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- (73) Patenthaver: **Beausoleil, Société par Actions Simplifiée à Associé Unique , 55 Avenue Victor Hugo, 75116 Paris, Frankrig**
Carriou, Xavier, La Brosse, 49770 Le Plessis Macé, Frankrig
- (72) Opfinder: **CARRIOU, Xavier, 23 route d'Angers, La Brosse, 49770 le Plessis Macé, Frankrig**
BEAUSOLEIL, Frédéric, 5 rue Froissart, 75003 Paris, Frankrig
- (74) Fuldmægtig i Danmark: **Larsen & Birkeholm A/S Skandinavisk Patentbureau, Banegårdspladsen 1, 1570 København V, Danmark**
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EYEGLASSES END-TIP INTENDED TO CONTAIN A PART OF A HEARING AID**TECHNICAL DOMAIN OF THE INVENTION**

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The present invention concerns an eyeglasses end-tip intended to contain a part of a hearing aid. Clearly, the invention also concerns eyeglasses fitted with the above end-tip.

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TECHNOLOGICAL BACKGROUND OF THE INVENTION

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The eyeglasses and acoustic aids (also called hearing aids) both mitigate a deficiency of the locomotor system. Consequently they constitute two different orthotics which, however, more frequently with advancing age, are necessarily located in the same place for all users whose sight requires correction and whose hearing needs to be improved.

20

Both these two orthoses are in fact too bulky for the auricle alone where, in general, these two objects are placed.

There are special types of hearing aid designed to fit with the temples of eyeglasses by cutting the latter to the desired size, but that distorts the eyeglasses and requires the hearing aid to have a special bend.

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There are special auditory temples, but that obliges the eyeglasses to be modified to take such arms.

There are also audio systems that are hooked to the temples of eyeglasses, but such systems are not stable.

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Finally, there are temples hollowed out to house either the hearing aid battery or cell only, or a part (the transmitter) of the hearing aid hereinafter known as the RIC (receiver in the canal) in which therefore only the earpiece or loudspeaker is situated in the ear canal.

All hearing aids comprise in fact a cell or electrical

power source battery, a microphone, an amplifier, a signal converter and an earpiece or loudspeaker.

Henceforth, eyeglasses combined with an auditory orthosis are more often designed so that their temples which support their
5 optical or solar frame are each fitted, at their free end, with a comfortable end-tip in contact with one ear of the user.

This is true whether the shape of the ends of the supporting temples of the eyeglasses is curved or straight.

Such end-tips are always removable and most often they are
10 made of a plastic material whilst they are designed to rest directly on the temporal bone, under the hair.

The invention applies more particularly to any eyeglasses end-tip intended to be attached at its front end to the free end of one temple of the said eyeglasses and to contain a part of a
15 hearing aid in the immediate proximity of its rear end situated in the region of the ear of the user wearing the said eyeglasses, the said end-tip comprising a cavity, suitable to take and fixedly hold the aforementioned part of the hearing aid, and a duct being drilled in one part of its length extending from the cavity to
20 the front end of the end-tip and emerging externally to the latter from its lower face, the said duct being intended to take the cable connecting the electrical power source housed alone or with the transmitter in the cavity to the other part of the hearing aid placed in the auditory canal of the user wearing the
25 eyeglasses.

These end-tips are for example described in documents DE 30 27 080, DE 88 08 620.8, GB 1.089.238 or again US 2005/0074137.

One of the major problems common to all these types of hearing aid is due to the difficulty in adjusting the cable
30 connecting the part of the hearing aid (that is to say at least its battery) housed and held fixedly to the rear of the end-tip and the part of the hearing aid (that is to say at least its earpiece) situated in the auditory canal of the ear of the user.

In fact, in any hearing aid, the electric cable is of a fixed

length, imposed by the manufacturer, and this cable must not be cut which would render the hearing aid unusable.

Also, to suit all types of auricle, manufacturers of hearing aids offer in general their hearing aids with five possible
5 lengths of cable.

Despite this multiplicity of lengths, it is frequent, if not usual, that the length of the cable supplied with a hearing aid does not satisfy the user, the latter wishing, in fact, the adjustment to be perfect, that is to say that the cable is neither
10 too short or too long.

If this cable is too short, it pulls on the earpiece which then no longer fits in the ear of the user as perfectly as it should; if the cable is too long, it hangs alongside the ear, which is completely non-aesthetic and, furthermore, embarrassing
15 for the user who, very often, prefers to hide from his interlocutors the fact that he is hard of hearing and therefore desires in every way possible that the cable of his hearing aid pass above the auricle of his ear then descend from the latter directly above the tragus, without being subject to any tension.

20 The present invention proposes a remedy for the problems outlined above.

GENERAL DESCRIPTION OF THE INVENTION

25 The present invention is described in the claims and firstly is an eyeglasses end-tip intended to be attached at its front end to the free end of one temple of the said eyeglasses and to contain a part of a hearing aid in immediate proximity to its rear end situated in the vicinity of the ear of a user wearing
30 the said eyeglasses, the said end-tip comprising a cavity, suitable to take and fixedly hold the aforementioned part of the hearing aid, and a duct being drilled through a part of its length extending from the cavity to the front end towards the front end of one temple and emerging externally to the latter from its lower

face, the said duct being able to take the cable connecting the electrical power source housed alone or with the transmitter in the cavity to the other part of the hearing aid placed in the auditory canal of the user wearing the eyeglasses, characterised
5 in that the duct extends in the form of a channel hollowed out in the lower face of the end-tip, the width of the external opening of said channel being less than the cable diameter in at least two slots so as to provide at least two cable pinch positions between the two converging edges of said opening.

