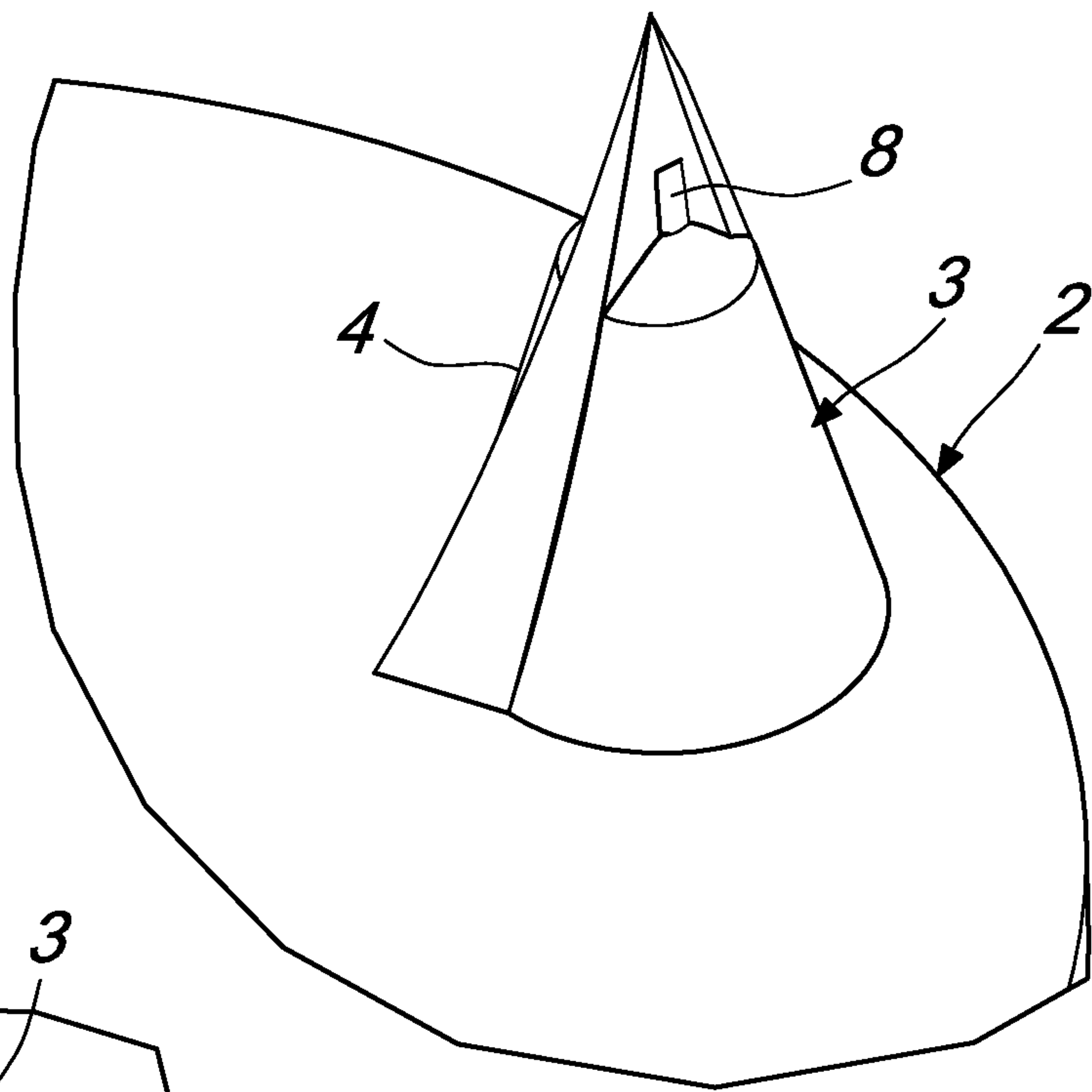


Fig. 6

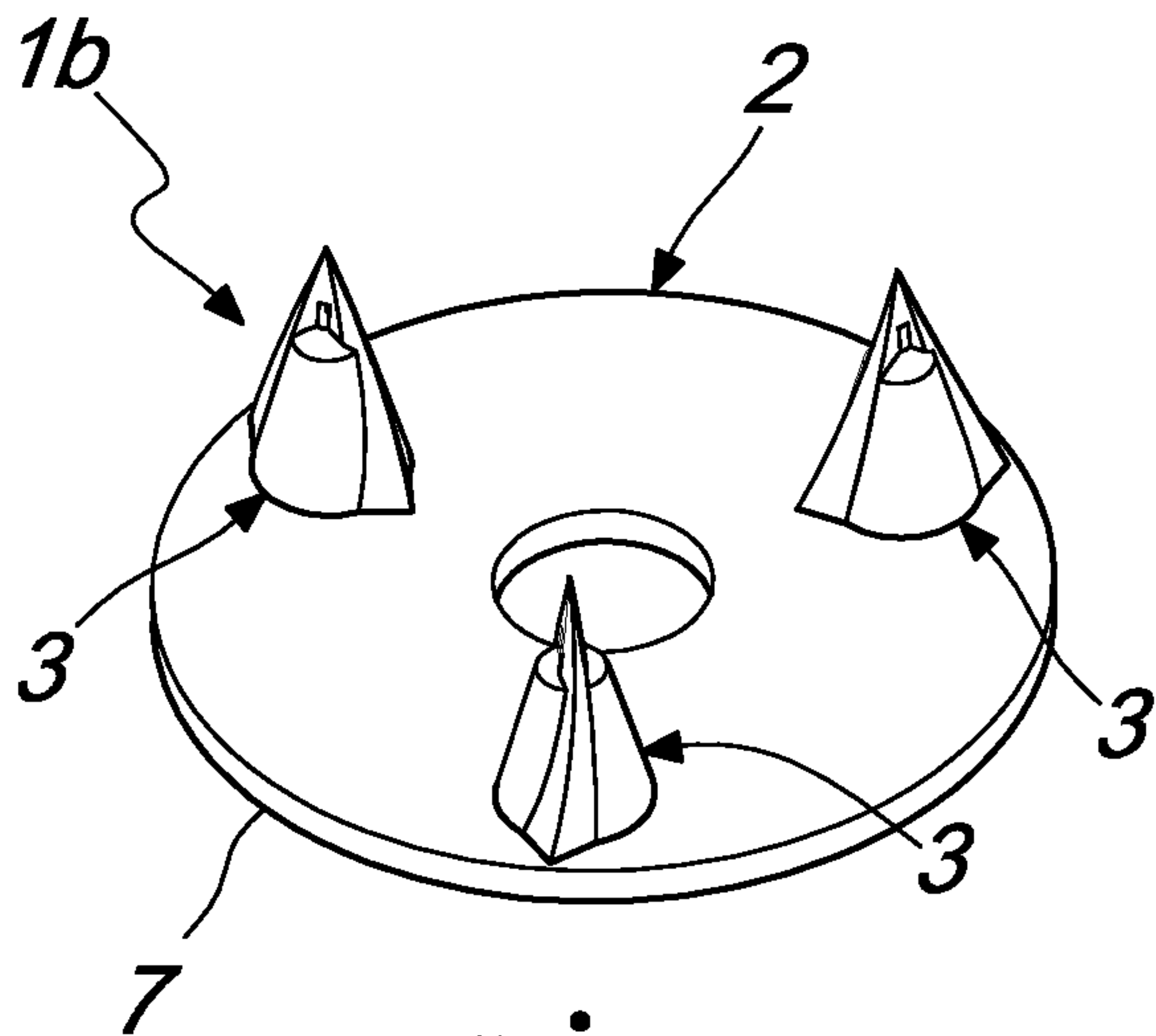


Fig. 7

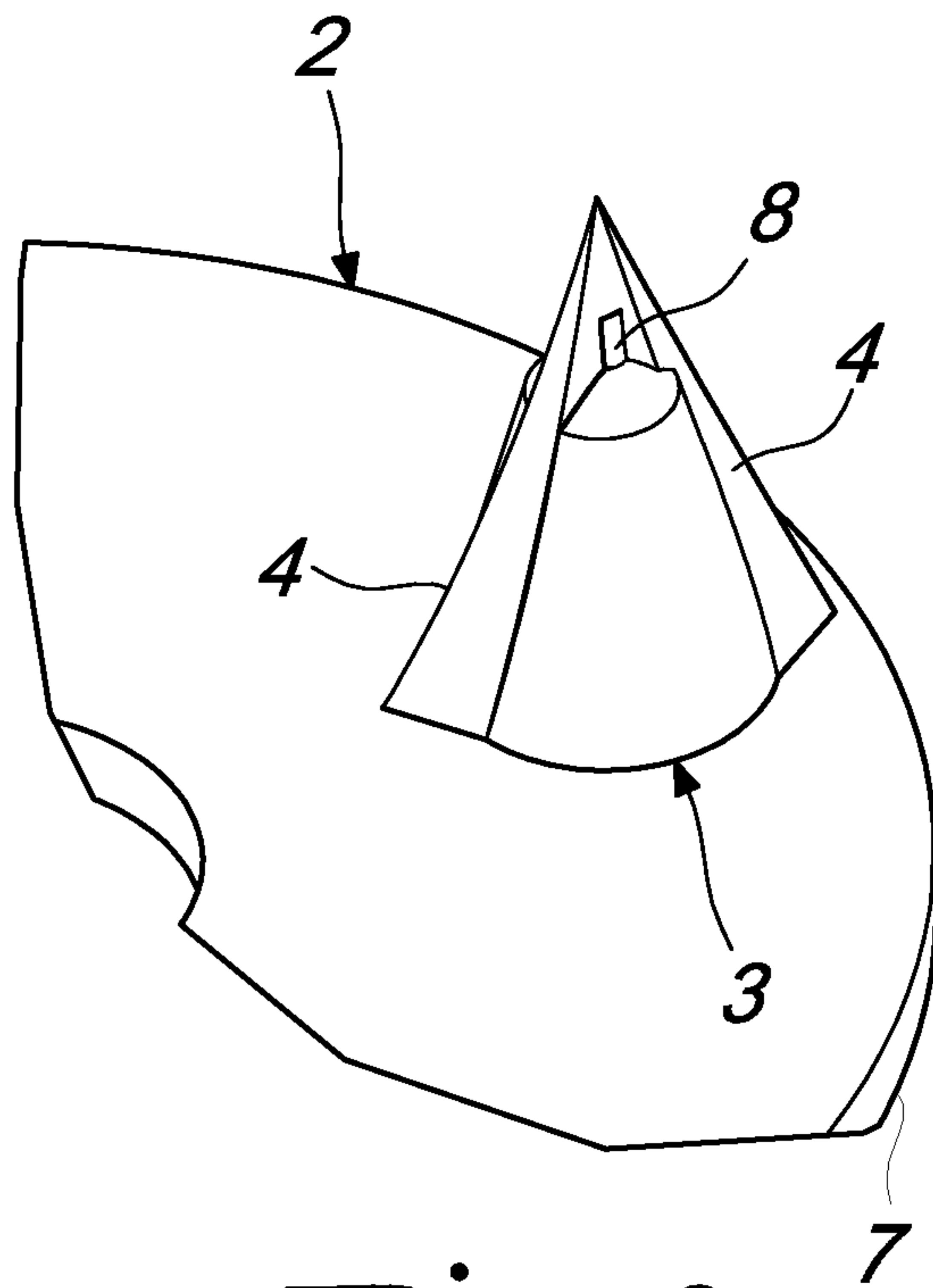


Fig. 8

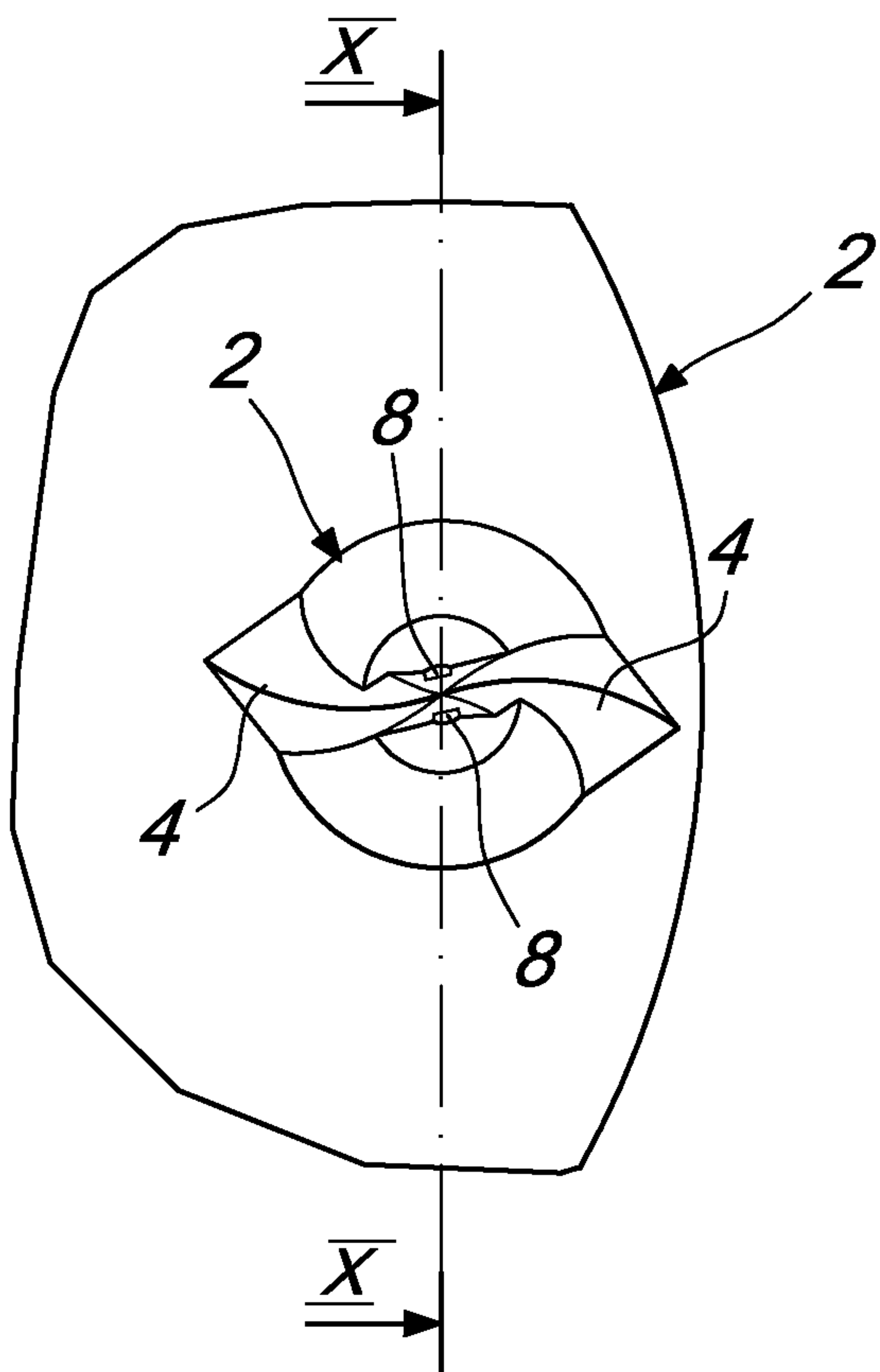


Fig. 9

