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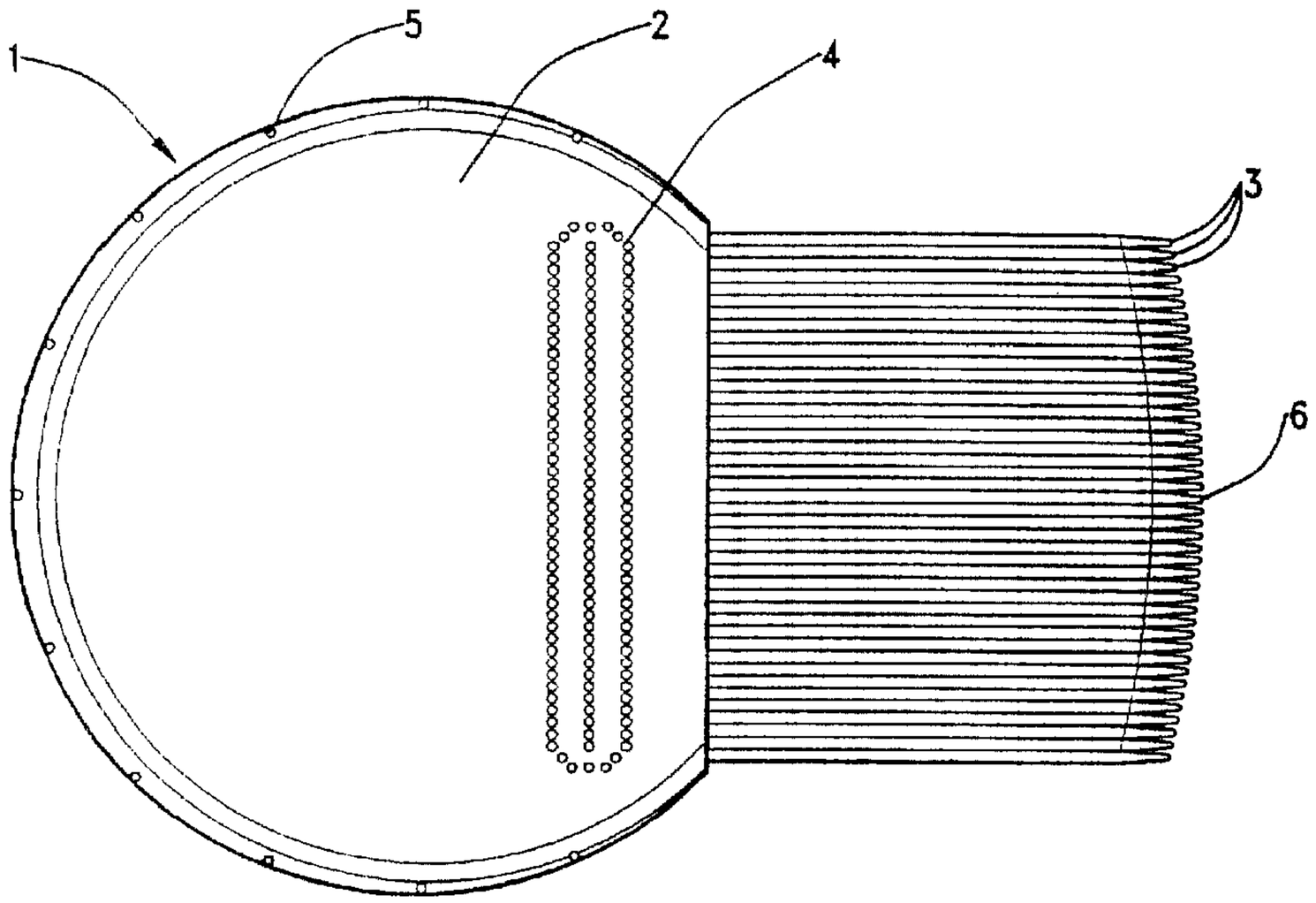
(54) Titre : PEIGNE SERVANT A NETTOYER MUNI DE DENTS A SURFACE PERIPHERIQUE IRREGULIERE ET METHODE DE FABRICATION D'UN PEIGNE SERVANT A NETTOYER PRESENTANT UNE GRANDE ROBUSTESSE MECANIQUE

(54) Title: CLEANING COMB WITH TEETH THAT ARE RUGGED ON THEIR PERIPHERAL SURFACE AND METHOD OF MANUFACTURING A HIGH MECHANICAL STRENGTH CLEANING COMB



(57) Abrégé/Abstract:
The present invention relates to a cleaning comb 1 with teeth 3 that are rugged on their peripheral surface and a method of manufacturing a high mechanical strength cleaning comb 1. The comb 1 includes a plurality of teeth 3 arranged parallel to each other with a spacing of under 100 µm, which are rugged on their peripheral surface for the purpose of more effectively removing foreign elements and smaller particles attached to the hair. The teeth 3 have a total length and a relatively large useful length, i.e. a portion that protrudes from the handle, and they have a diameter of over 1 mm. In order to give the comb a high mechanical strength, the method of manufacturing the comb includes attaching the teeth 3 onto the handle 2 preferably by laser welding or soft soldering. The ruggedness on the peripheral surface is provided by cutting an helical groove 9 or several parallel circumferential grooves 10 in the respective surface.