10 According to a first variant of the invention, the width of the opening on the outside of the channel is essentially constant, less than the diameter of the cable over the whole part of said channel able to take the said cable, so as to provide a multiplicity of pinch positions of the cable between the two
15 converging edges of said opening.

According to a second variant of the invention, the channel emerges externally to the end-tip in a direction slightly inclined relative to that of the lower face of the end-tip so that the width of the external opening of the channel increases
20 progressively, from the rear towards the front of the end-tip, but remains less than the diameter of the cable in places so as to offer nevertheless different pinch positions of the cable between its converging edges.

In this second case, in the area where it emerges in the
25 lower face of the end-tip, the general direction of the duct is inclined at an angle of less than 20° , and preferably close to 10° , relative to the plane of the said lower face of the end-tip.

Beneficially, the duct and the channel that extends it may essentially be situated in the longitudinal plane of symmetry of
30 the end-tip.

Still beneficially, the external opening of the channel extends above the ear of the user wearing said eyeglasses.

According to a preferred method of construction, the opening of the channel extends for a length of between 1 and 2 cm.

According to another preferred method of construction, one of the pinch positions of the cable between the edges of the opening of the channel is situated vertically above the tragus of the user wearing the eyeglasses.

5 Very beneficially, the width of the external opening of the channel is between 50% and 95% of the diameter of the cable.

The second subject of the present invention is also an eyeglasses end-tip fitted with a part of a hearing aid housed in its cavity.

10 Finally, there is a third subject for eyeglasses in which one of their two temples is equipped with an end-tip possessing at least one of the aforementioned characteristics.

BRIEF DESCRIPTION OF THE DRAWINGS

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Detailed specifications of the invention are given in the description which follows in association with the attached drawings. It is to be noted that the only purpose of these drawings is to illustrate the text in the description and they
20 in no way constitute any limitation of the scope of the invention.

In these drawings:

- figure 1 shows a side and front view of an end-tip according to the invention.
- figure 2 is a side view of a variant of the end-tip in which
25 the cavity is only provided with an electrical power source battery.
- figure 3 shows schematically a cross section of the end-tip of figure 2 enabling it to be set to the correct length as a function of the user profile,
- 30 - figure 4 is a side view of the end-tip in figure 2 without its battery,
- figures 5, 6 and 7 are views of the end-tip according to the invention illustrating various pinch positions of the cable and various lengths of said end-tip,

- figures 8 and 9 show a side view in longitudinal cross section and a rear view of a variant of the end-tip including a cavity to take a battery,
- figures 10 and 11 show a side view in longitudinal cross section and a rear view of another variant of the end-tip including a cavity to take a battery and the whole transmitter part of the hearing aid.

DESCRIPTION OF THE PREFERRED METHODS OF IMPLEMENTATION OF THE INVENTION

The invention describes an eyeglasses end-tip intended to contain a part of a hearing aid, this part may be either the cell or battery for the electrical power source, which in any case is housed in the cavity provided at the rear end of said end-tip, or the power source completed by the microphone, the amplifier and signal converter which form the transmitter part of the hearing aid.

On the other hand, the earpiece or loudspeaker is always external to the end-tip since it is intended to be placed in the auditory canal of the user of the hearing aid. This receiver part is completed by the transmitter part when only the cell or battery is housed in the end-tip.

In all the examples of implementation of the end-tip according to the invention shown in the various attached diagrams, it was decided that the said end-tip should contain an elongated blind hole 1 that extends over nearly the entire length of the end-tip, from its front end 2 in the direction of its rear end 3, this blind hole 1 being able to take the free end of a temple of the eyeglasses. It goes without saying that the end-tip according to the invention is also able to work well with the end of the temple according to a converse provision of the preceding one, the male part being placed at the front end 2 of the end-tip and the female part being drilled at the end of the free end of each

of the two temples of the frame of the eyeglasses.

Figures 1 to 4 show a first variant of implementation of the end-tip according to the invention in which the part of the hearing aid housed in it is reduced to a cell 4, the cavity 5 which takes fixedly this cell then obviously also being of a reduced volume. Such an end-tip 6 is drilled over at least a part of its length, here over its whole length, with a duct 7 which extends from the cavity 5 towards the front end 2 of said end-tip and emerges externally from the latter, at its lower face 8, being essentially tangential to that face 8 in order to form a channel 9 whose profile is the same as that shown in figures 10 and 11, at the bottom of their cross section CC. The duct 7 which extends in the form of the open channel 9 is intended to take the electric cable 10 shown in figures 5 to 7 with very little play. It can therefore be seen that, if the width of the opening 11 of the channel 9 is less in some places than the diameter of the cable 10, potential pinch positions of said cable are created at the locations between the two converging edges 12 of said opening.

It is sufficient for this that the distance separating the two edges 12 facing each other are of the order of 50% to 95% of the diameter of the cable 10.

Furthermore, ideally, the distance between the two edges 12 of the opening 11 will be essentially constant over the whole length of the channel 9 so that it thereby offers a multiplicity of pinch positions for the cable 10.