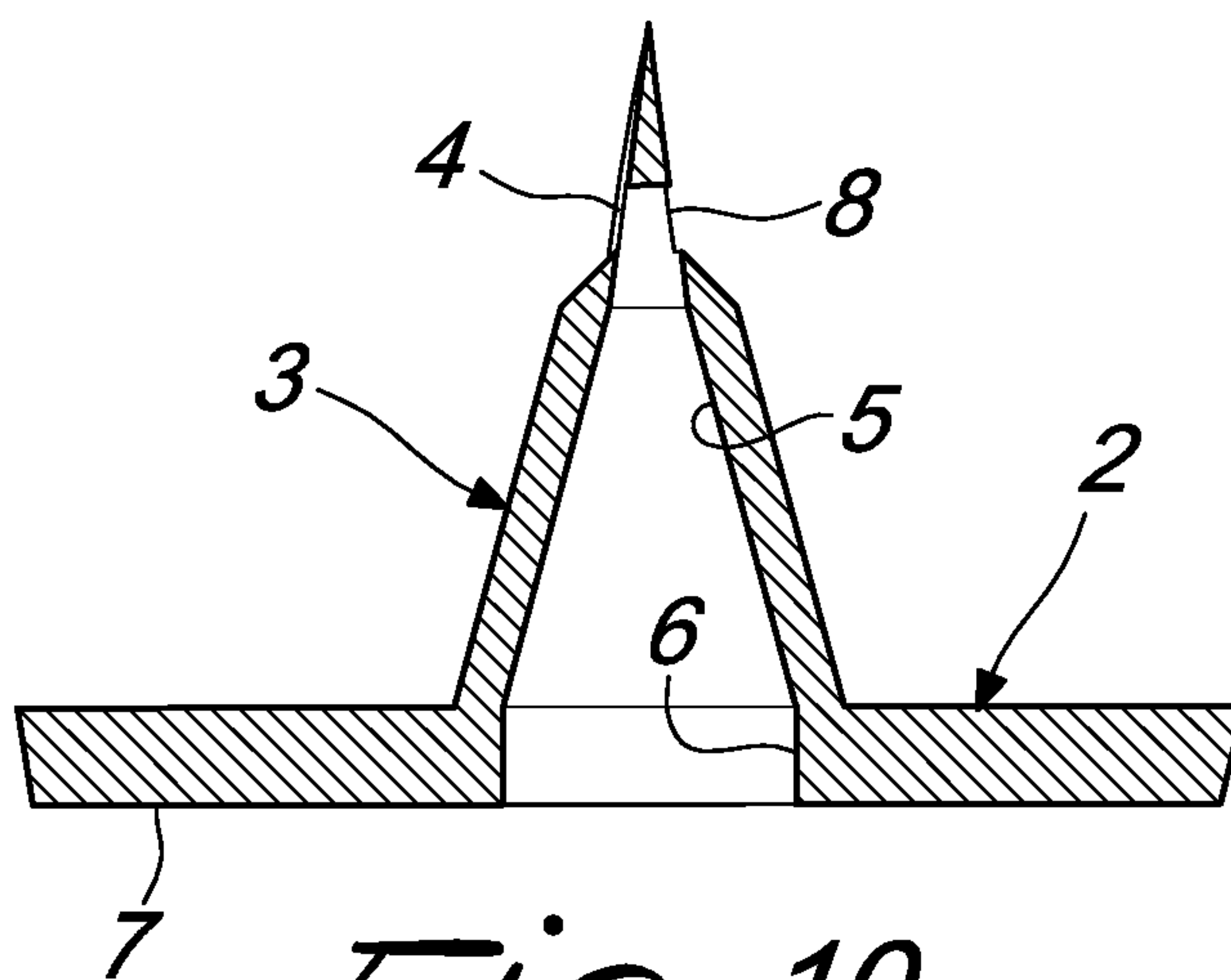


Fig. 10

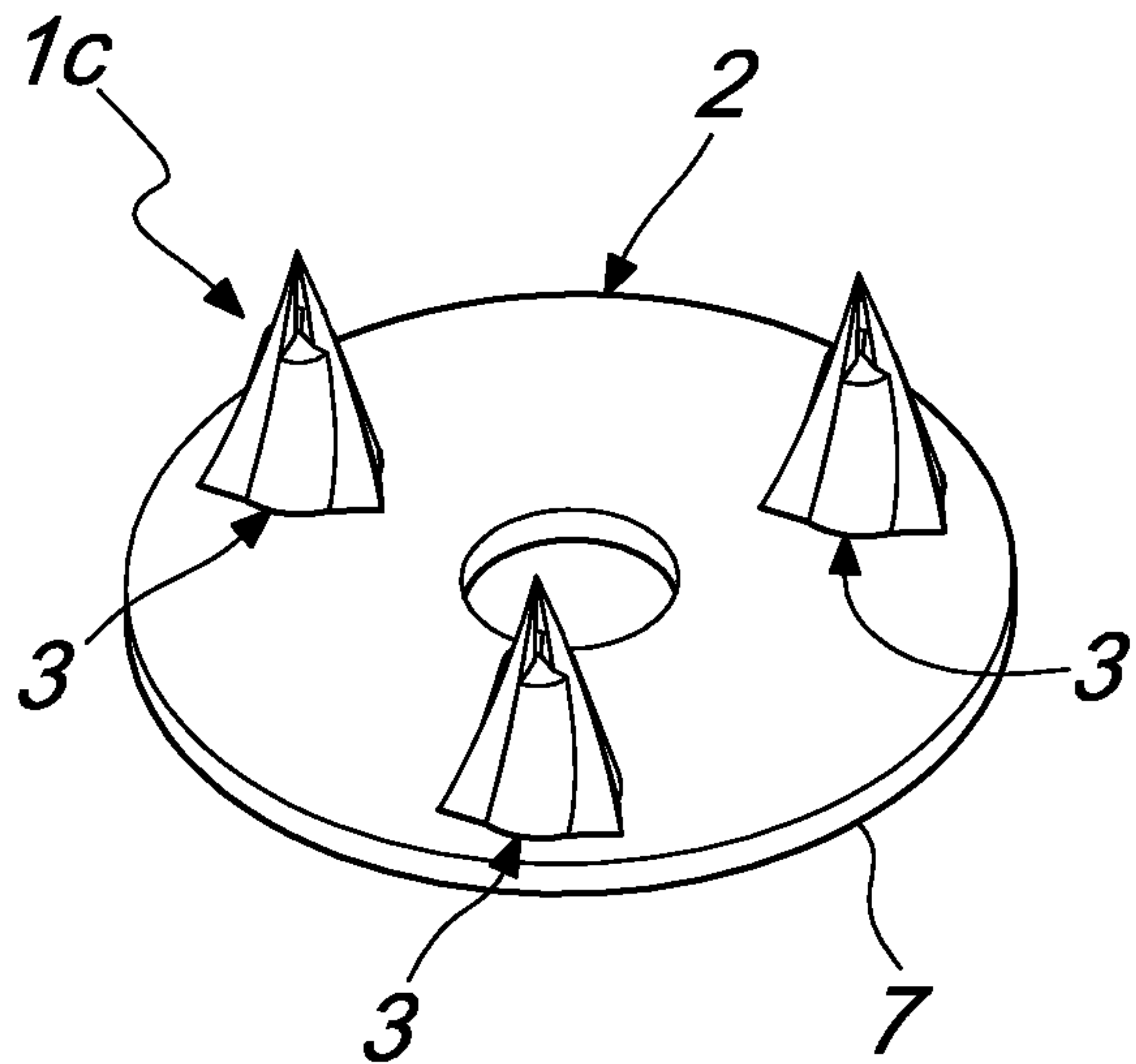


Fig. 11

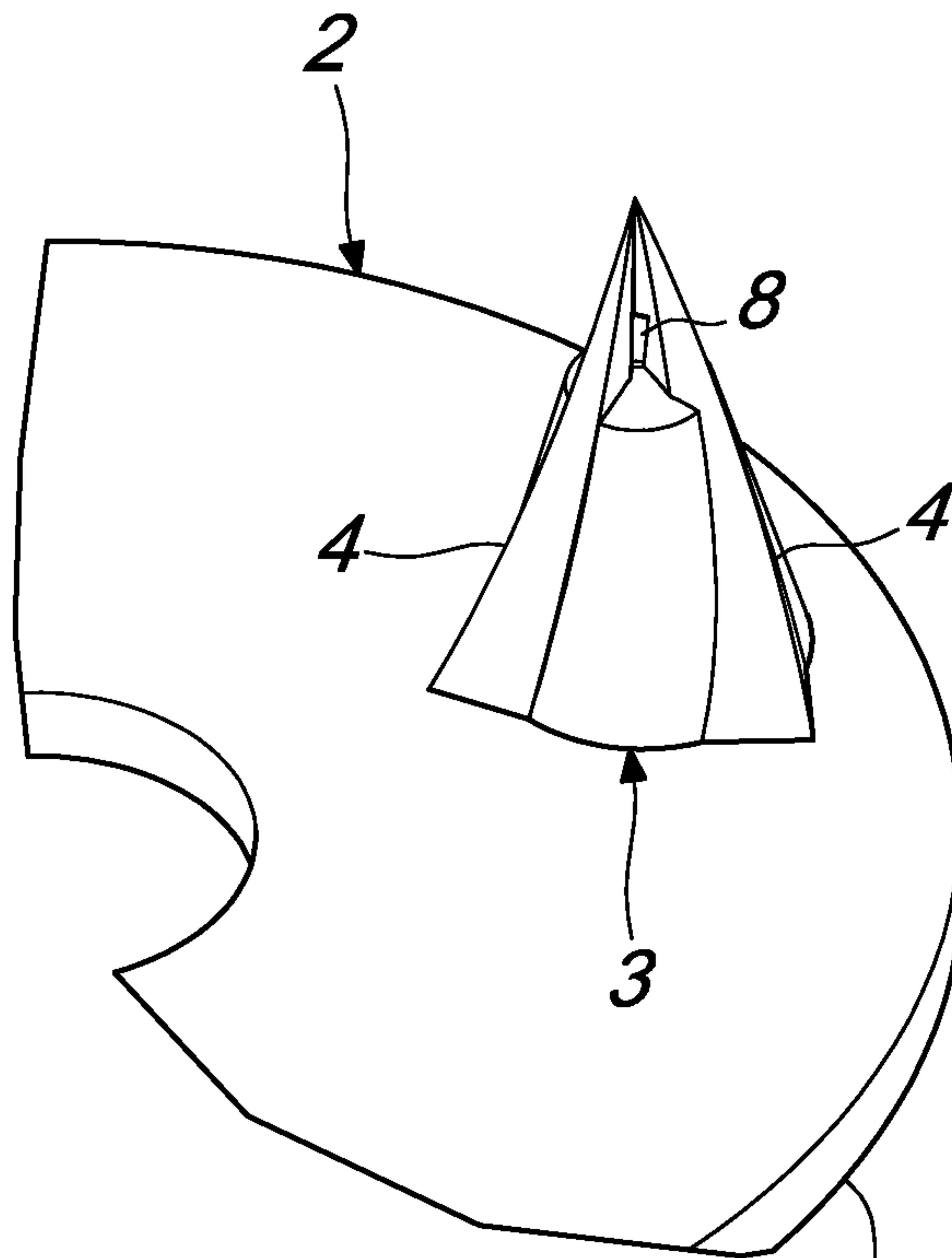


Fig. 12

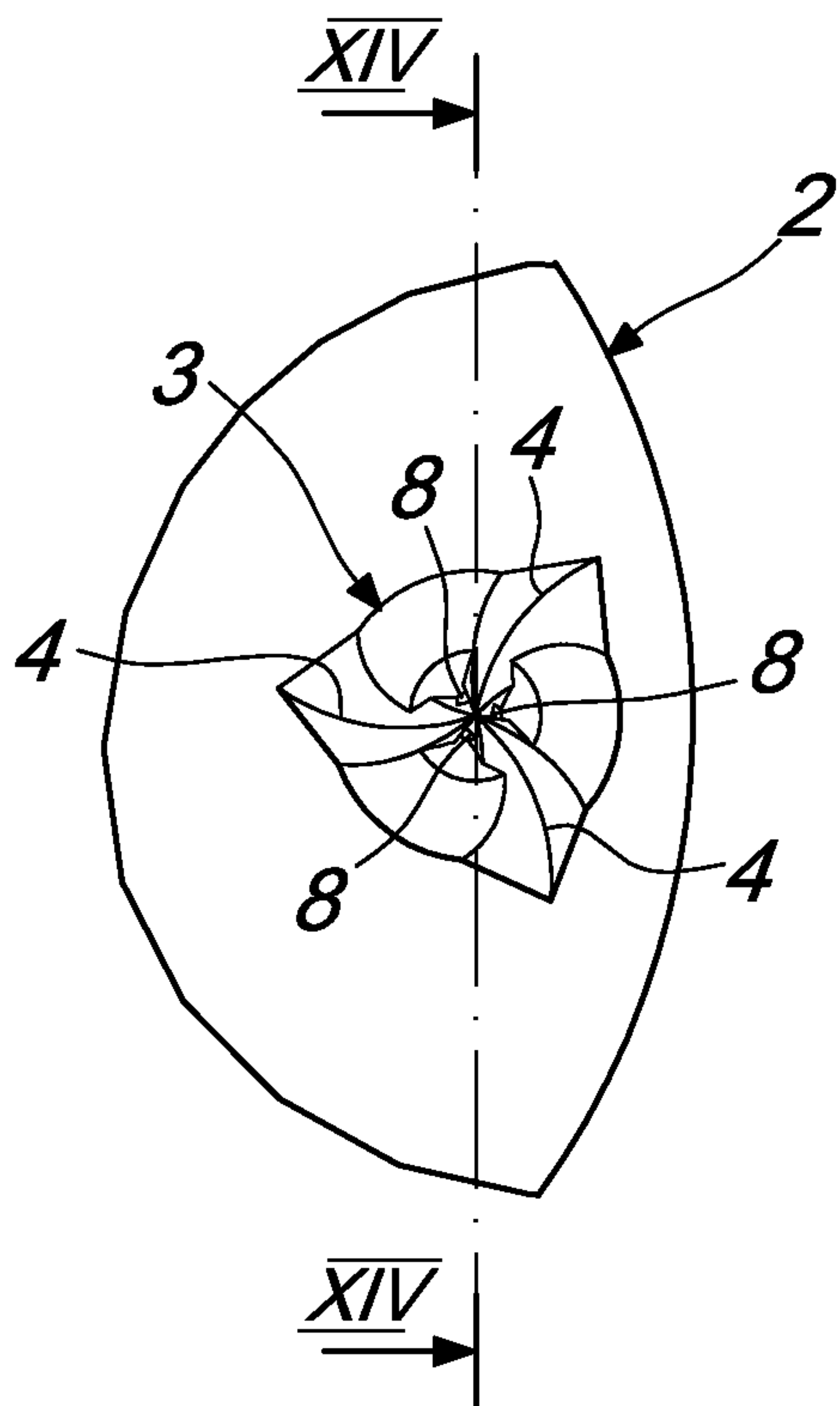


Fig. 13