ABSTRACT

The present invention relates to a cleaning comb 1 with teeth 3 that are rugged on their peripheral surface and a method of manufacturing a high mechanical strength cleaning comb 1. The comb 1 includes a plurality of teeth 3 arranged parallel to each other with a spacing of under 100 μm, which are rugged on their peripheral surface for the purpose of more effectively removing foreign elements and smaller particles attached to the hair. The teeth 3 have a total length and a relatively large useful length, i.e. a portion that protrudes from the handle, and they have a diameter of over 1 mm. In order to give the comb a high mechanical strength, the method of manufacturing the comb includes attaching the teeth 3 onto the handle 2 preferably by laser welding or soft soldering. The ruggedness on the peripheral surface is provided by cutting an helical groove 9 or several parallel circumferential grooves 10 in the respective surface.

CLEANING COMB WITH TEETH THAT ARE RUGGED ON THEIR PERIPHERAL SURFACE AND METHOD OF MANUFACTURING A HIGH MECHANICAL STRENGTH CLEANING COMB

FIELD OF THE INVENTION

The present invention relates to a cleaning comb with teeth that are rugged on their peripheral surface and a method of manufacturing a high mechanical strength cleaning comb.

BACKGROUND OF THE INVENTION

While various types of combs that clear hair of strongly attached particles are known in the art, and particularly lice combs, the problem of foreign agents on human or animal hair has not yet been solved. The most important problem is that of nits (i. e. the eggs of human lice) for they are most strongly attached to hair.

US. Patent No. 4,612,945 describes a comb for the cleaning of hair from lice and nits. This comb has teeth having a triangle-shaped cross section. The diameter of the teeth is tapered from the gripping ends to the leading ends, so that the distance between adjacent teeth is larger at the leading ends than close to the handle. The teeth are arranged with their longitudinal axes parallel to each other and in two different planes, with adjacent teeth staggered between both planes. With this design a scissors effect is achieved to detach lice and nits. This comb, however, has a few drawbacks. Its teeth have a limited length, whereby it is not always possible to reach the bottom of the hair. The distance between the leading ends of the teeth is substantially large, so that the efficiency against lice and particularly against their eggs, is significantly reduced. In addition, teeth are triangle-shaped with sharp edges and thus they tend to damage hair, a totally undesired effect.

U. S. Patent No. 4,671,303 discloses a nit comb and a method of manufacturing the same. The comb includes a plurality of metal teeth, which are mounted on a handle, with a distance between the teeth of about 100 μm to 120 μm. Each tooth is provided with an elongated groove that matches an elongated interconnection member in the handle, to insure the teeth are held parallel to each other both during manufacturing and in use. The teeth have a useful length, i.e. a portion of each tooth that protrudes from the handle and can be used to comb the hair, of approximately 9 mm or less, and the ends are hook-shaped to aid in removing lice and nits from the hair. In many instances the reduced effective length is not suitable for the comb to reach the base of the hair. Despite the particular shape of the tips of the teeth, the comb lacks the required efficiency to remove the particles that remain strongly attached to the hair, such as nits, because the distance between teeth is to big and the surface of the teeth is smooth, therefore leaving most of the eggs ungrasped.

SUMMARY OF THE INVENTION

It is an object of this invention to provide a comb with significantly improved characteristics to clean any type of hair or the like, of tightly attached particles, and particularly of objects such as nits which are generally very firmly attached to the hair without at the same time damaging the hair.

It is another object of this invention to provide methods of manufacturing cleaning combs of high mechanical strength, while still having teeth of a relatively large useful length.

It is a further object to manufacture comb teeth that have an uneven peripheral surface of which has specific characteristics for removing particles that are strongly attached to the hair.

In a preferred embodiment, the cleaning comb with teeth that have a rugged peripheral surface comprises parallel teeth arranged on a single plane with a spacing between teeth of under 100 μm, to effectively remove all the foreign elements and smaller particles attached to the hair.

To be effective, the teeth must have a preferred useful length, i.e. the portion protruding from the handle, of at least 35 mm, since shorter teeth render the job of cleaning hair too burdensome, especially in the case of a full head of hair.

The teeth are of a cross section without sharp edges, therefore, the cross section is circular or oval and they are preferably of a substantially cylindrical shape, so that they do not damage or clutch the hair to be combed and cleaned.

The teeth are made of a material that has a mechanical strength that is equal or greater than steel, and preferably of stainless steel with at least 1 mm diameter, to give the comb a higher mechanical strength in spite of their relatively large useful length, and which, on cleaning the hair, helps the comb overcome the resistance opposed by the nit.

The most important novel feature in the teeth is that they have a peripheral surface that has a fine ruggedness, which has the effect of removing foreign particles that are attached to the hair, to a significantly greater extent compared to the previous art teeth; for example, between 30 and 50 % more nits can be removed using the cleaning comb of the present invention than the previous art combs.