Depending on the profile of the user, the optician adjusting the eyeglasses incorporating the hearing aid will cut the end-tip according to the invention to the desired length, marked with arrow 13 in figure 3, then he will pinch the electric cable at a position as close as possible to directly above the tragus of the user. Any excess cable will be placed and held in the cavity 5. Figures 5 to 7 illustrate the wide variety of methods available to the optician: the closer the pinch position of the cable 10 to the rear end 3 of the end-tip 6, the more important will be

the length of the cable he has available to place the receiver part of the hearing aid conveniently in the auditory canal of the user; the shorter the end-tip, the further forward will be the position directly above the tragus.

5 Figures 8 to 11 show a variant of construction in which the duct 14 intended to take the electric cable emerges externally to the end-tip 15 this time in a direction slightly inclined relative to that of the lower face 16 of said end-tip, shown by the angle Y. The upper part of the wall of the rounded duct 14
10 is essentially tangential to the lower face 16 so that a channel 17 is formed which extends the duct 14, the channel inside which the electric cable will be gripped as long as the distance separating the two edges 12 opposite to said channel are separated by a distance less than the diameter of the cable. It is
15 understood that the width of the opening 11 of the channel 17 increases progressively from the rear 3 toward the front 2 of the end-tip 15, as shown by the successive transverse cross sections DD, CC, BB and finally AA, but that, in the whole region where the duct 14 emerges at the lower face 16, and even beyond that,
20 the width of the channel thus formed is less than the diameter of the cable and offers various pinch positions for the latter between the converging edges 12.

The angle Y is less than 20° , and preferably close to 10° so that, precisely, the segment of the channel along which
25 pinching is permitted is as long as possible.

The construction shown in figures 8 to 11 is suitable for the temples of eyeglasses with curved ends and the construction shown in figures 1 to 4 is suitable for the temples of eyeglasses with straight ends but can without difficulty also be transposed
30 to curved temples.

The end-tip 15 shown in figures 8 and 9 is more particularly intended to house only a cell, its cavity 18 being narrow, while the end-tip shown in figures 10 and 11 is designed to take a cell and the transmitter part of the hearing aid, its cavity 19 being

significantly wider.

Each cavity 5, 18 or 19 can by construction be placed either lateral or centred in the plane of longitudinal symmetry of the end-tip. Ideally, the duct 7, 14 and the channel 9, 17 which
5 extends it will on the other hand be situated preferably in the plane of symmetry.

Of course, the invention is not limited only to the preferential methods of implementation described above.

On the contrary, it embraces all possible variants of
10 implementation, in so far as the latter are not restricted by the attached claims which define the scope of the present invention.

P A T E N T K R A V

1. Brilllemuffe (6, 15) beregnet til at fastgøres i sin forreste ende (2) på den frie ende af en af brillens stænger og til at indeholde en del af et høreapparat i umiddelbar nærhed af sin bagerste ende (3), som befinder sig i nærheden af øret af den bruger, der er udstyret med brillen, hvilken muffe omfatter en fordybning (5, 18, 19), som er egnet til at tage imod og fastholde ovennævnte del af høreapparatet, og som er gennemboret af en gang (7, 14) i en del af sin længde, hvilken gang strækker sig fra fordybningen i retningen af muffens forreste ende (2) og munder ud på ydersiden af denne i dens underside (8,16), hvilken gang (7, 14) er beregnet til at tage imod kablet (10), der forbinder den elektriske strømkilde (4), som er placeret alene eller sammen med senderen i fordybningen (5, 18, 19), med den anden del af høreapparatet, der sidder i øregangen af brugeren, som er udstyret med brillen, **kendetegnet ved, at** gangen (7, 14) forlænges i form af en rende (9, 17), der er boret i muffens underside (8,16), idet bredden af rendens åbning (11) mod ydersiden er mindre end diameteren af kablet (10) på mindst to steder, således at der er mindst to positioner, hvor kablet (10) er i klemme mellem åbningens (11) to konvergerende kanter (12).

2. Brilllemuffe (6) ifølge krav 1, **kendetegnet ved, at** bredden af rendens (9) åbning (11) mod ydersiden er tilnærmelsesvis konstant og mindre end diameteren af kablet (10) i hele den del af renden, der er egnet til at tage imod kablet, således at der er en flerhed af positioner, hvor kablet (10) er i klemme mellem åbningens (11) to konvergerende kanter (12).

3. Brillemuffe (15) ifølge krav 1, **kendetegnet ved, at** gangen (14) munder ud på ydersiden af muffen med en let hældende retning i forhold til retningen af muffens underside (16), således at bredden af rendens (17) åbning (11) mod ydersiden stiger gradvist fra muffens bagende (3) mod dens forende (2), medens den visse steder forbliver mindre end diameteren af kablet (10), således at der er forskellige positioner, hvor kablet er i klemme mellem dens konvergerende kanter.

4. Brillemuffe (15) ifølge krav 3, **kendetegnet ved, at** gangen (14) i det område, hvor den munder ud i muffens underside (16), har en generel retning, der hælder med en vinkel (γ) på under 20° , fortrinsvis i nærheden af 10° , i forhold til planet af muffens underside (16).

5. Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 4, **kendetegnet ved, at** gangen (7, 14) og renden (9, 17) i dens forlængelse er tilnærmelsesvis beliggende i muffens langsgående symmetriplan.

6. Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 5, **kendetegnet ved, at** rendens (9, 17) åbning (11) mod ydersiden strækker sig over det ydre øre af brugeren, der er udstyret med brillen.

7. Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 6, **kendetegnet ved, at** rendens (9, 17) åbning (11) strækker sig over en længde på mellem 1 og 2 cm.

8. Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 7, **kendetegnet ved, at** en af de positioner, hvor kablet (10) er i klemme mellem kanterne (12) af rendens (9, 17)

åbning (11), er beliggende lodret i forhold til tragus af brugeren, der er udstyret med brillen.

5 **9.** Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 8, **kendetegnet ved, at** bredden af rendens (9, 17) åbning (11) mod ydersiden ligger på mellem 50 % og 95 % af diameteren af kablet (10).

10 **10.** Brillemuffe (6, 15) ifølge et hvilket som helst af kravene 1 til 9, **kendetegnet ved, at** den er forsynet med en del af et høreapparat, der er placeret i dens fordybning (5, 18, 19).

15 **11.** Brille, **kendetegnet ved, at** en af dens to stænger er udstyret med en muffe (6, 15) ifølge et hvilket som helst af kravene 1 til 9.

Fig. 1

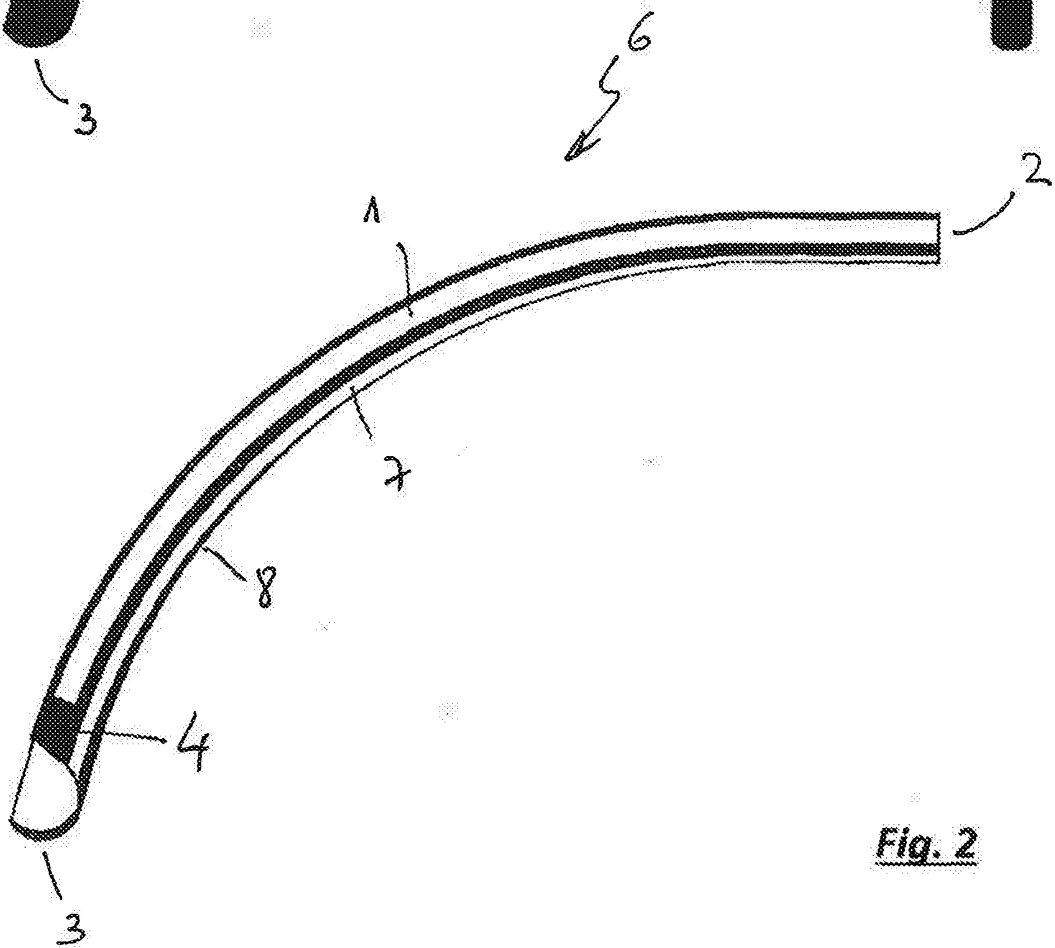
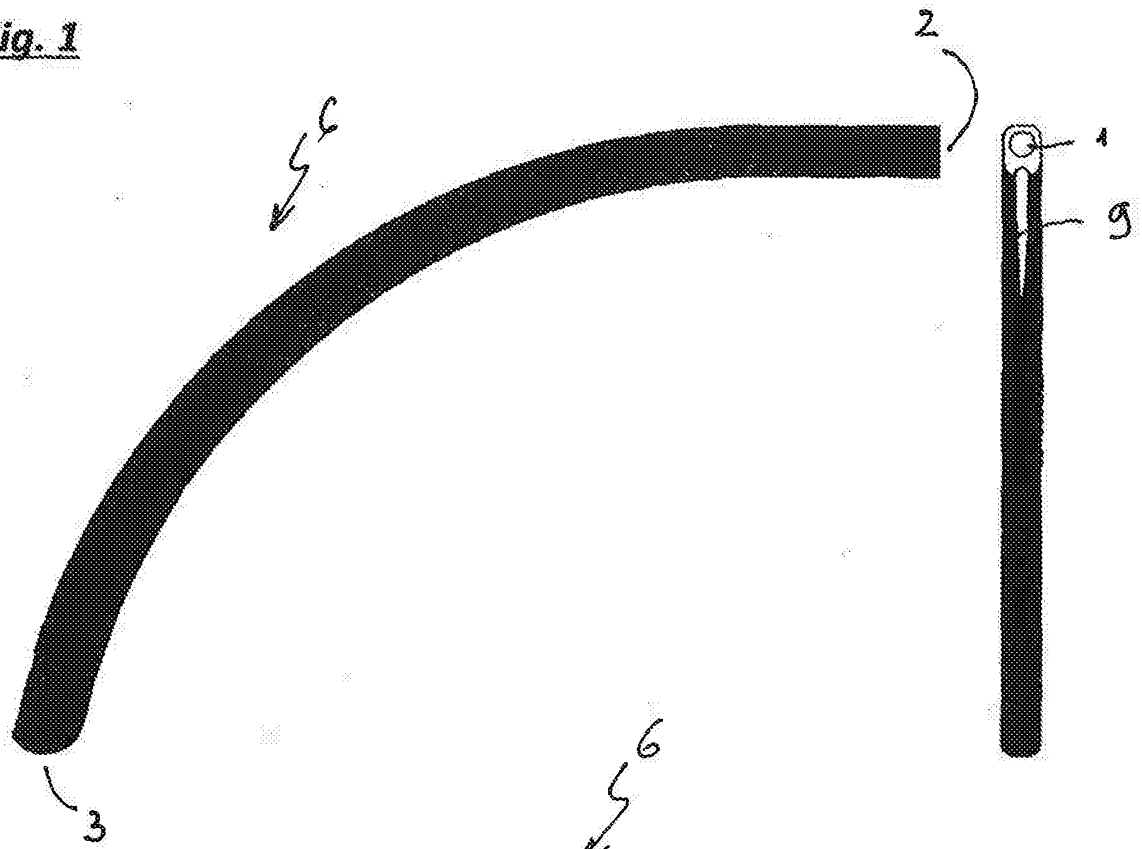