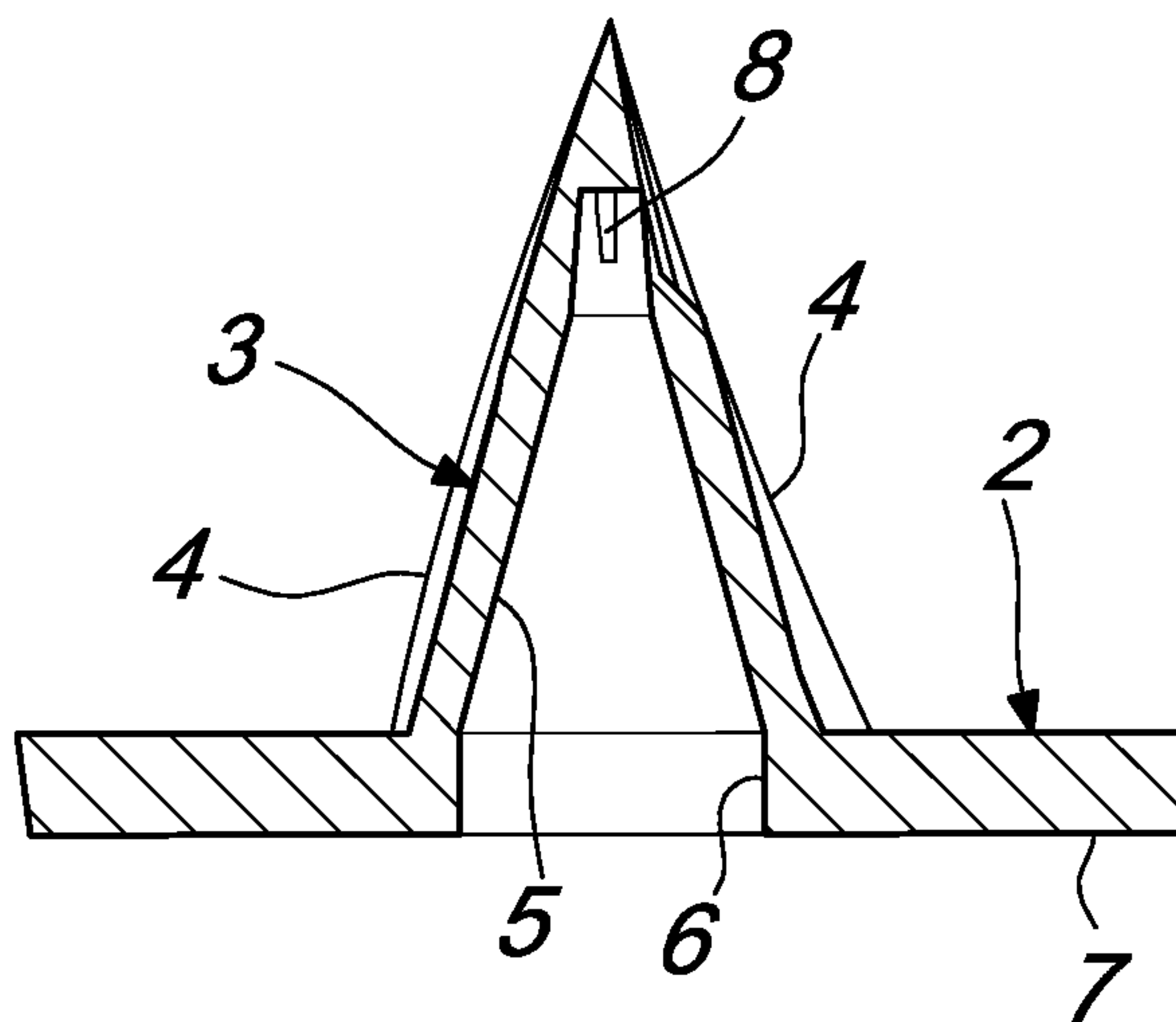


Fig. 14

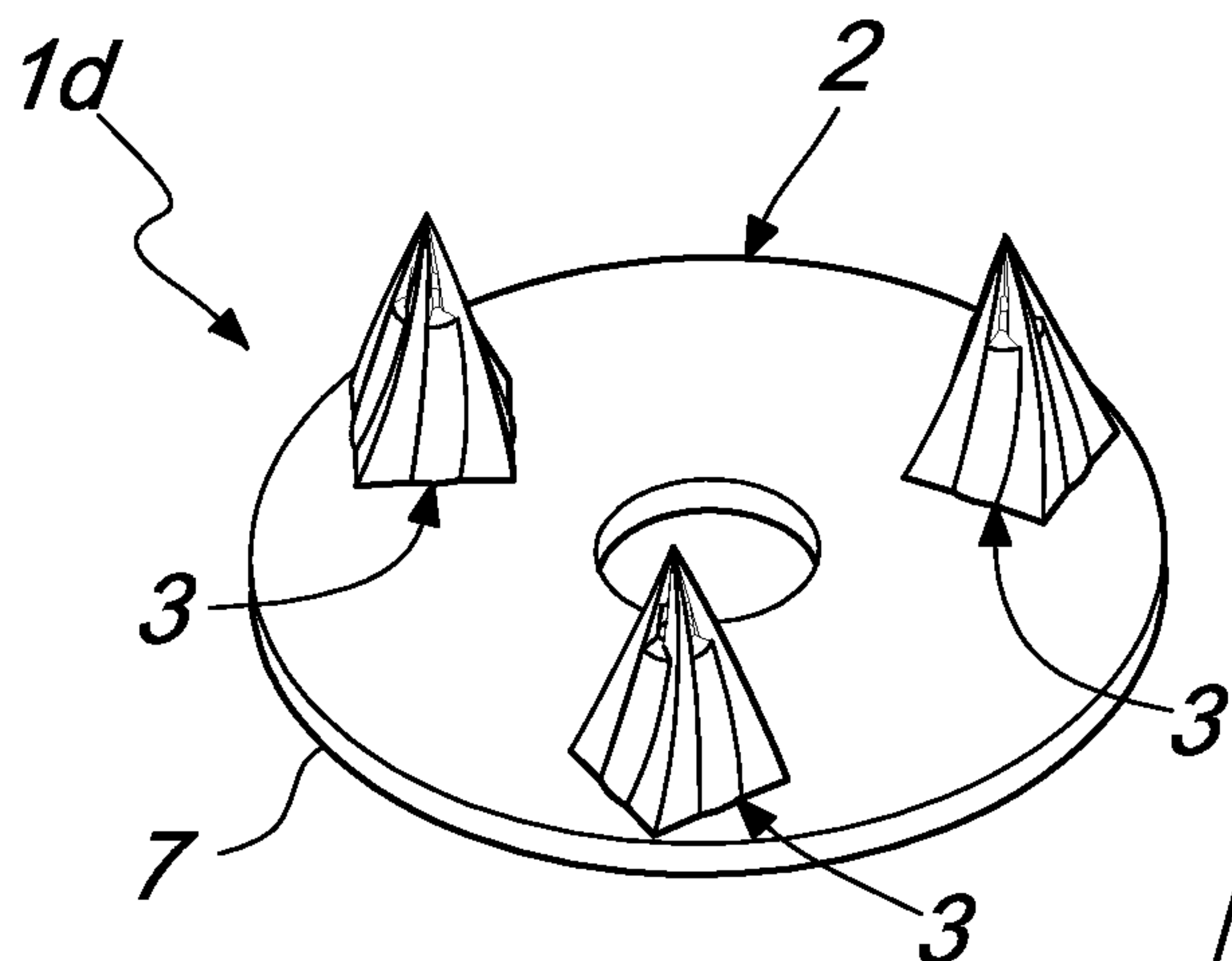


Fig. 15

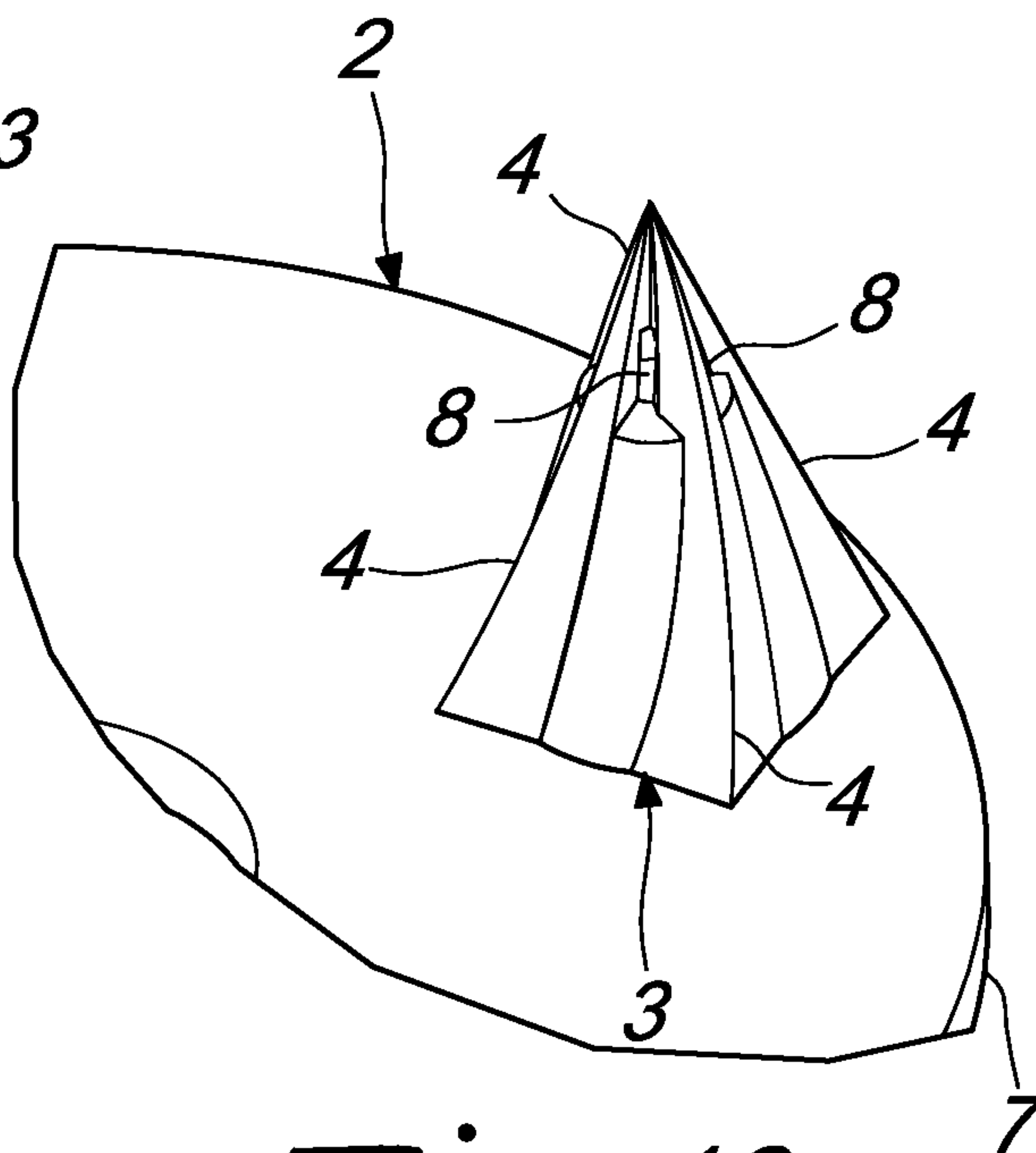


Fig. 16

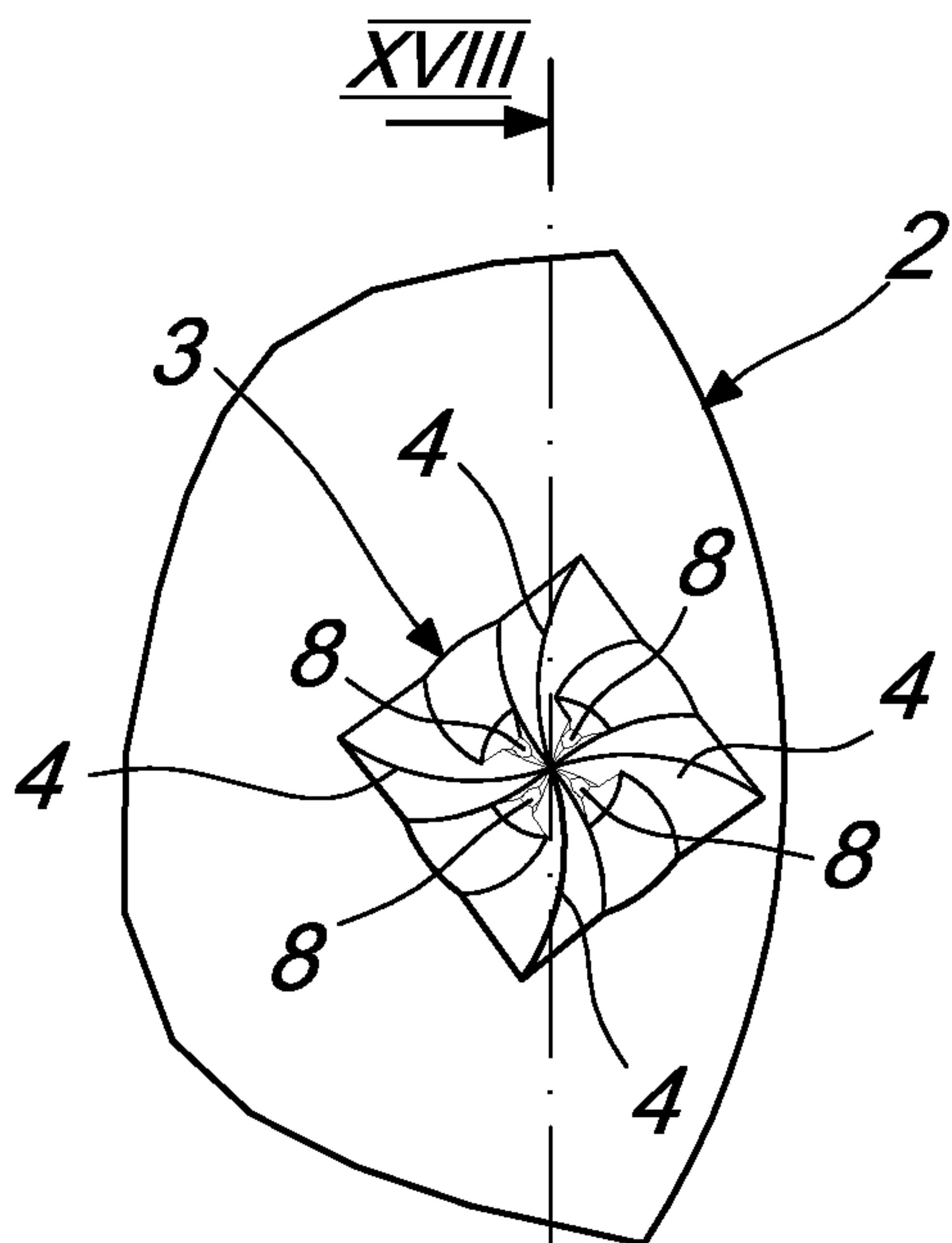


Fig. 17