While any ruggedness may be used to improve the cleaning effect of the comb, the preferred ruggedness, which offers the best cleaning and/or lowest manufacturing costs results are fine grooves that are abrasive to the nit without damaging hair. The grooves may be provided as a helical groove with a pitch that

is not too wide or as parallel ring-shaped circumferential grooves with a specified limited spacing between them.

Preferably, the teeth are attached to a handle that is made of sterilizable material, such as, for example, stainless steel, so that it can be boiled in tap water every day without undergoing any changes.

In a preferred embodiment, the method of manufacturing the cleaning comb comprises the steps of providing a plurality of teeth which are of a relatively large total length; creating a ruggedness on the peripheral surface of each tooth; honing and rounding up the distal tip of the leading end of each tooth; placing the proximal ends of the teeth side by side with a spacing between them that is less than 100 μm on the internal side of a first handle plate, so that they have a useful length, outside of the handle, of over 30 mm; arranging the teeth slightly offset so that their leading ends make up a curved edge; firmly attaching the teeth one by one onto said first handle plate, thus giving the comb a high mechanical strength; and covering the handle with the second plate.

In a further preferred embodiment, the ruggedness is made by a method that comprises the steps of placing a cutting tool on a tool-holder device, with a spring to give it a constant pressure on the straightening roller train of a wire straightener - cutter; placing one of the plurality of teeth inside the straightener; turning said straightening roller train together with said cutting tool around the tooth, taking out cuttings in the shape of a groove; and, at the same time, advancing a tooth through the straightening roller train, with the groove finally taking an helical shape on the peripheral surface of the tooth; and repeating the above steps from the placing step on, for each of the plurality of teeth.

In a further preferred embodiment a ruggedness is created using the steps of placing the tooth inside a straightener; and cutting parallel circumferential grooves on the peripheral surface of the tooth.

In order to provide a leading end that is more comfortable for the user, it is possible, during the placing step, to slightly offset the teeth so that the leading ends of the comb form a curved edge.

In one of the preferred embodiments the teeth are welded onto a first plate by laser welding. It is possible to apply the laser beam form the outer side of the first plate; or it may be applied from the side of the teeth, but in the latter case only between two adjacent teeth so that the structure of the teeth is not altered on applying the laser beam. In these embodiments the handle is sealed by laser welding of said second plate onto said first plate.

In a further preferred embodiment, the teeth are soft soldered from the side of the teeth. Here, the handle is press closed after an interposed plastic member has been inserted between the first plate and the second plate, which serves the purpose of absorbing and supporting the application force during press closure.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects are achieved by the device of this invention, which is shown in the following figures, in which:

Figure 1A is a top plane view of the first handle plate of the comb of the present invention;

Figure 1B is a partial section side view of the cleaning comb along the line I-I of Figure 1A;

Figure 2A is a side view of a tooth that has a ruggedness in the shape of an helical groove;

Figure 2B is a side view of a tooth that has a ruggedness in the shape of parallel circumferential grooves;

Figure 2C is an enlarged view of part II of Figure 2A; and

Figure 2D is an enlarged view of part III of Figure 2A.

DETAILED DESCRIPTION OF THE INVENTION

In Figure 1A there is shown a comb 1 of the present invention, which comprises a plurality of teeth 3, and two plates or covers, a first plate 7 and a second plate 9 (Fig. 1B), which make up the handle 2. The number of teeth 3 may be from 10 to 100, and preferably the comb 1 comprises 33 individual needles or teeth 3.

The teeth 3 consist of two portions. An active or useful portion, which ends, on its leading end, in a rounded conical tip 11 (Figures 2A and 2D) and has a substantially cylindrical body with a peripheral surface machined either in the shape of one helical groove 9 (Figures 2A and 2C) or several parallel circumferential ring-shaped grooves 10 (Figure 2B). The remaining portion of the teeth is the fastening portion that enters the handle 2 and is affixed to the first plate 7.

The teeth 3 are made from straight cylindrical members having a diameter of 1,0 mm to 1,5 mm, and preferably having a diameter of about 1,25 mm with a tolerance of about 0,01 mm, the teeth being straight with a straightness tolerance of about 0,02 mm (Figures 2A and 2B), since teeth of such diameter provide the comb with high mechanical strength, which is required for the large useful length of the teeth 3.

The teeth have a ruggedness on their peripheral surface, which preferably consists of one helical groove 9 (Fig. 2A) or several parallel circumferential ring-shaped grooves 10 (Fig. 2B).

For the manufacturing of a tooth 3, a known wire straightener and cutter is used, to which, on one of its straightening roller trains, a cutting tool is coupled ; the cutting tool being arranged on a tool-holder with a spring to provide a constant pressure.

Said tool together with the straightening rollers turns about the straight cylindrical member, cutting from this member a chip in the shape of a groove 9. Upon moving forward on the straightening roller train, groove 9 will finally take an helical shape 9 on the peripheral surface of the tooth 3. The pitch of the helix 9 (Fig. 2A) is under 4 mm, and preferably under 2 mm.

So far, the straight member, which has a surface provided with a helical groove, is maintained in its cylindrical form. This member is then taken to a sharpener, which is a centerless grinder that sharpens the tip in one or more cuts.