Fig. 2

Fig. 3

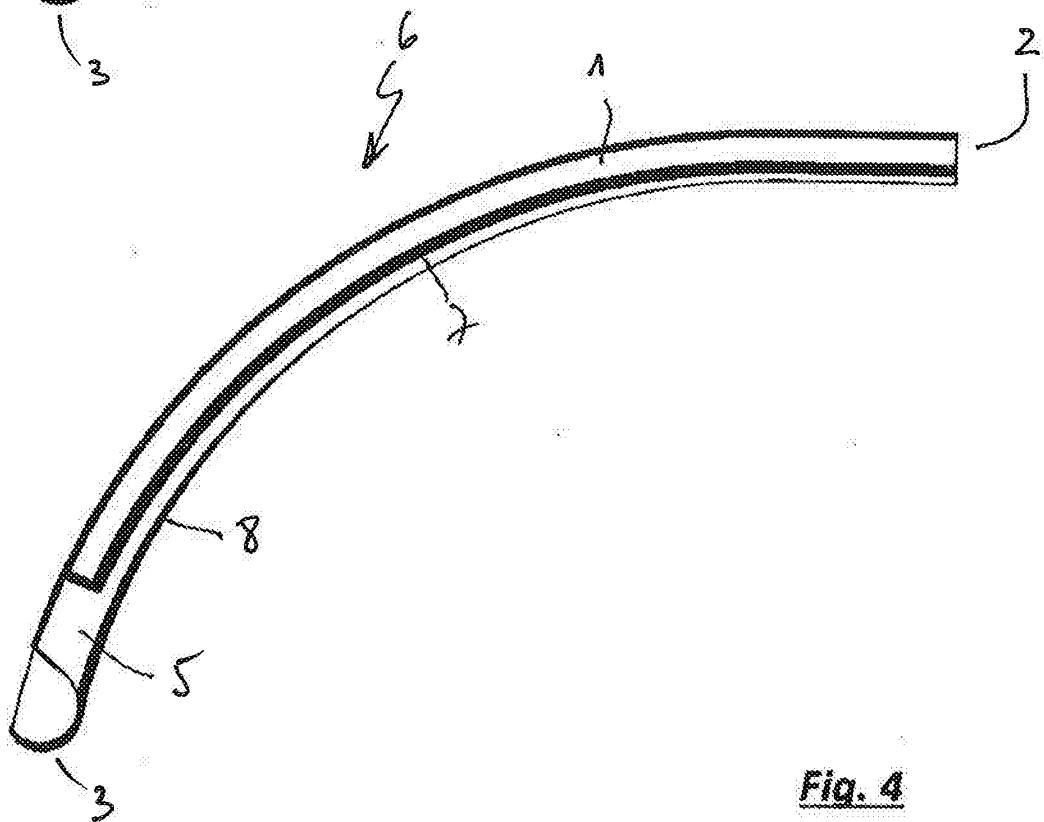
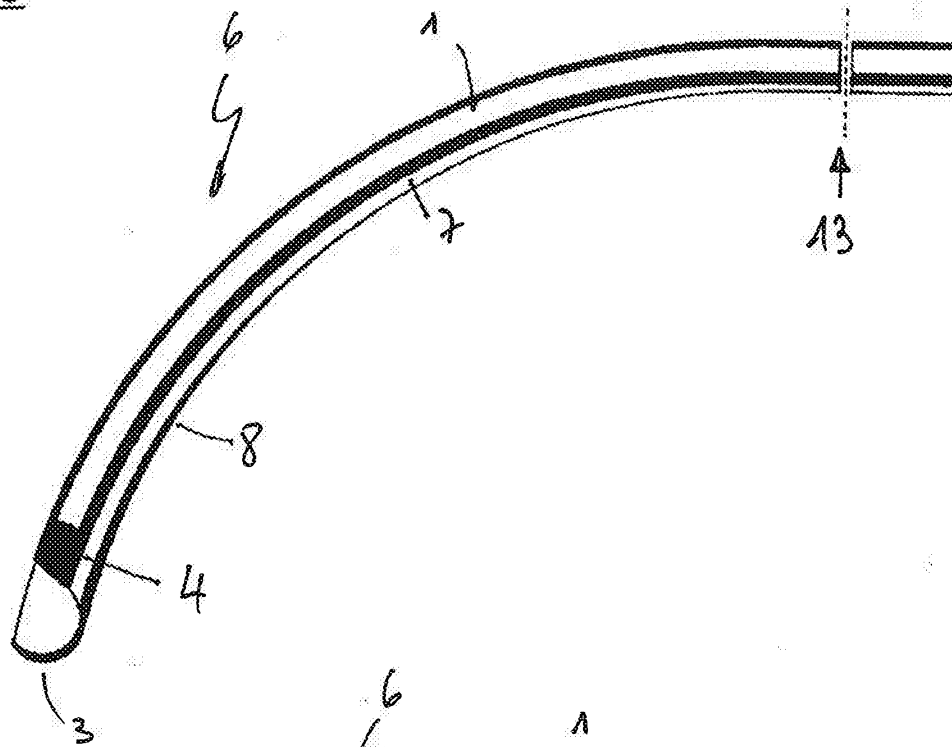