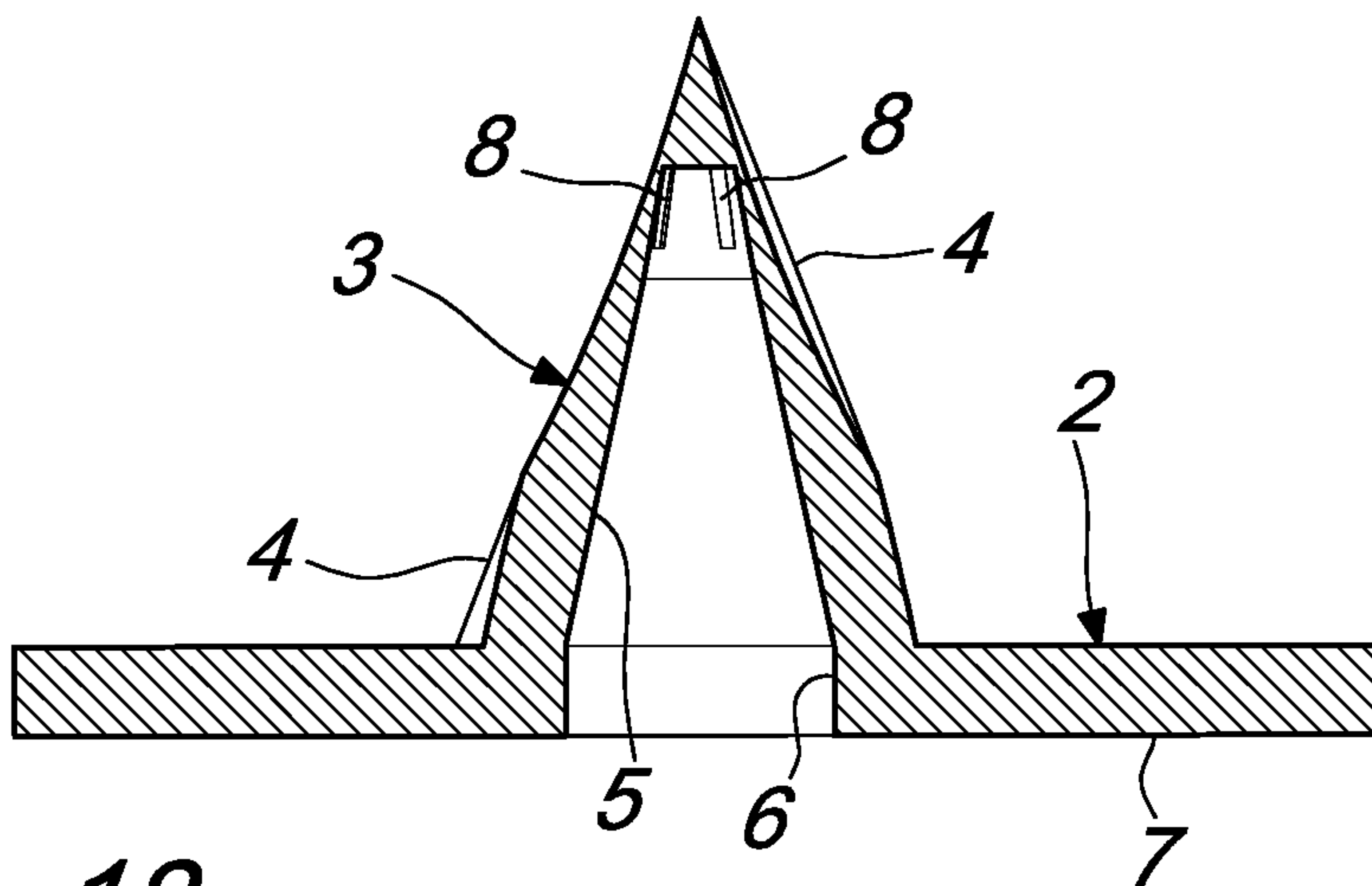


Fig. 18

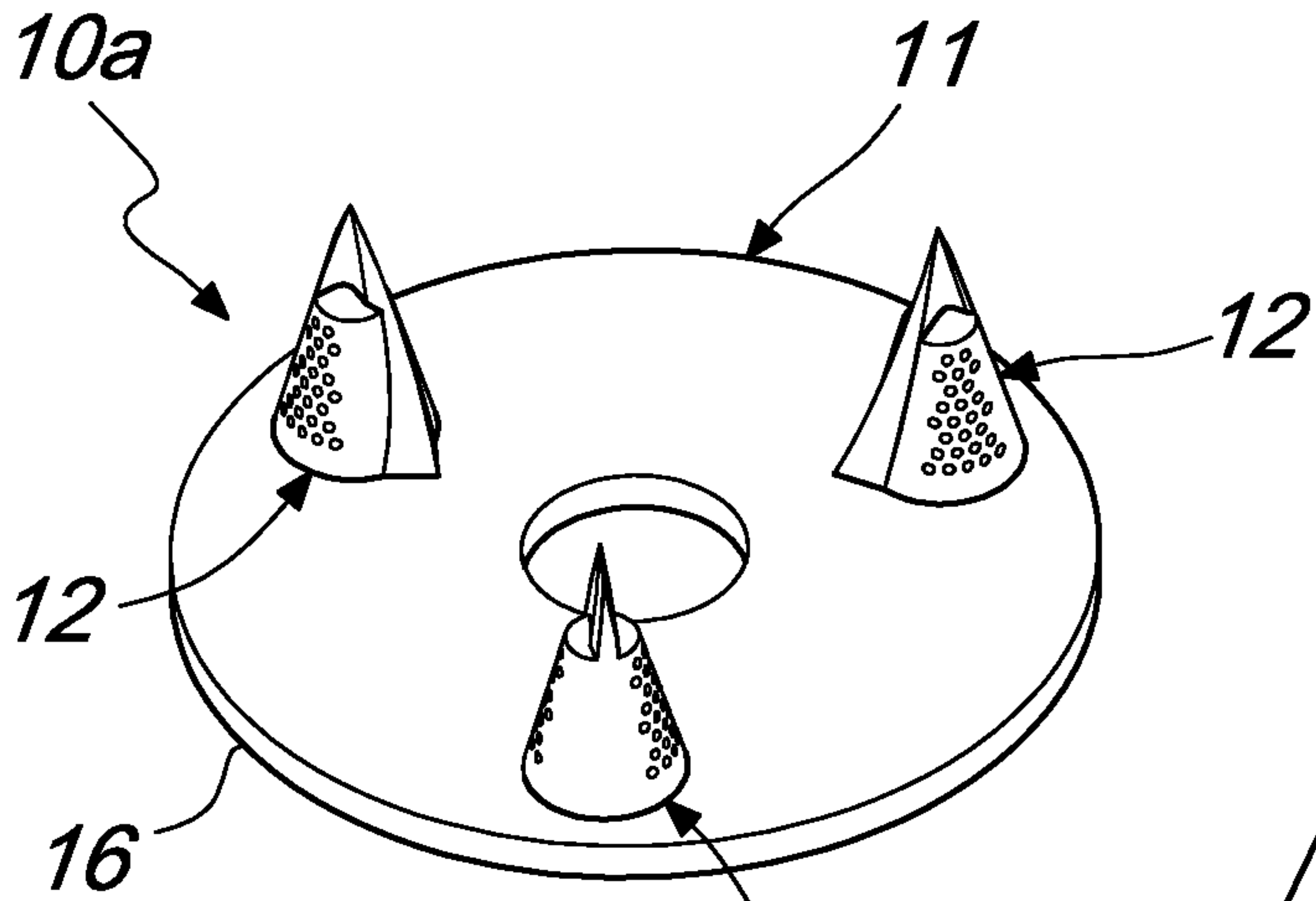


Fig. 19

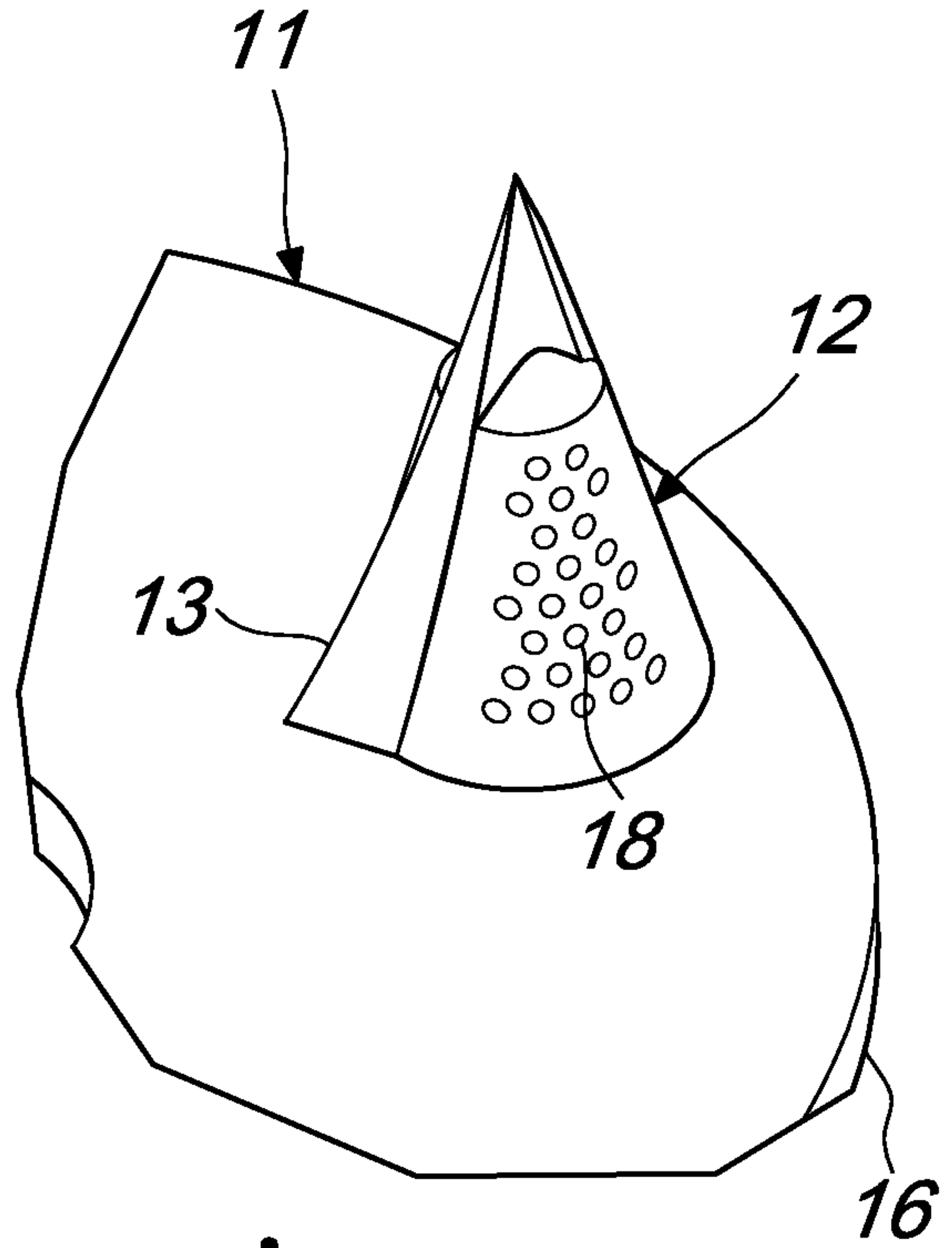


Fig. 20

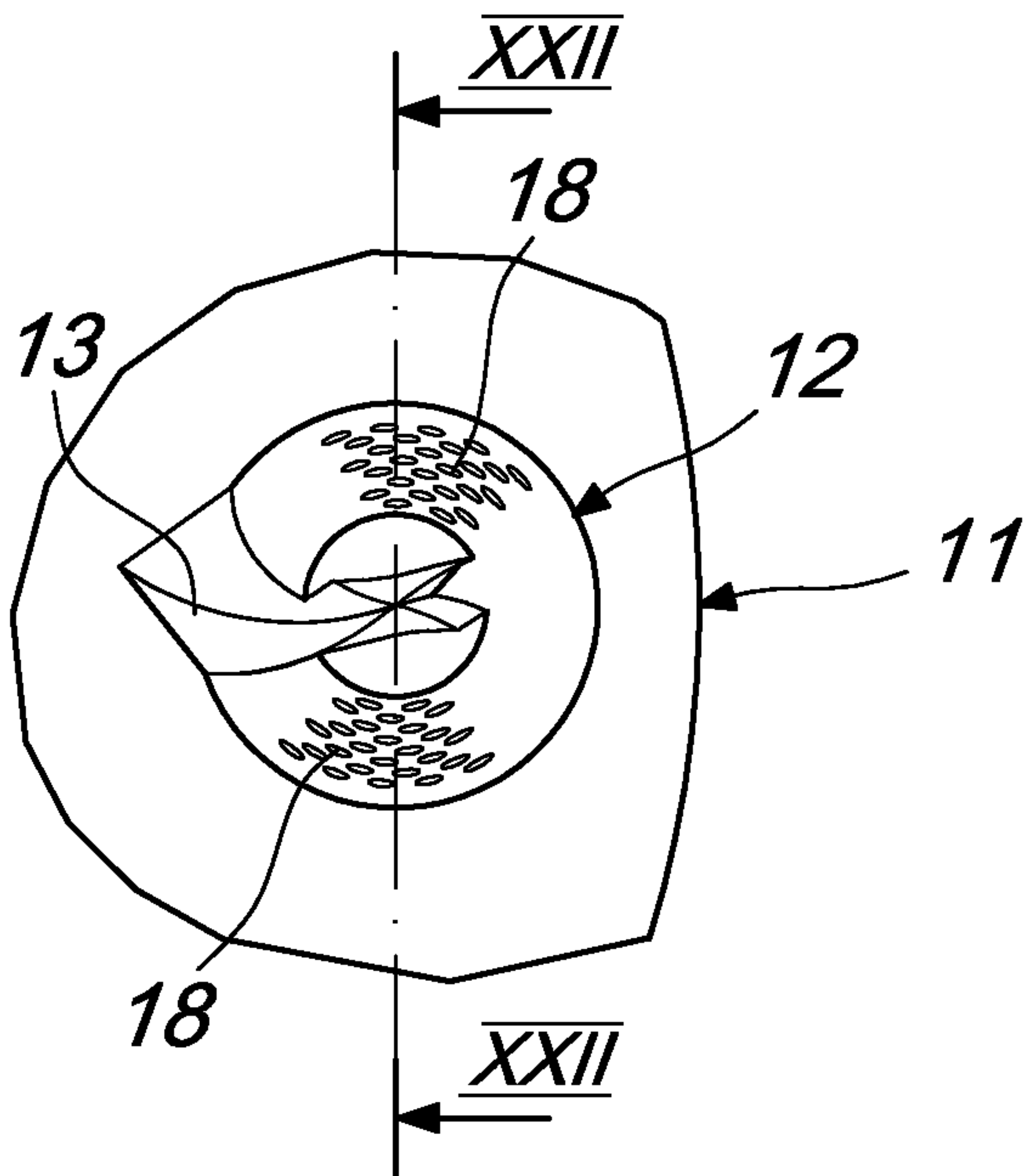


Fig. 21

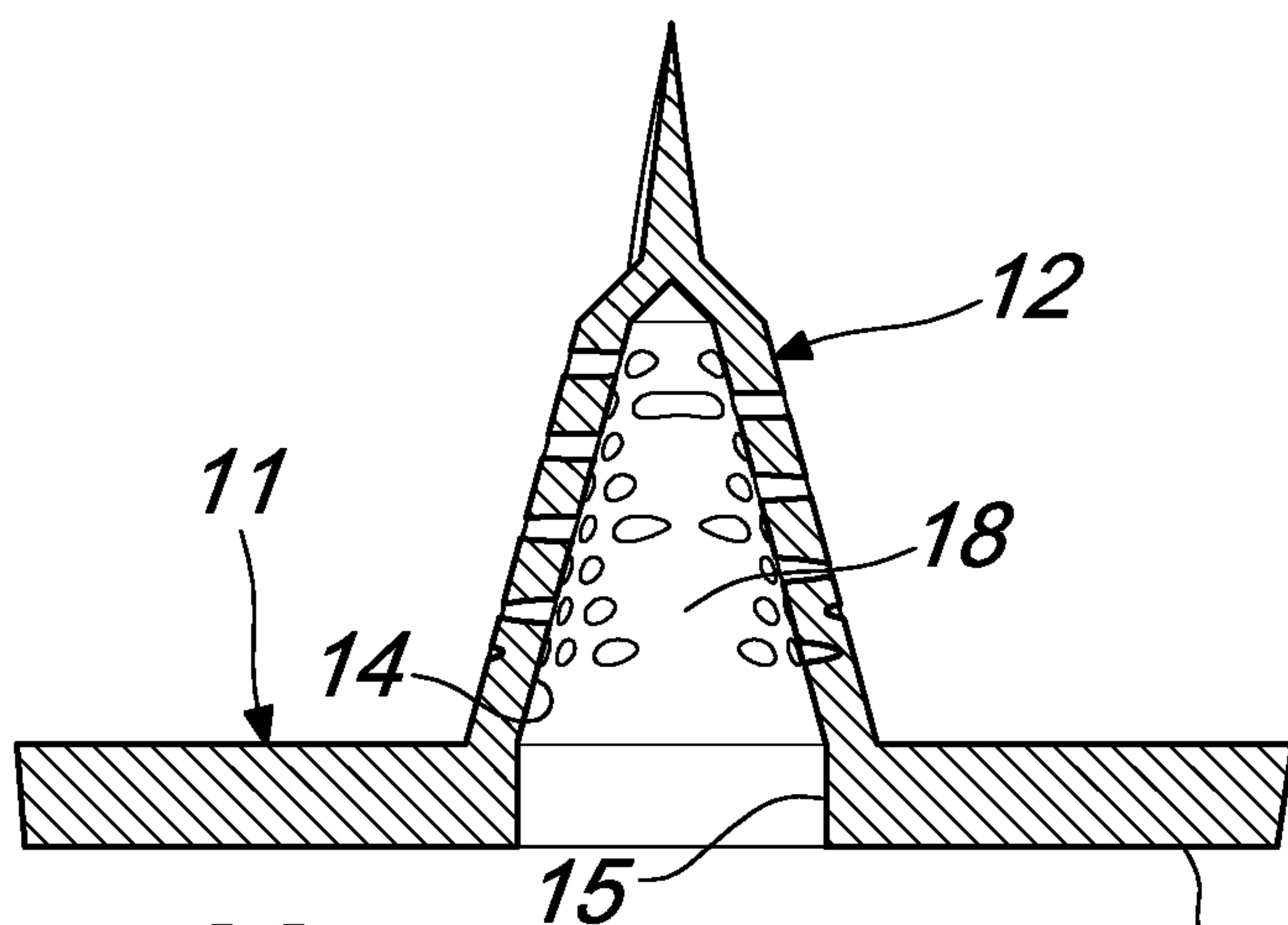