The grooves 10 of the surface may also be achieved with this grinder, provided it is constructed with a suitable configuration; in this case the hatch made of grooves 10 consists of parallel circumferential grooves 10 that are parallel to each other with a spacing between 0,5 mm and 3 mm and preferably between 1 mm and 2 mm (Fig. 2B).

As seen in Figure 2C, both groove 9 and grooves 10, have a limited depth, of under 0,2 mm, and preferably under 0,1 to achieve its object, the removal of foreign particles attached to the hair to be cleaned, such as lice and/or nits, without damaging hair.

Each tooth, which has been provided with an helix 9 or with parallel circumferential grooves 10 on its peripheral surface, is then taken to a vibrating buffing machine which rounds up the conical leading end 11, as shown in Figures 2A and 2B. The length of the cone is between one and four times the diameter of the cylindrical member, and it is preferably three times the diameter of the cylindrical member. This cone ends in a hemisphere with a diameter of approximately 0,6 mm (Fig. 2D).

The teeth prepared in such a way are arranged onto the first plate 7, parallel to each other, with a spacing between any two adjacent teeth of between 50 μm and 100 μm, and preferably about 90 μm. The teeth are arranged so that a

certain useful length of about 30 mm to 50 mm, and preferably of at least about 35 mm, starting from the right side 12 of the handle 2 is left outside the handle, for the purpose of combing and cleaning, and they have a total length of between 40 and 80 mm, and preferably of about 55 mm, to give the comb 1 a great efficiency on any kind of hair to be cleaned with it.

When arranging the teeth 3 on top of the first plate 7 they are slightly offset from the nearest tooth 3, so that their leading ends altogether make up a curved edge 6 (Fig. 1A).

The fastening of the teeth 3 onto the first plate 7 will be carried out by individual soft soldering or laser welding of one tooth after the other, and there will be at least 6 mm from the straight end 12 of the handle to the nearest welding points.

Where teeth 3 are laser welded onto the first plate 7, the laser beam may be applied either from the outer side of the first plate 7 or from the side of the teeth 3.

When the laser is applied from the outer side of the first plate 7, it is firstly welded on two points of each tooth 3 spaced at a distance of about 6 mm from each other and more than 6 mm away from the straight edge of the first plate 7, matching the respective axes of the teeth 3, to keep them in place and to prevent them from being shifted, and thereafter a third point is welded on each tooth 3 halfway between the previous ones.

When the laser is applied from the side of the teeth 3, they are welded with two or three laser points halfway between the tooth 3 to be fixed and the adjacent tooth 3, at an equal distance from their longitudinal axes, always at a distance of over 6 mm from the edge of the first plate 7.

After welding the teeth 3 onto the first plate 7, the second plate 8 is placed on the first plate 7 and the rounded edges of both plates 7, 8, are soldered with

laser points 5 indistinctly, if the teeth have been soldered either from the outer side of the first plate 7 or from the side of the teeth.

Where teeth 3 are soft soldered, it is carried out first from the side of the teeth 3. The handle is then closed pressing the second plate 8 on top of the first plate 7. In this case, an interposed member, that is not shown, is placed between both plates 7, 8 before pressing, so that it absorbs and supports the application force during press closure.

It is understood that the above detailed description is given only by way of illustration and that modifications and variations can be made without departing from the spirit and scope of the invention.

The embodiments of the invention in which exclusive property or privilege is claimed are defined as follows:

1. A cleaning comb with teeth that are rugged on their peripheral surface, which comprises a handle and a plurality of teeth; wherein said comb is made of a sterilizable material having a strength at least equal to steel; said handle comprising a first plate and a second plate; each tooth comprising a fastening end, a leading end and a peripheral surface; the fastening end of the teeth being attached side by side to the inner surface of the first plate; the second plate being attached to the first plate and enclosing the fastening ends of all teeth; and the leading end of each tooth having a pointed and rounded tip characterized by said peripheral surface of each tooth being provided with a ruggedness; the distance between any two adjacent teeth being in the range of 50 μm to 100 μm; each tooth having a total length in the range of 40 to 80 mm and a useful length, outside of the handle, in the range of 20 to 60 mm.

2. The comb as claimed in claim 1, characterized in that the comb is made of steel.

3. The comb as claimed in any of claims 1 or 2, characterized in that each tooth has a cylindrical shape with a diameter of at least 1 mm.

4. The comb as claimed in any of claims 1 through 3, characterized in that the distance between two adjacent teeth is about 90 μm.

5. The comb as claimed in any of claims 1 through 4, characterized in that each tooth has a total length in the range of about 55 mm and a useful length, outside the handle, not less than 35 mm.

6. The comb as claimed in any of claims 1 through 5, characterized in that the plurality of teeth comprises between 10 and 100 teeth.

7. The comb as claimed in claim 6, characterized in that the plurality of teeth comprises 33 teeth.

8. The comb as claimed in any of claims 1 through 7, characterized in that the teeth are offset from each other, the leading ends altogether forming a curved edge.

9. The comb as claimed in any of claims 1 through 8, characterized in that the ruggedness on the peripheral surface of each tooth is a corresponding helical groove with a pitch of under 4 mm.