Fig. 4

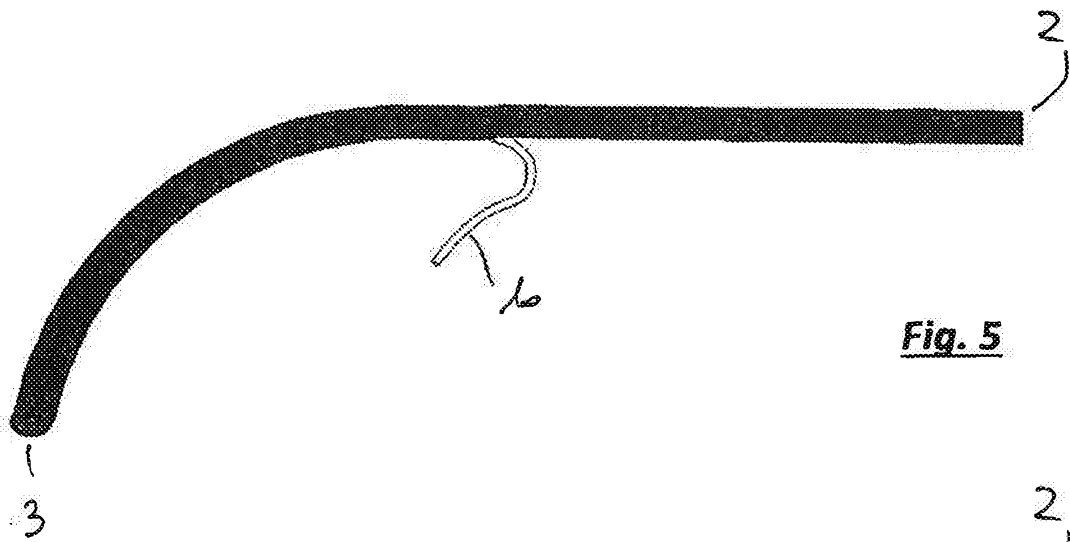


Fig. 5

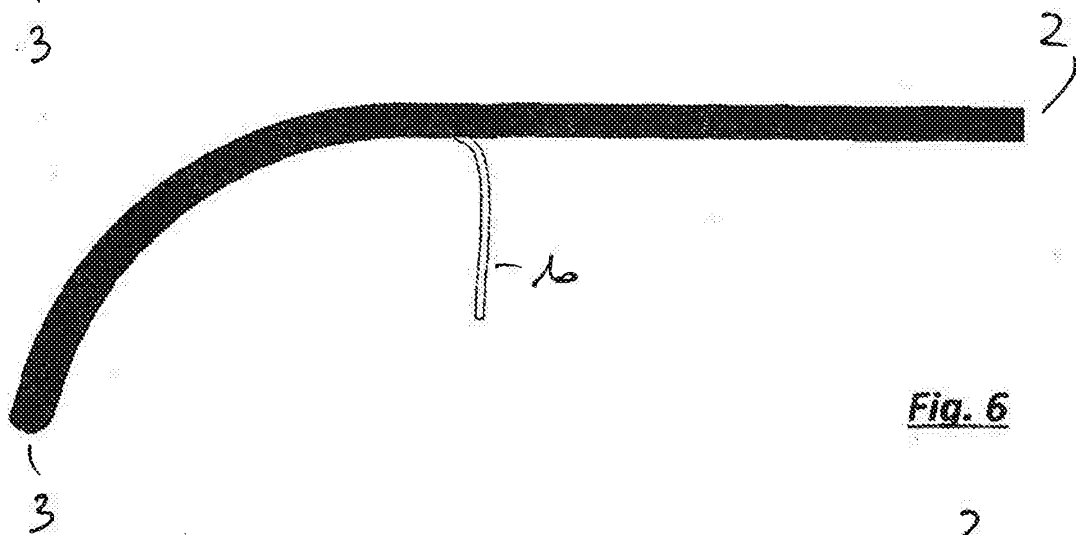


Fig. 6

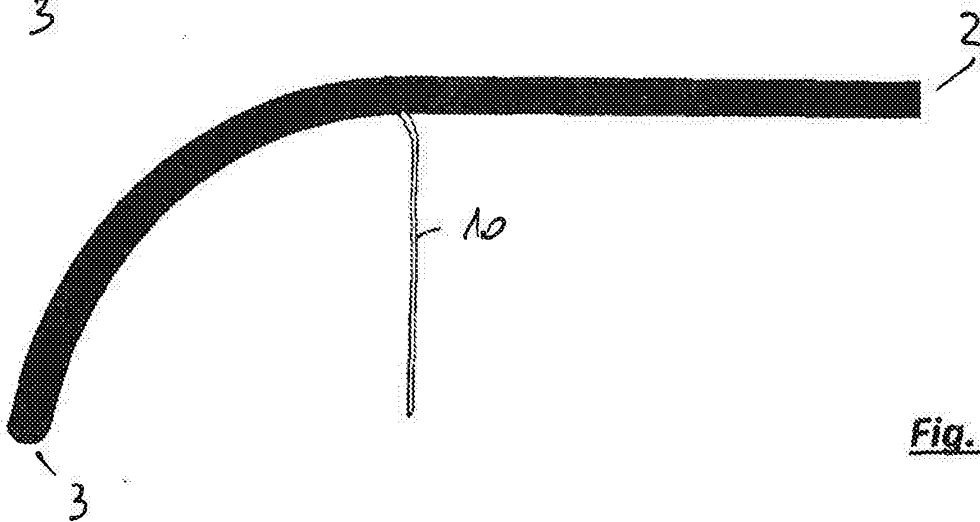