Fig. 22

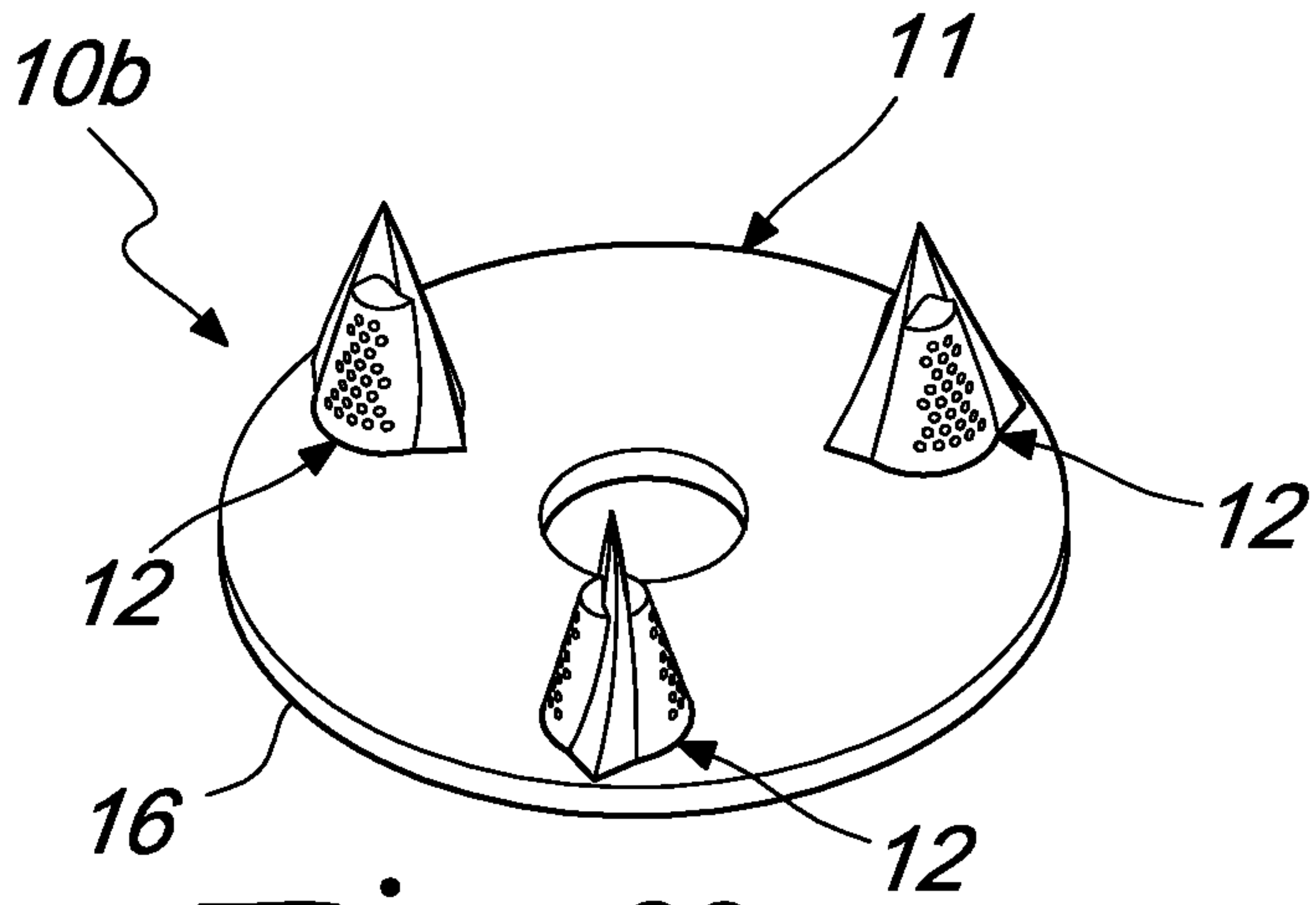


Fig. 23

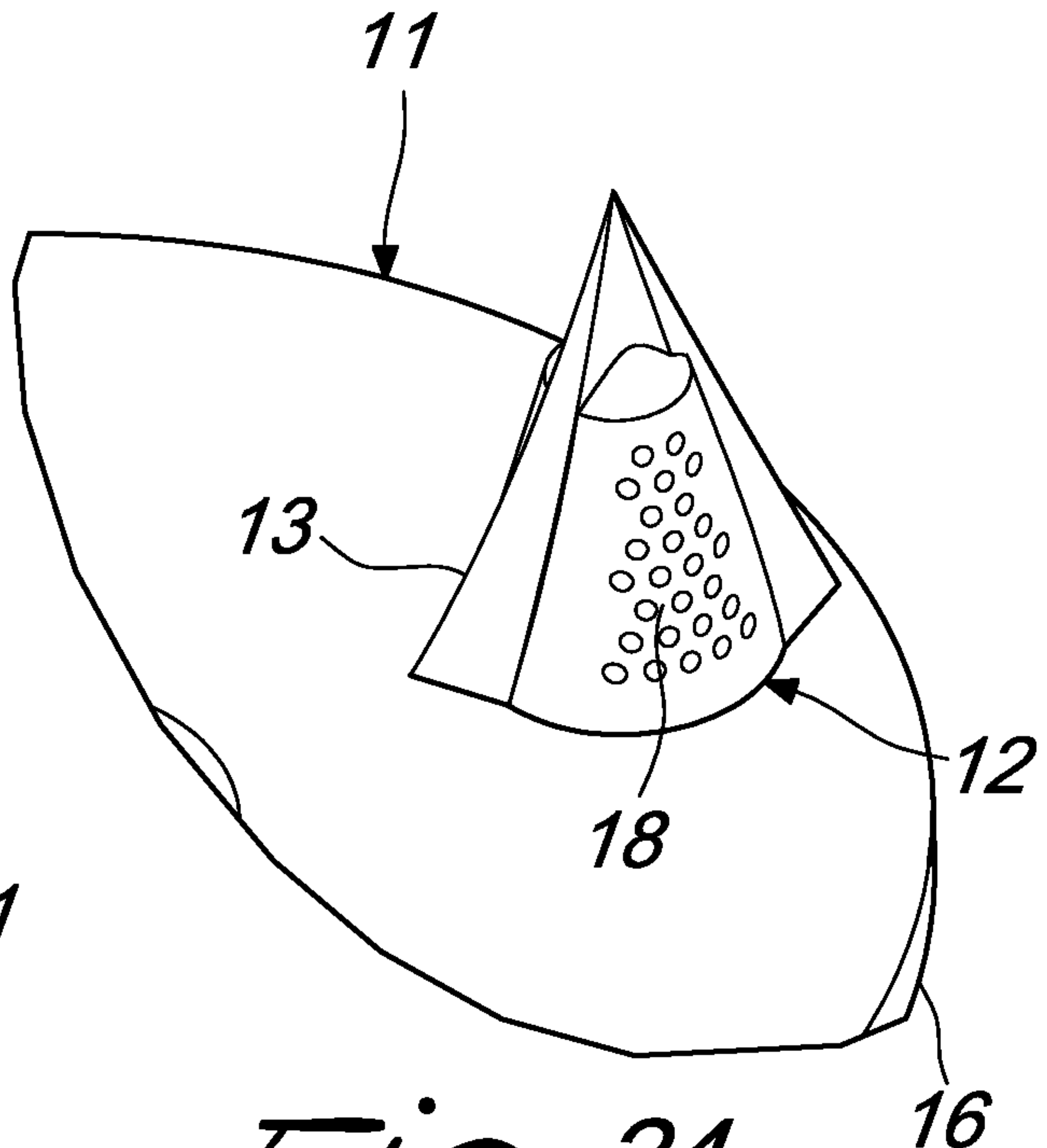


Fig. 24

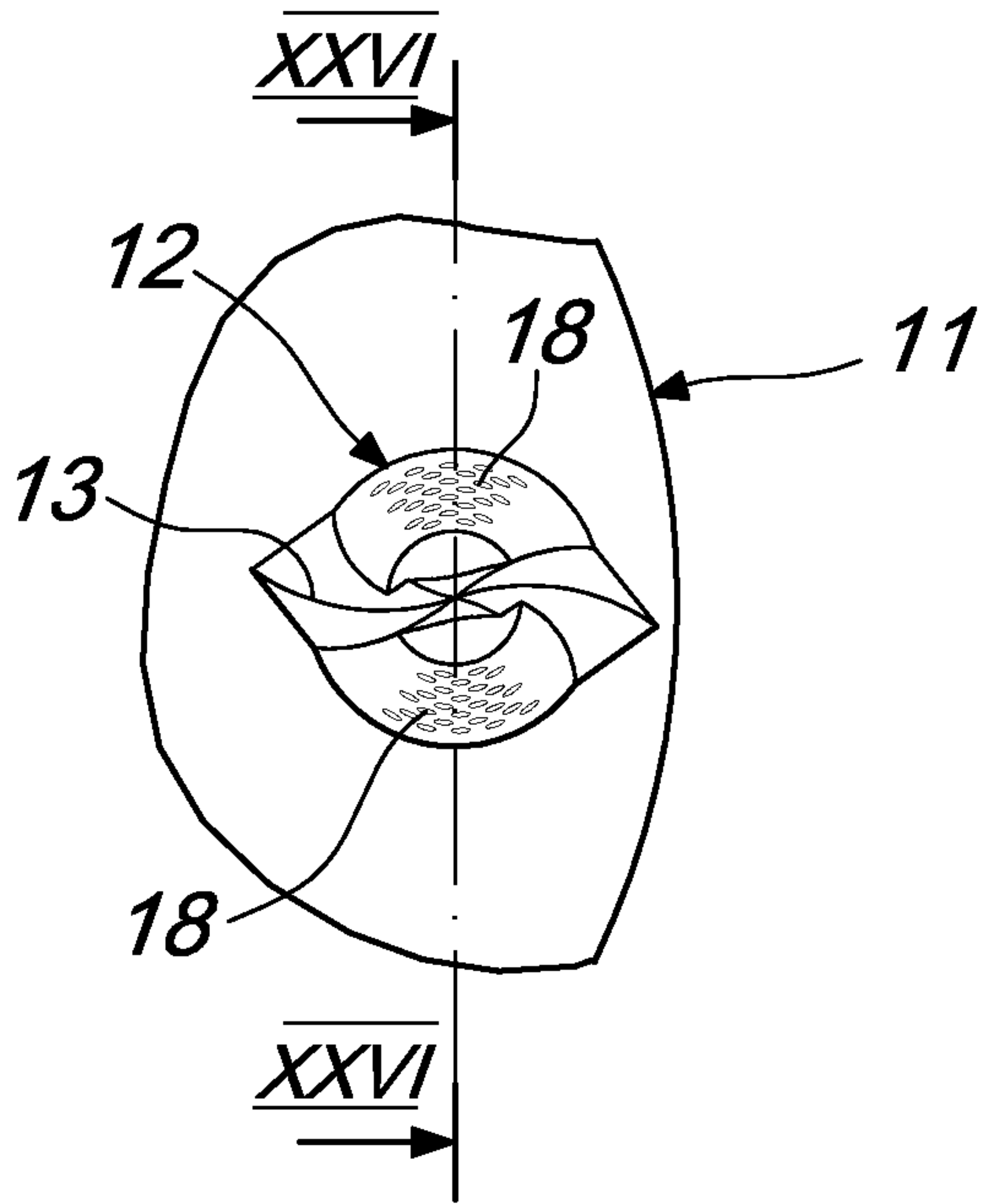


Fig. 25

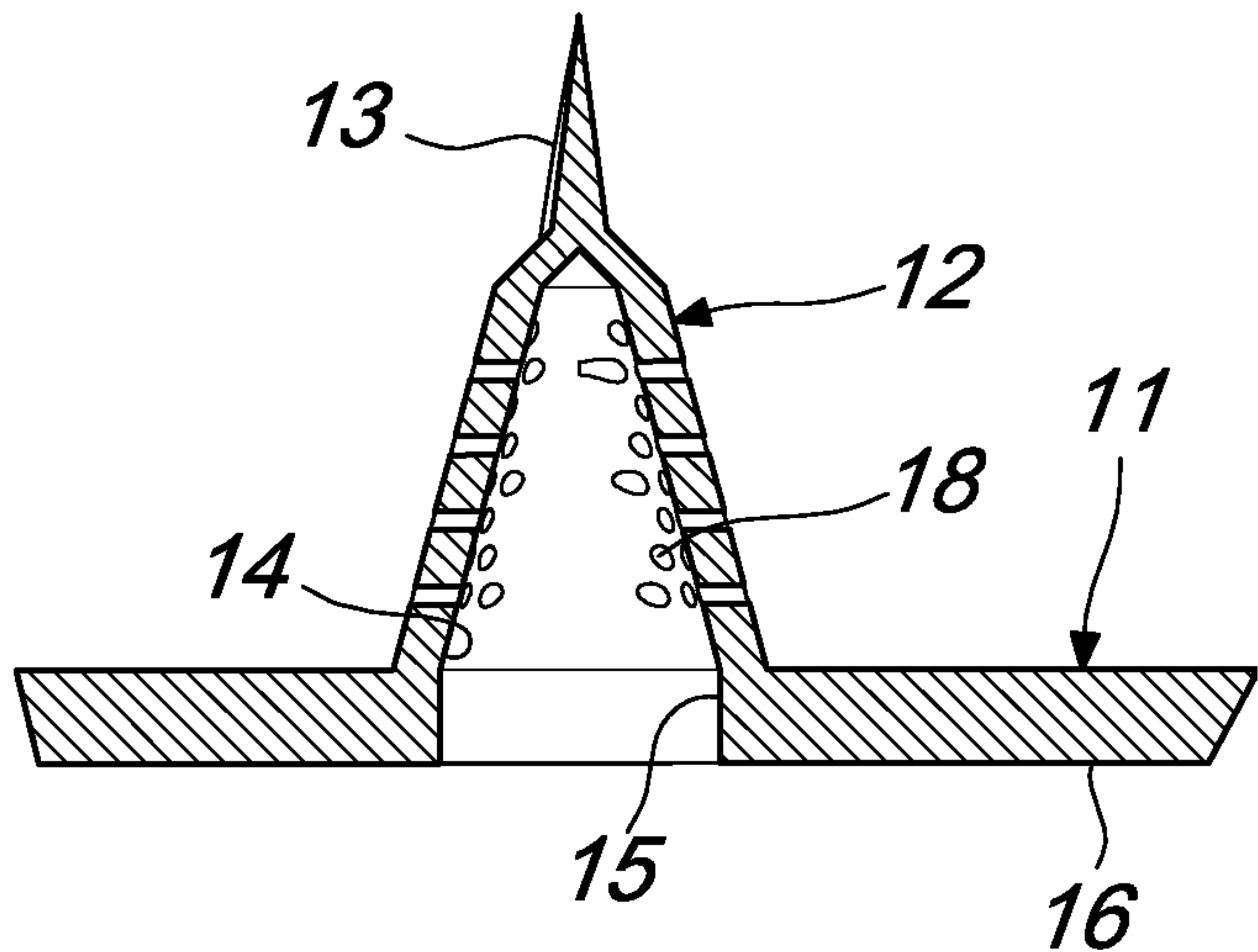