10. The comb as claimed in claim 9, characterized in that said helix has a pitch of under 2 mm.

11. The comb as claimed in any of claims 1 through 8, characterized in that the ruggedness on the peripheral surface of each tooth consists of parallel circumferential grooves with a spacing of 0.5 to 3 mm from each other.

12. The comb as claimed in claim 11, characterized in that said parallel circumferential grooves are spaced at a distance of 1 to 2 mm from each other.

13. The comb as claimed in any of claims 9 through 12, characterized in that the depth of said groove is under 0.2 mm deep.

14. The comb as claimed in claim 13, characterized in that the depth of said grooves is under 0.1 mm deep.

15. The comb as claimed in any of claims 1 through 14, characterized in that the comb further comprises a plastic interposed member

disposed between the first plate and the second plate, which is capable of supporting the press fitting on press closing the handle.

16. A method of manufacturing a high mechanical strength cleaning comb which is made of a sterilizable material having a strength at least equal to steel; said method comprising the steps of

providing a plurality of teeth, which have a total length of 40 to 80 mm and each having a forward end and a leading end with a distal tip;

creating a ruggedness on the peripheral surface of each tooth;

sharpening the distal tip of the leading end of each tooth and rounding it;

placing the proximal ends of the teeth side by side at a distance of 50 μm to 100 μm from each other on the inner side of the first handle plate, so that the teeth have a useful length, outside the handle, of 30 mm to 50 mm, arranging the teeth slightly offset, with their leading ends forming a curved edge;

firmly attaching the teeth one by one onto said first plate, thus giving the comb a high mechanical strength ; and

sealing the handle with the second plate.

17. The method as claimed in claim 18, characterized in that the step of creating a ruggedness includes the steps of

placing a cutting tool on a tool-holder, with a spring to provide the cutting tool a constant pressure, on a straightening roller train of a wire straightener-cutter;

placing one tooth of the plurality of teeth in the straightener;

turning said straightening roller train together with said cutting tool about the tooth, cutting a chip in the shape of a groove and, at the same time:

advancing the tooth through the straightening roller train, so that the groove finally takes a helical shape on the peripheral surface of the tooth; and

repeating the above steps, from the placing step onwards, for each of the plurality of teeth.

18. The method as claimed in claim 19, characterized in that the pitch of the helix is under 2 mm.

19. The method as claimed in claim 16, characterized by the step of creating a ruggedness including the steps of

placing the tooth inside a grinder;

cutting circumferential parallel grooves on the peripheral surface of the tooth.

20. The method as clamed in claim 19, characterized by the distance between grooves being between 0.5 and 3 mm.

21. The method as claimed in any of claims 17 through 20, characterized in that the grooves are under 0.2 mm deep.

22. The method as claimed in claim 21, characterized in that grooves are under 0.1 mm deep.

23. The method as claimed in any of claims 16 through 22, characterized in that the step of firmly attaching the teeth is carried out by laser welding and the step of sealing the handle includes the step of laser welding said second plate onto said first plate.

24. The method as claimed in claim 23, characterized in that said laser welding is carried out by applying the laser beam from the outer side of

the first plate, and by including the steps of fixing each tooth with one or two laser welding points in the site of the tooth to be fixed; and firmly attaching each tooth with at least one further laser welding point in a sufficient distance from the one, or between the two, first laser welding points.

25. The method as claimed in claim 23, characterized in that said laser welding is carried out by applying the laser beam from the side of the teeth using one or more laser welding points in positions between said tooth to be fixed and the adjacent tooth.

26. The method as claimed in any of claims 16 through 22, characterized in that the step of attaching the teeth is carried out by soft soldering applied from the side of the teeth; and the step of sealing the handle includes the steps of interposing a plastic member between the first and the second plate, and pressing the second plate onto the first plate, wherein said interposed plastic member must support the application force during press closure.