Fig. 7

Cross section AA Cross section BB Cross section CC Cross section DD

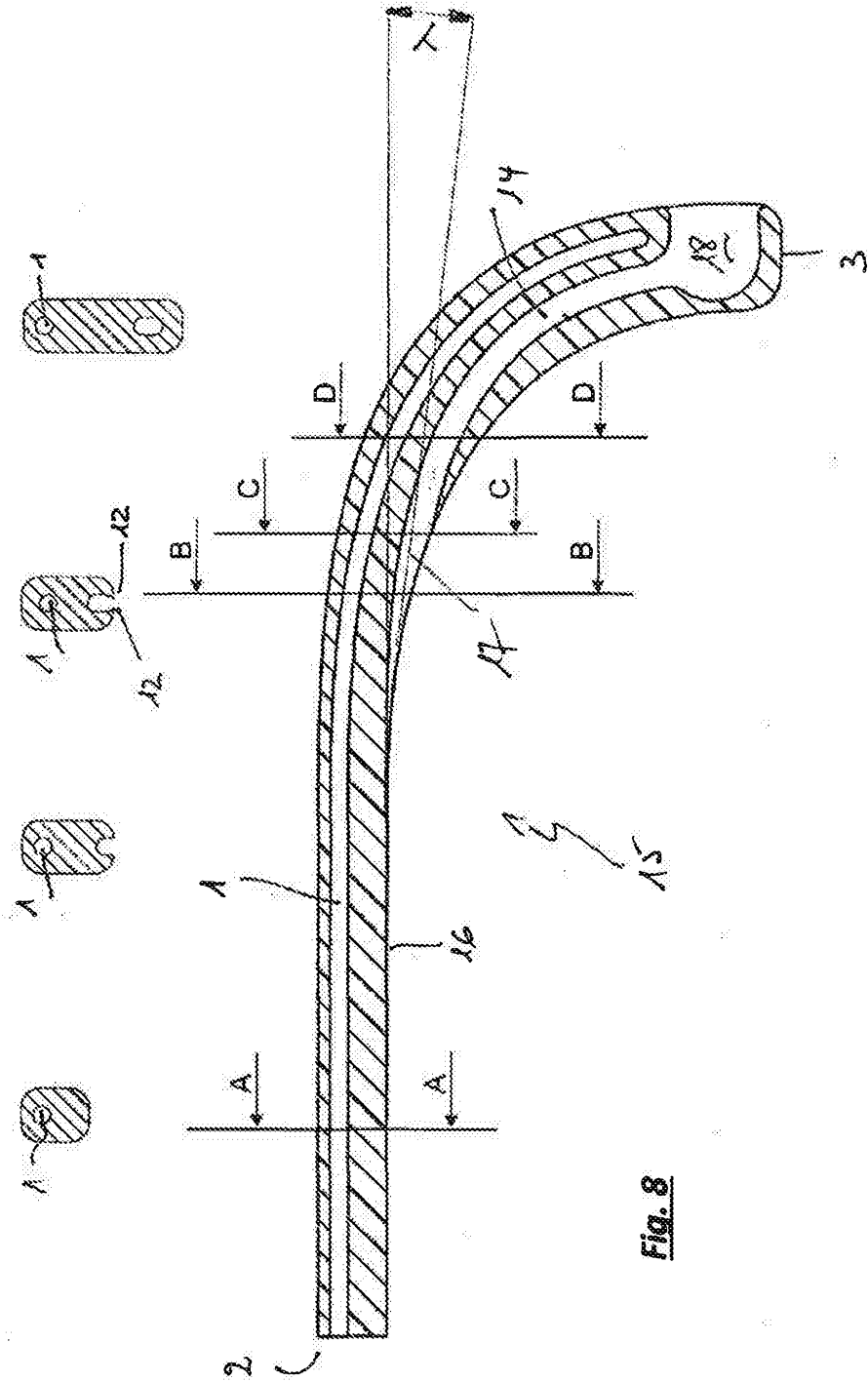
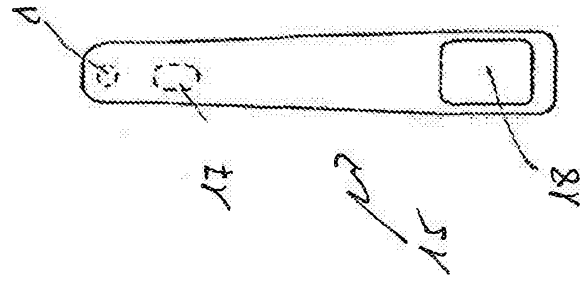