Fig. 26

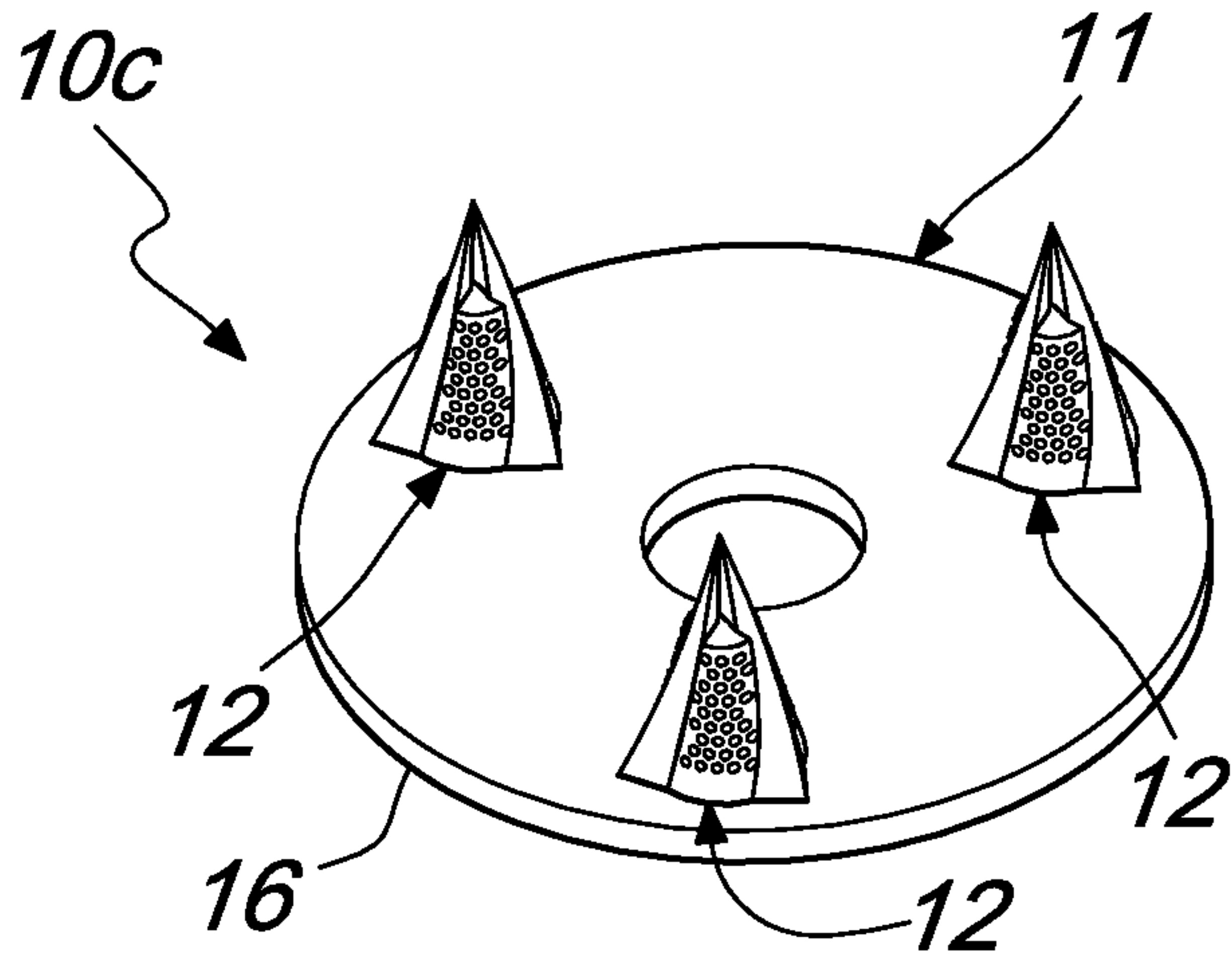


Fig. 27

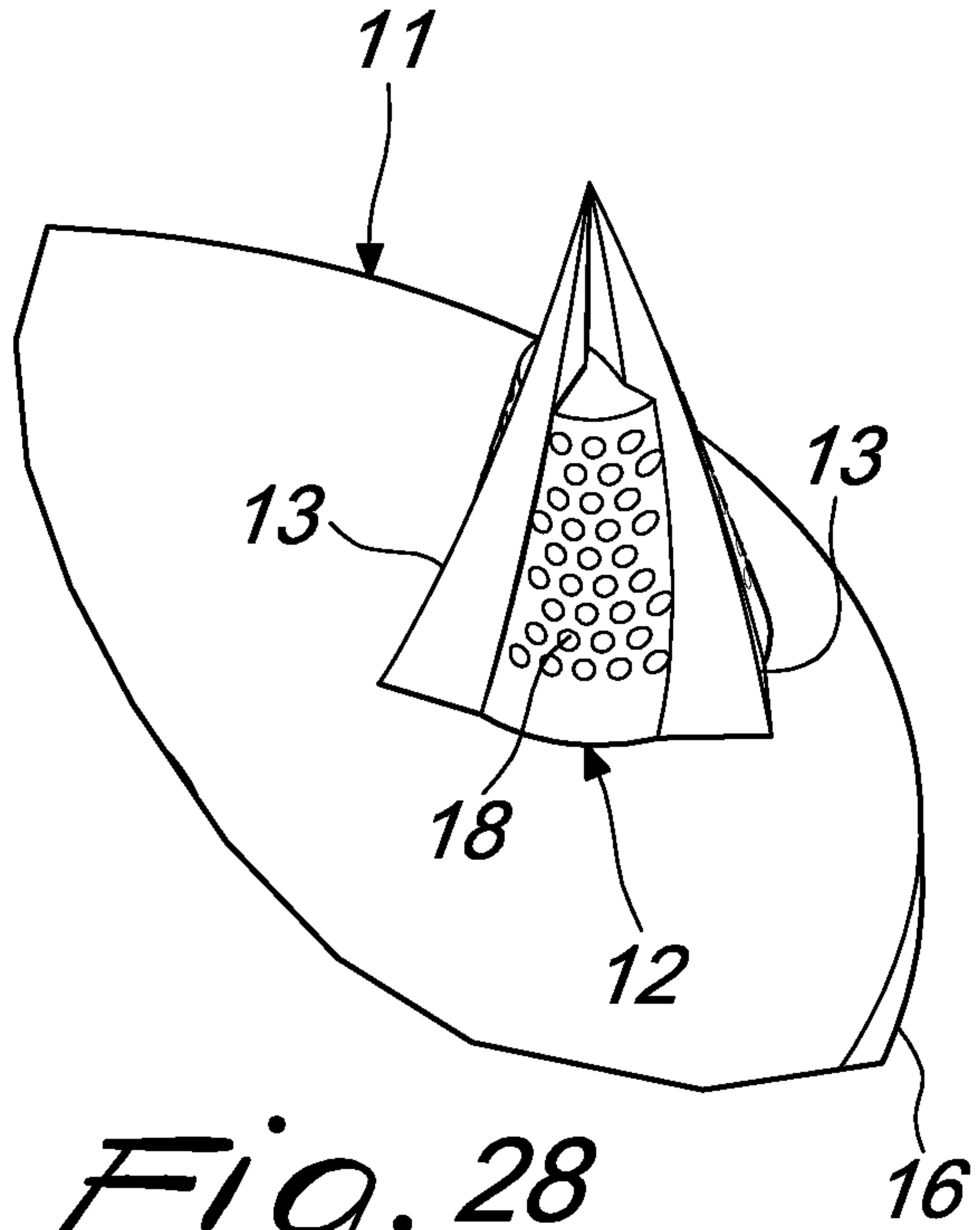


Fig. 28

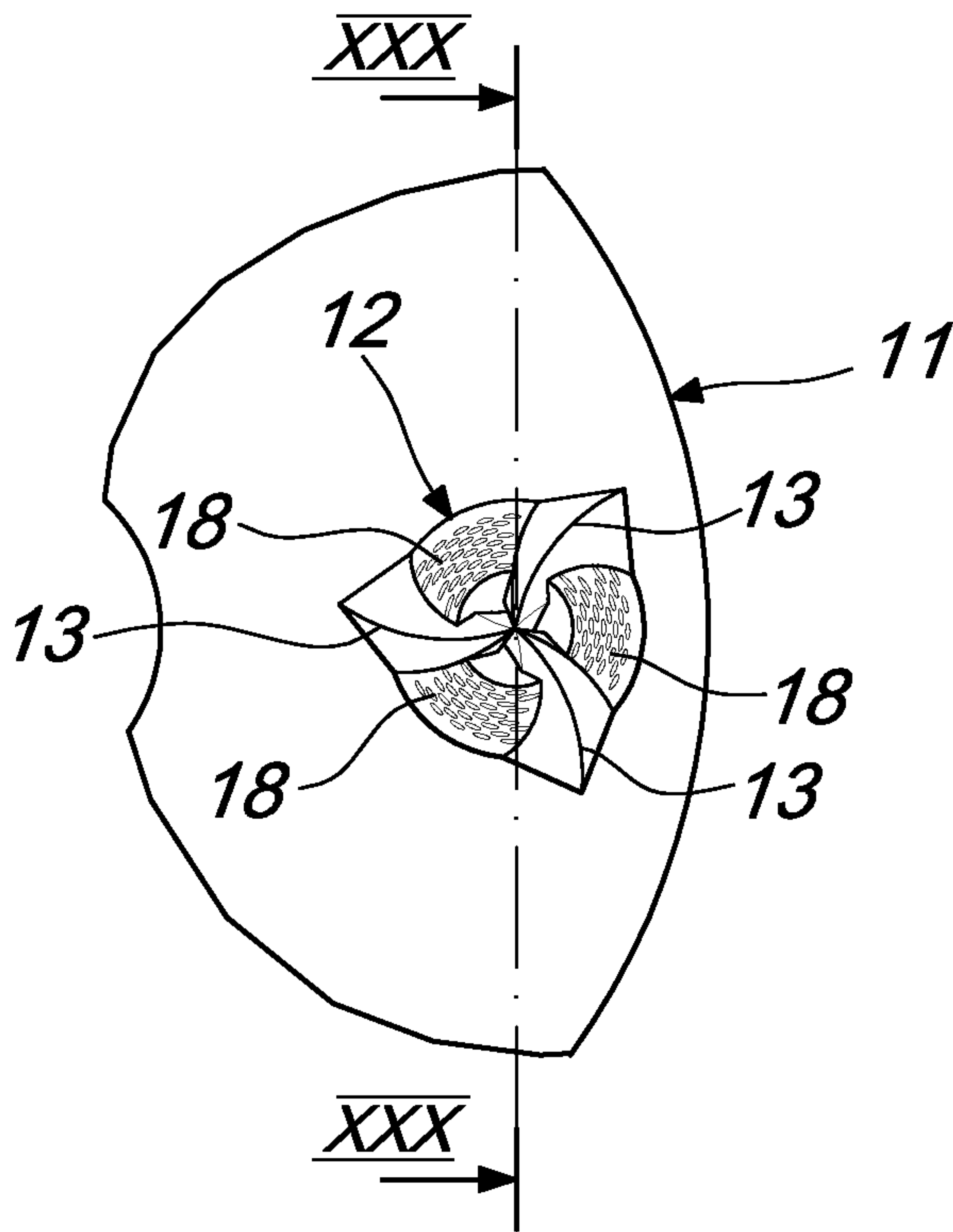


Fig. 29

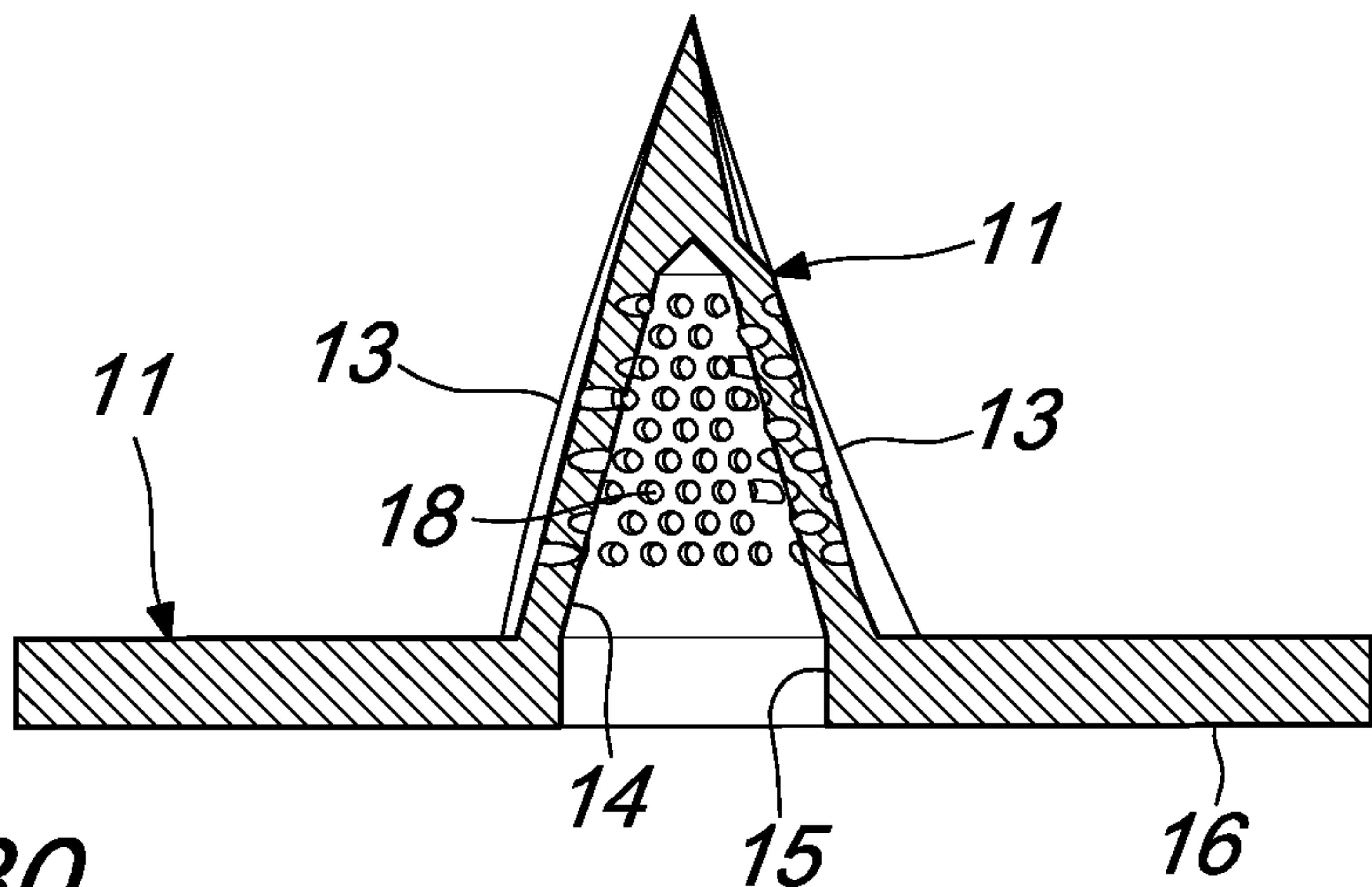