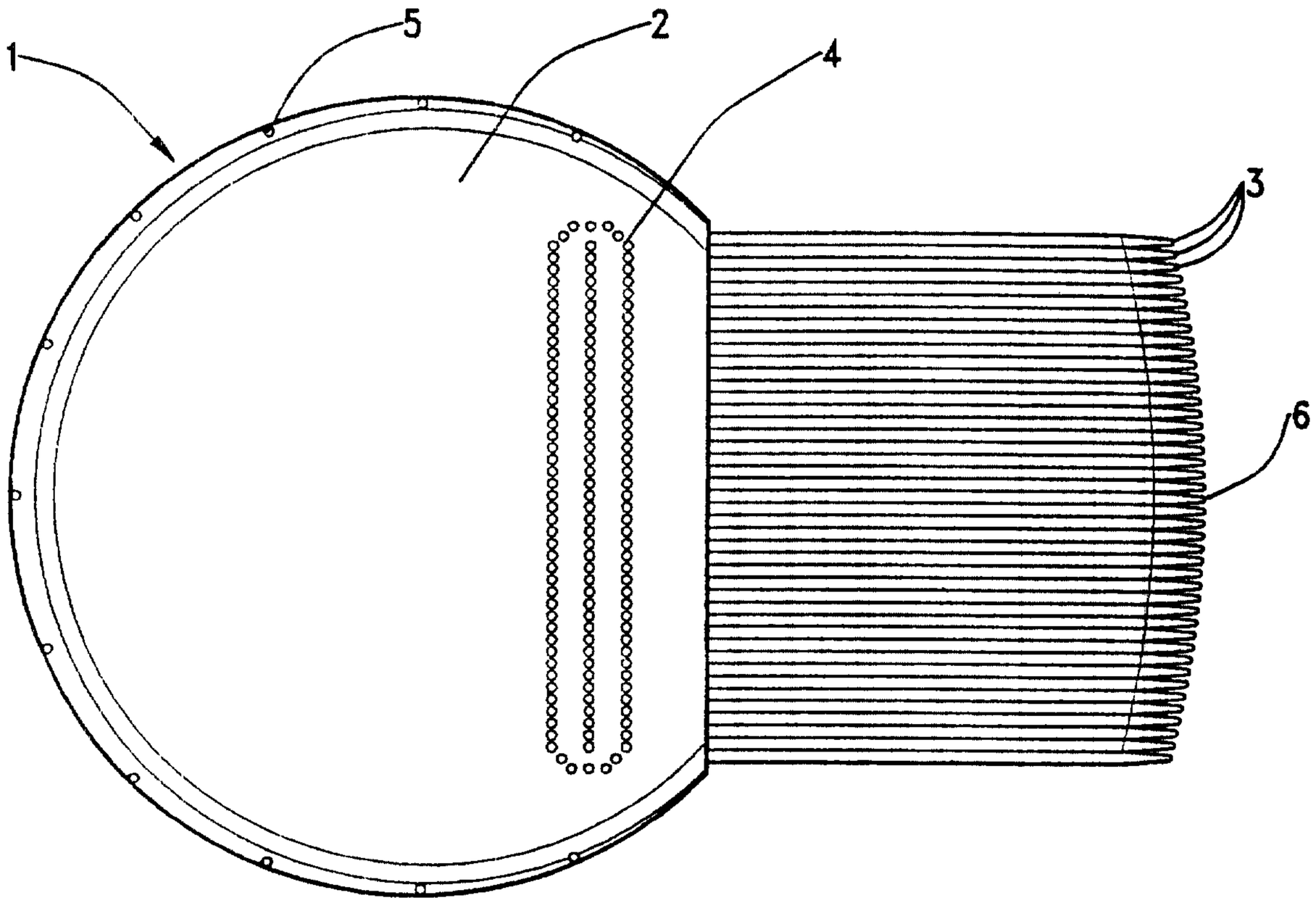


FIG. 1A

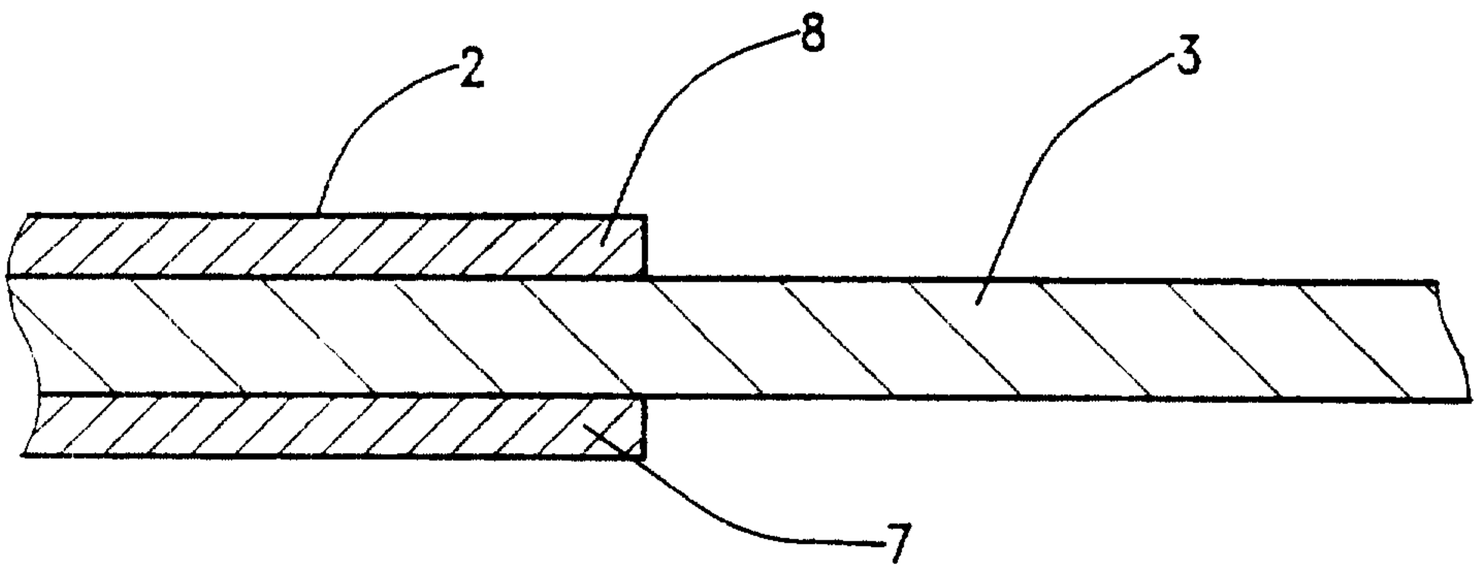


FIG. 1B

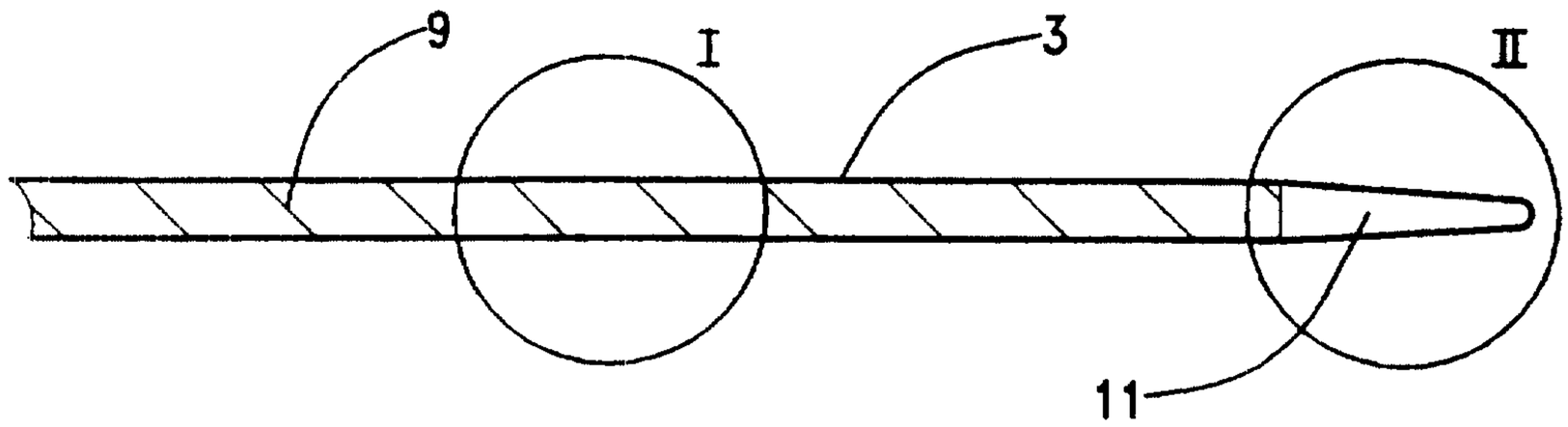