Fig. 8

Fig. 9



Cross section AA Cross section BB Cross section CC Cross section DD

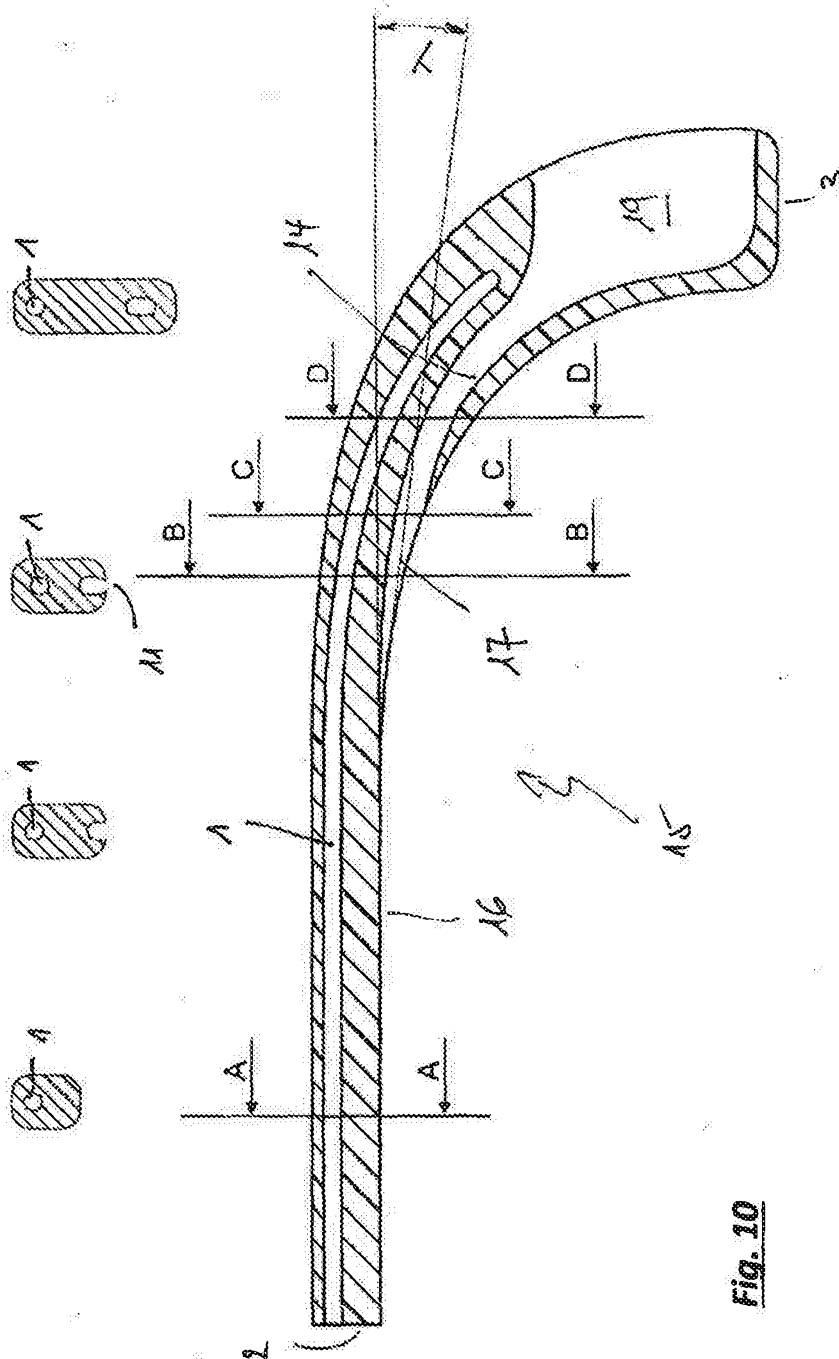


Fig. 10

Fig. 11