Fig. 30

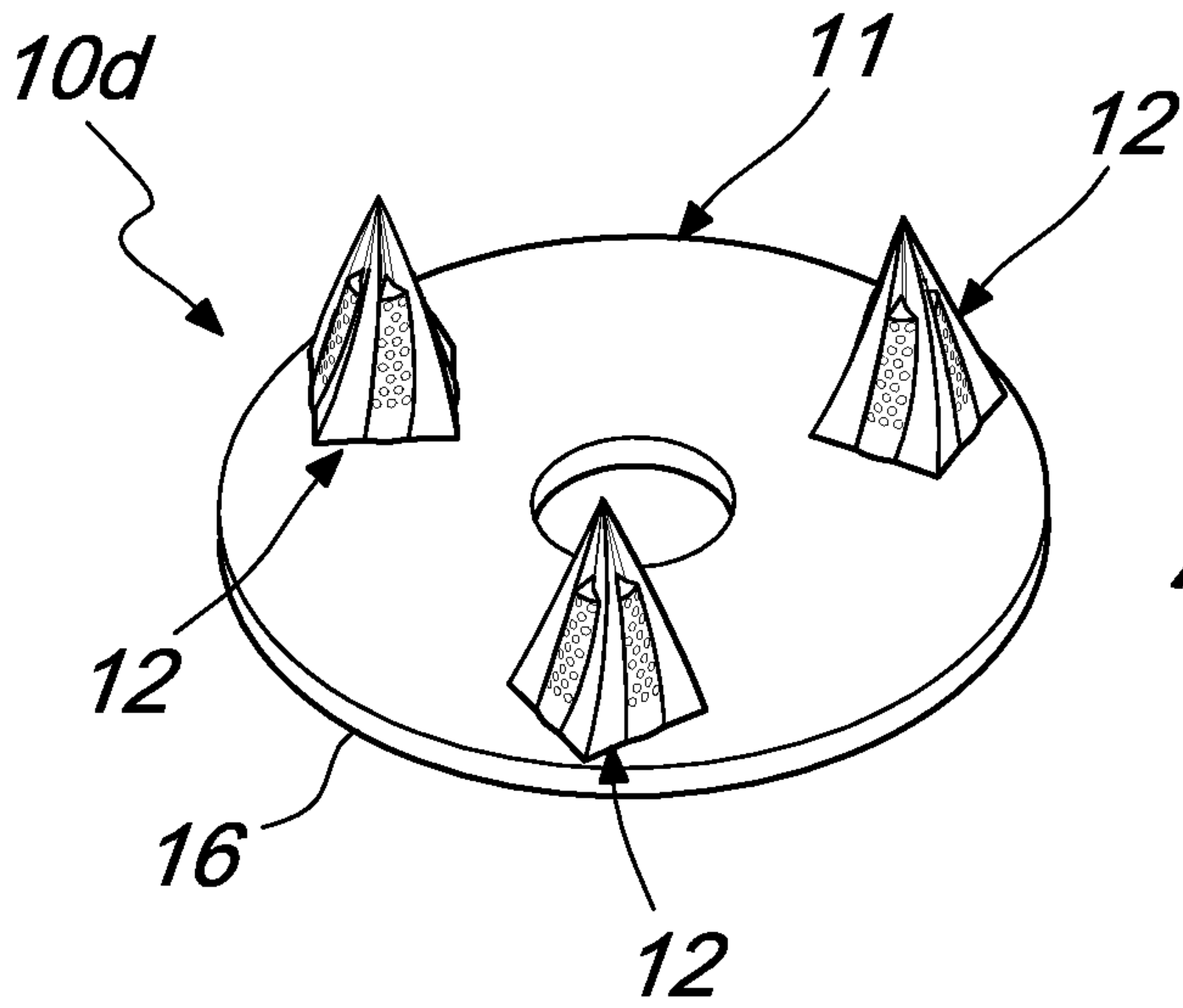


Fig. 31

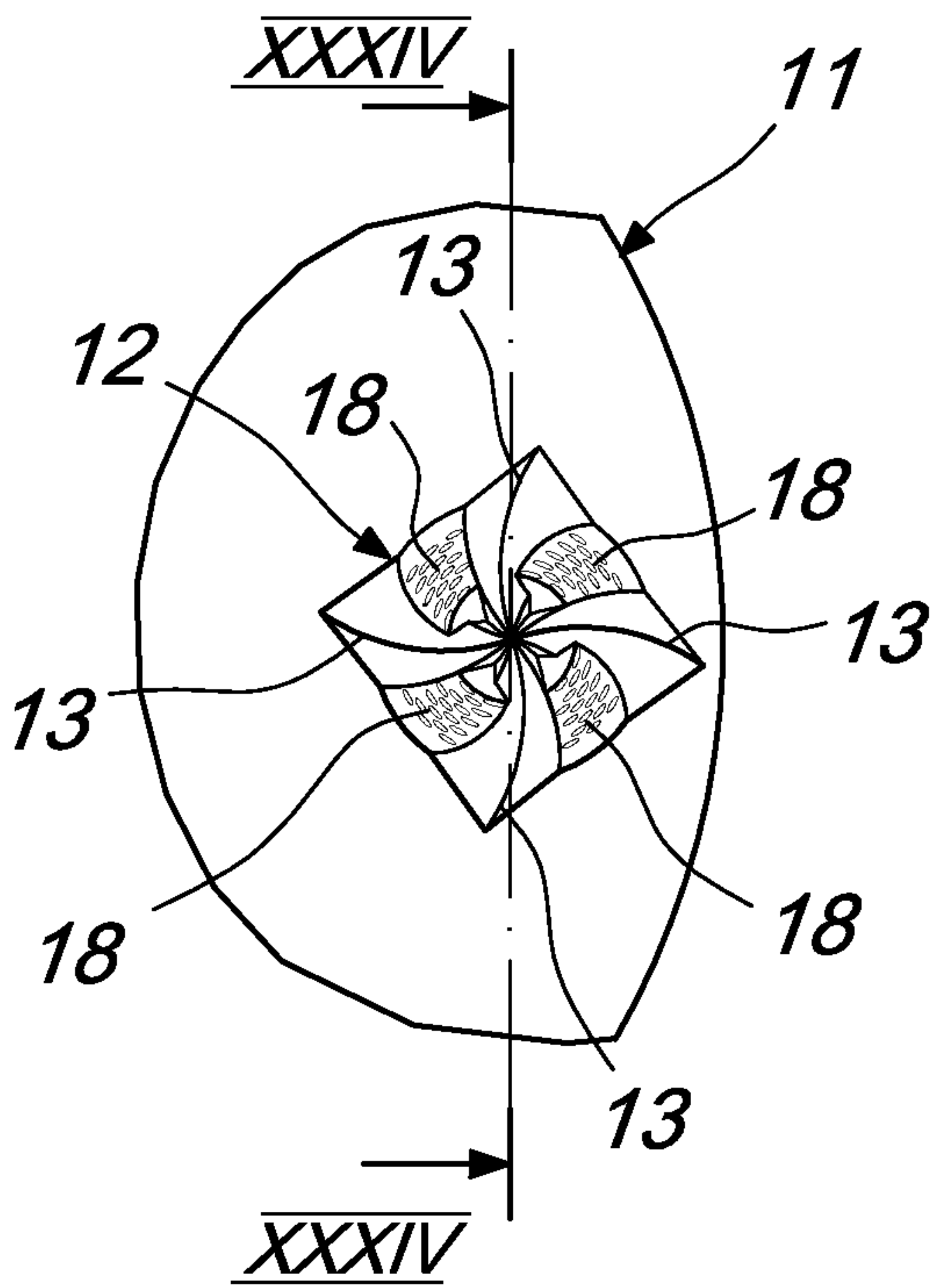


Fig. 33

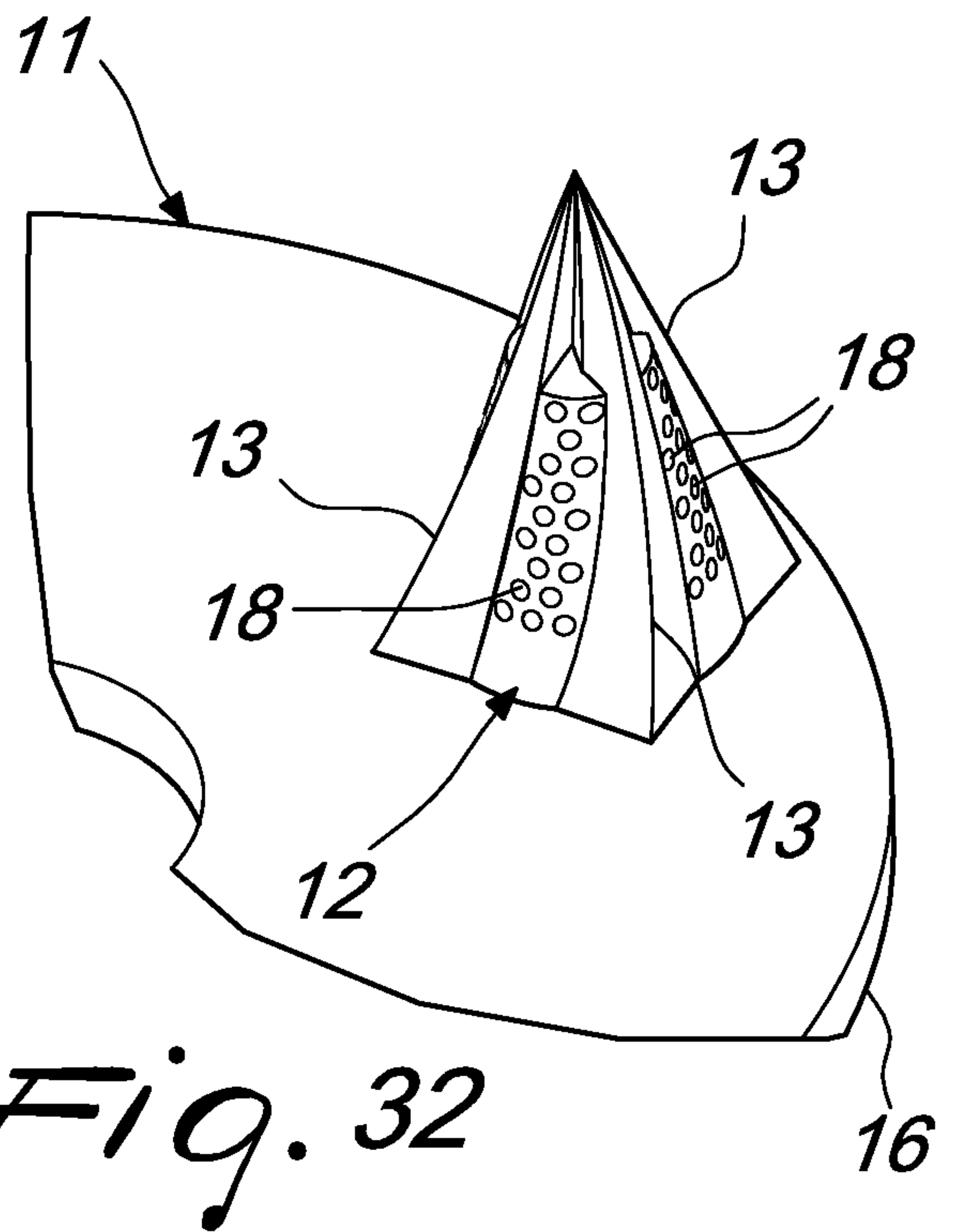


Fig. 32

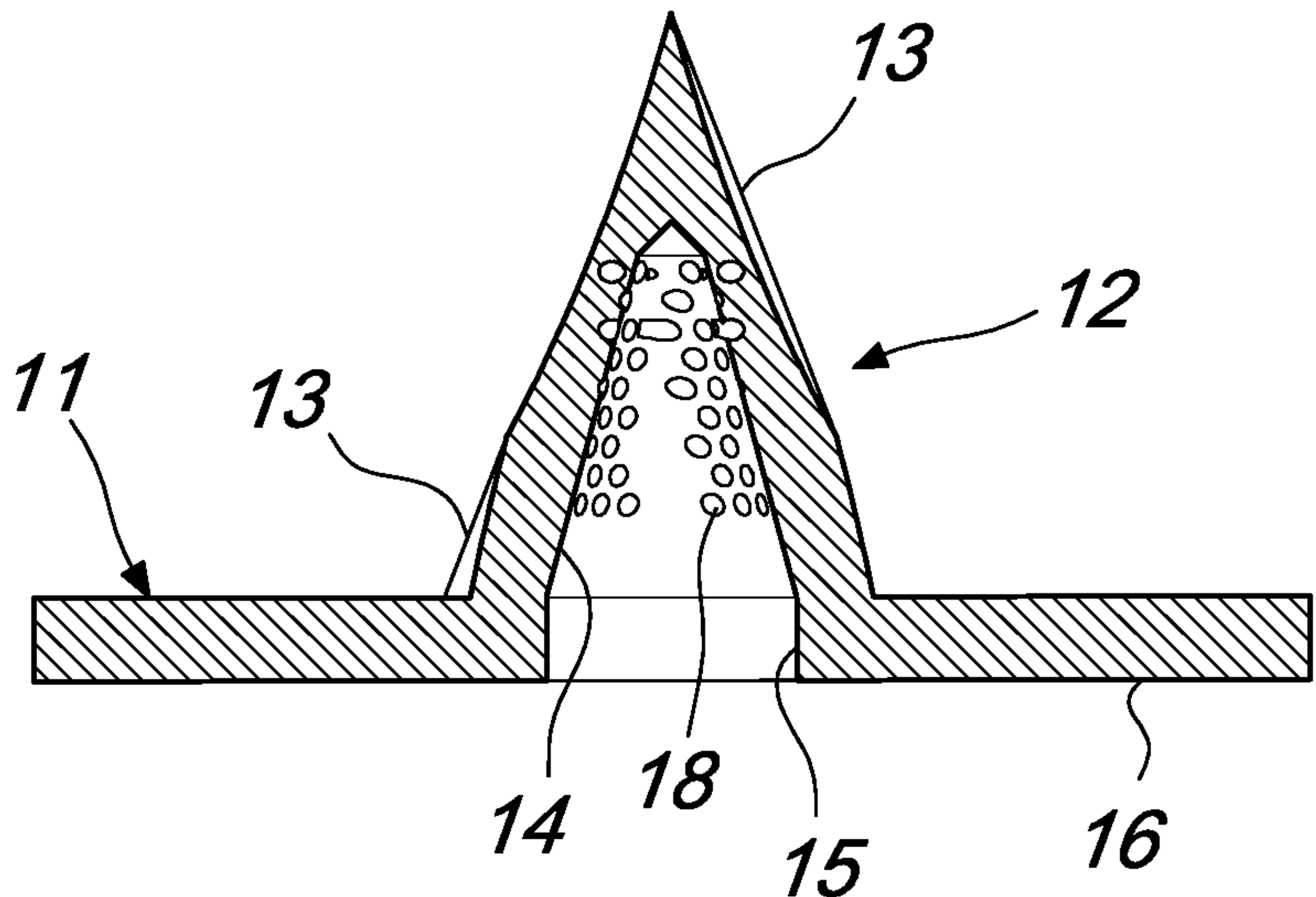