FIG. 2A

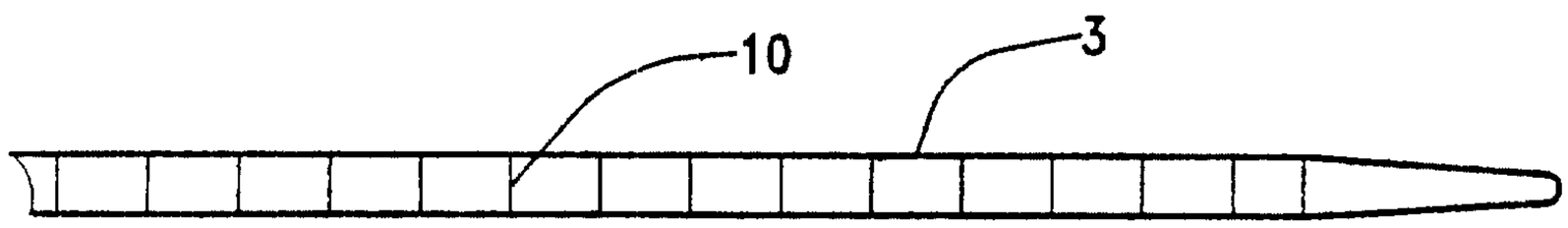


FIG. 2B

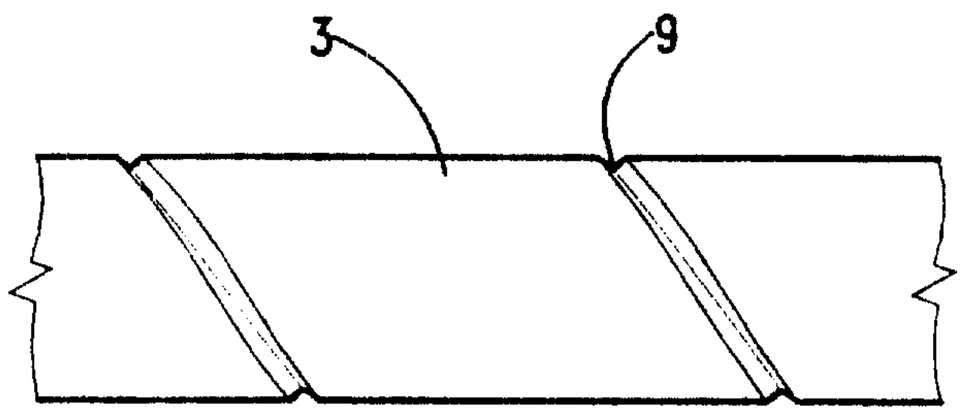


FIG. 2C

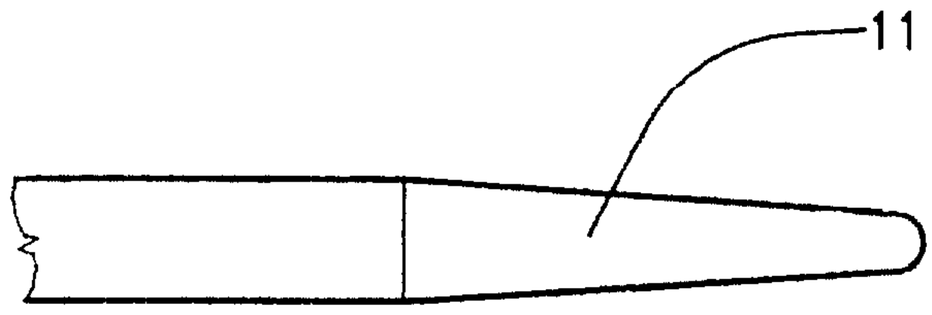
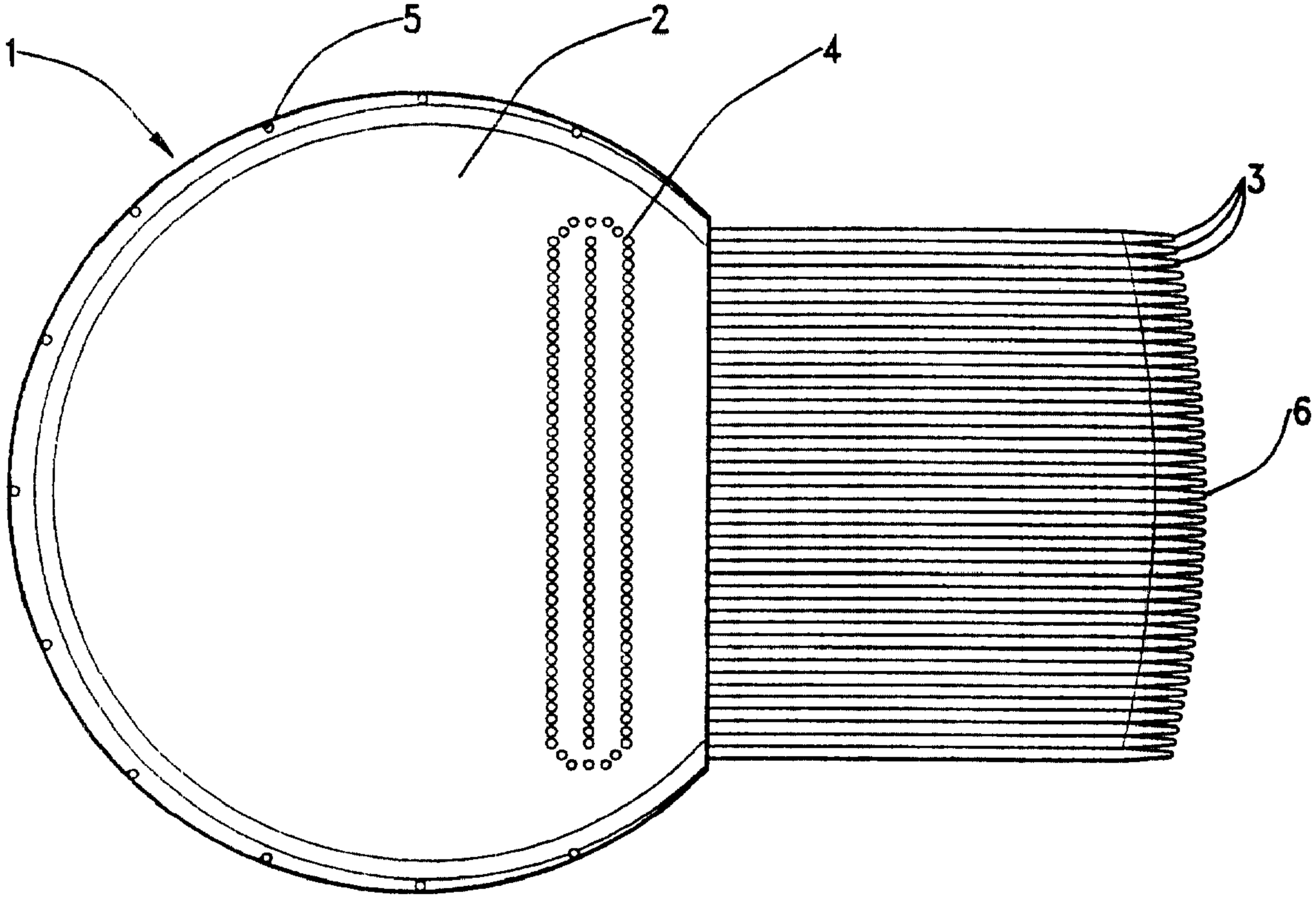


FIG. 2D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