Fig. 34

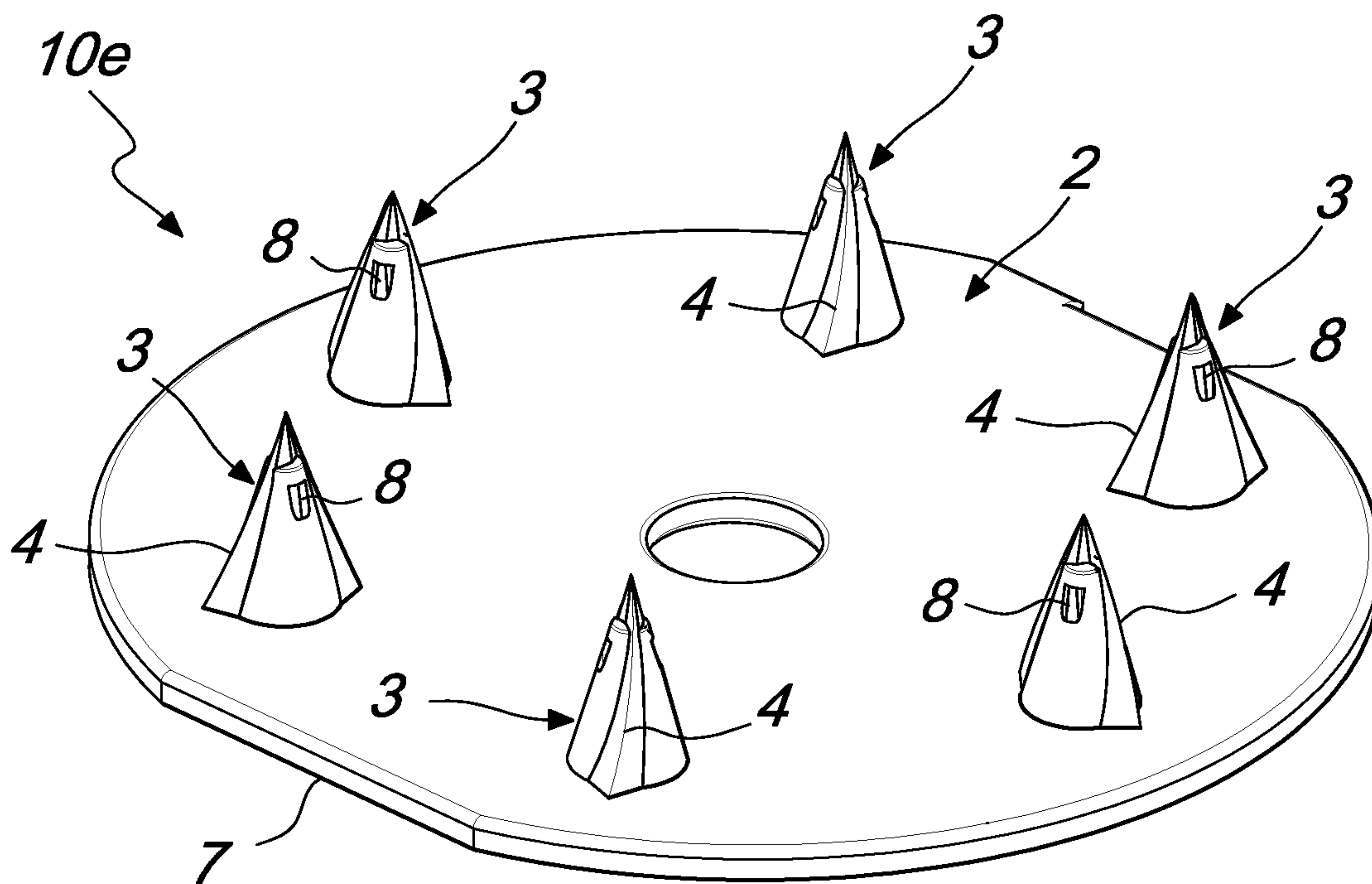


Fig. 35

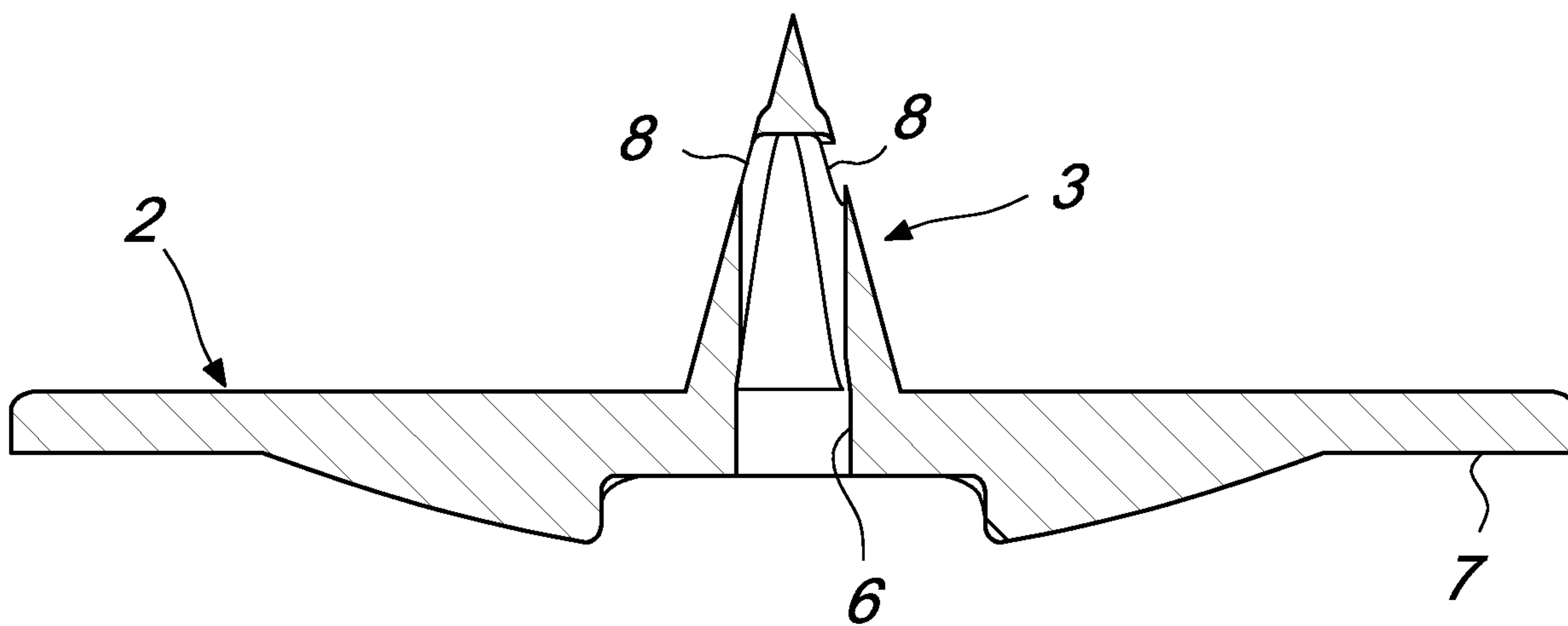


Fig. 36

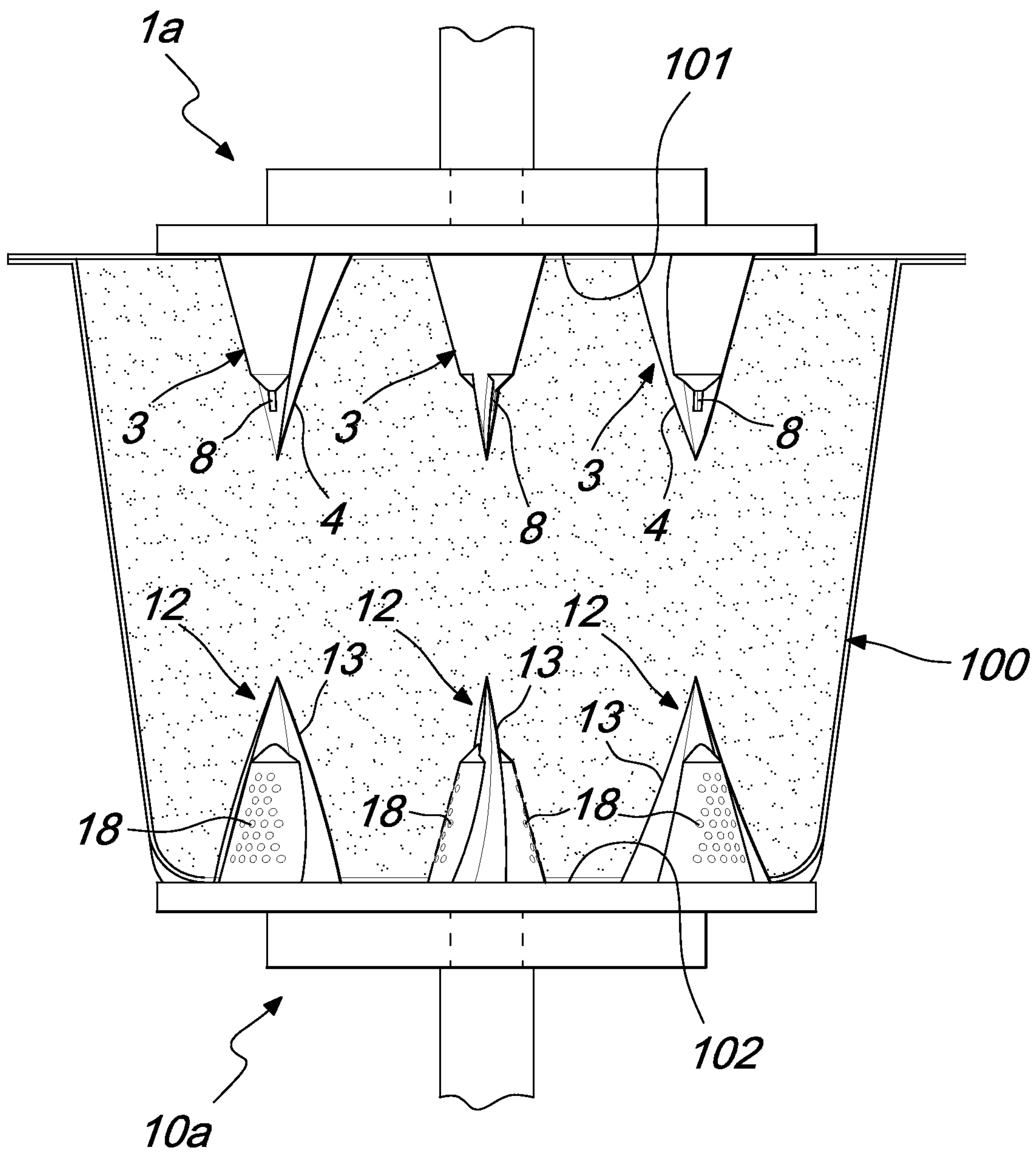


Fig. 37

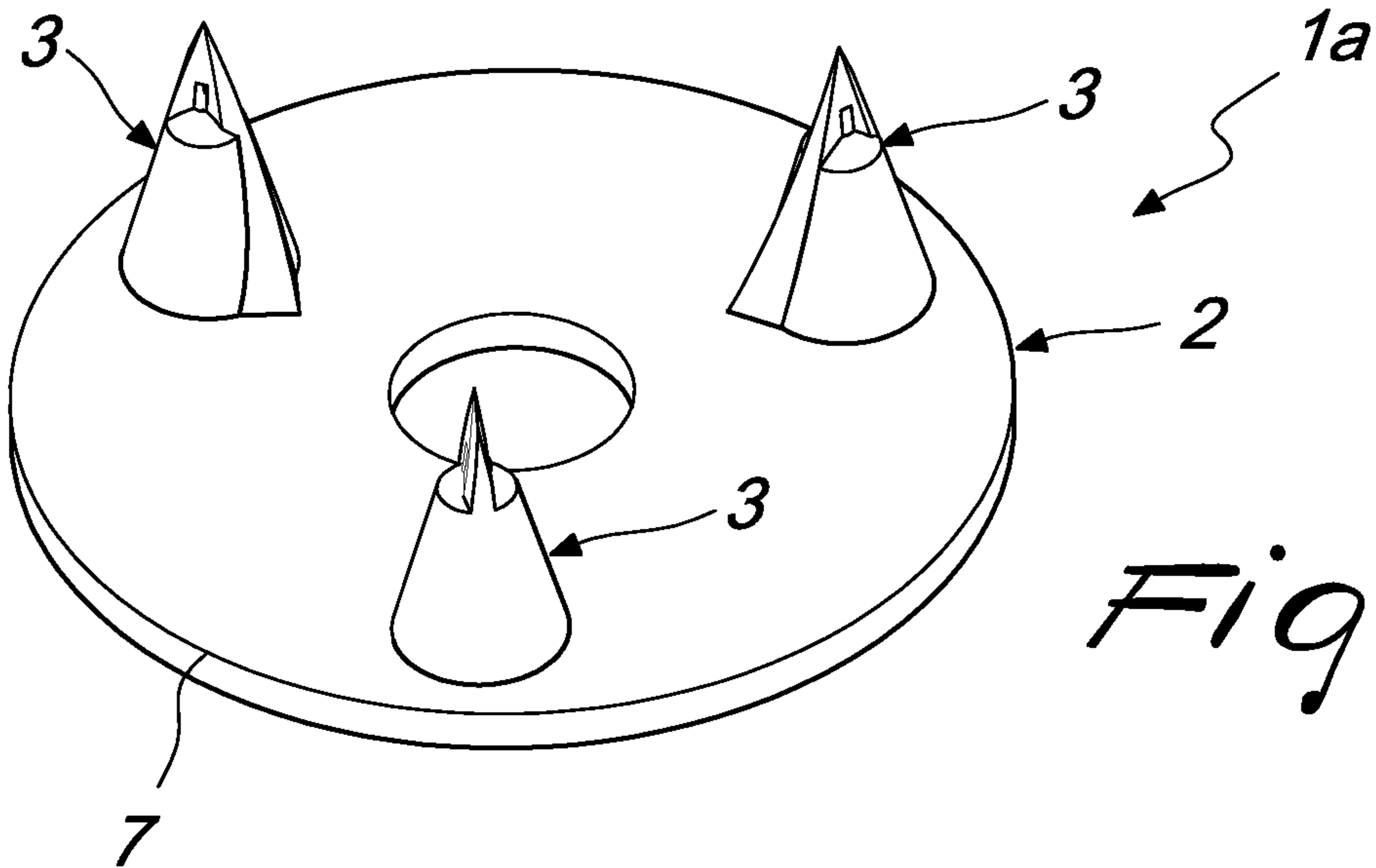


Fig. 1