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(54) **Theft deterrent device and set of parts including such a device**

(57) A theft deterrent device (1) to be attached to an article to be protected has a housing (6) including a first housing part (10) on a connecting side of the housing (6), a second housing part (11) on the opposite side of the housing (6), and a passage (14) on the connecting side for inserting the pin (3) into the housing (6). The housing parts (10,11) enclose a theft deterrent member (13). A retainer (5) has a support surface (15) mounted

against a support surface (16) of the second housing part (11) facing away from the first housing part (10). Pulling forces exerted onto the pin (3) retained in the retainer (5) result in the retainer (5) being pressed against the second housing part (11), causing the housing parts (10,11) to be pressed together, without relying on the transfer of forces via a connection between the housing parts (10,11).

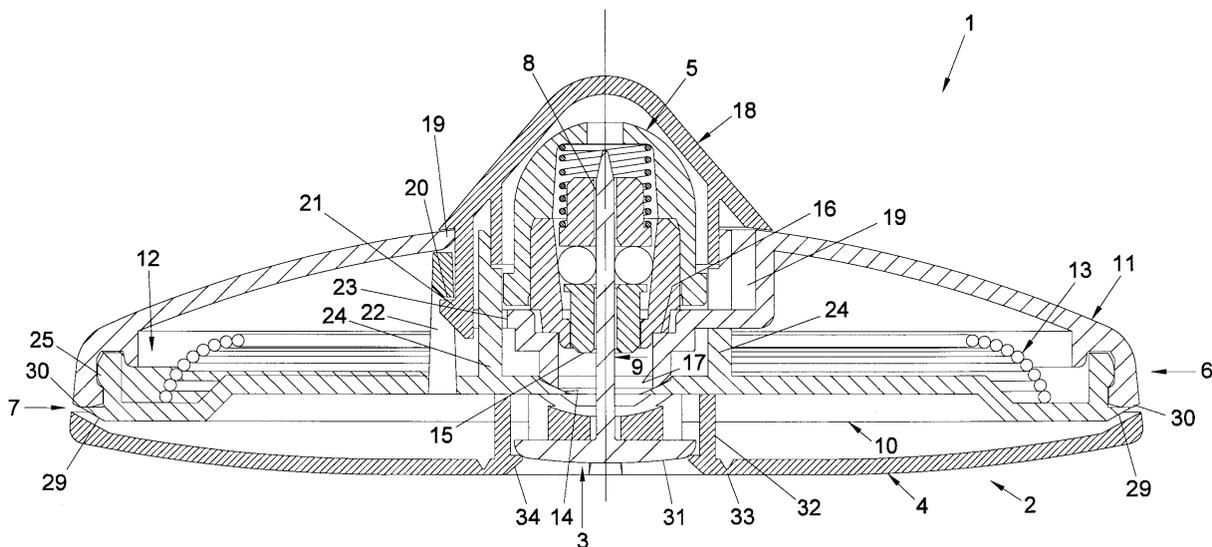


Fig. 1

## Description

### TECHNICAL FIELD AND BACKGROUND ART

**[0001]** The invention relates to a theft deterrent device according to the introductory portion of claim 1 and to a theft deterrent set of parts including such a theft deterrent device.

**[0002]** An example of such a device, also known as an electronic article surveillance (EAS) device, is known from United States patent 4,903,383. In this device, the retainer is secured in a cylindrical cavity in a housing part at the side of that housing opposite the connecting side. The cylindrical cavity is open towards the connecting side and the retainer is secured therein by a closure member or disc mounted at the open end of the cavity.

**[0003]** The strength of the connection between the closure member or disc and the housing part at the side of the housing opposite the connecting side is critical for the maximum pull-out force exerted onto the shank of the pin which the device can resist without mechanical failure.

**[0004]** After mechanical failure of the connection between the disk and the housing part in which it is accommodated, the device is prone to complete failure, because pull out forces exerted onto the shank of the pin are then directly transmitted to the relatively thin housing part at the connecting side of the housing. This allows pulling forces exerted onto the shank to pull the housing parts apart or to flex and/or break the housing part at the connecting side of the housing. This, in turn, allows the theft deterrent member, such as an electrical circuit to be removed from the housing, thereby effectively making the device inoperative. Therefore, the connection between the closure member or disc and the housing part at the side of the housing opposite the connecting side needs to be very strong. This also applies to the connection between the housing parts, which are typically welded together ultrasonically along their periphery to retain the electrical circuit between these two parts.

**[0005]** Other theft deterrent devices are known in which the retainer engages the housing part at the connecting side. In such theft deterrent devices, the strength of the connection between the housing parts and the strength of the housing parts needs to fulfil high requirements as well, because pulling loads exerted via the shank of a pin retained in the retainer are at least to a large extent transmitted via the connection between the housing parts.

### SUMMARY OF THE INVENTION

**[0006]** It is an object of the invention, to provide a theft deterrent device having at least the same resistance against tampering, while housing parts and connections can be of a lighter construction meeting lower requirements regarding resistance against loads exerted ther-

eon.

**[0007]** According to the present invention, this object is achieved by providing a theft deterrent device according to claim 1. The invention can also be embodied in a set of parts according to claim 10 which includes a theft deterrent device and a pin with a shank to be retained by the retainer.

**[0008]** Since the support surface of the retainer is mounted against a support surface of the second housing part facing away from the first housing part on the connecting side of the housing, any pulling forces exerted onto a shank retained in the retainer results in the retainer being pressed against the second housing part on the side of that second housing part opposite the connecting side. Thus, the housing parts are effectively pressed together if pulling forces are exerted onto a shank retained by the retainer without relying on the transfer of pulling forces or shear forces via a connection between housing parts or between a housing part and a closure member for keeping the retainer in position. Removal of the theft deterrent member within the housing is thereby made very difficult while connections of the housing need not meet particularly high demands.

**[0009]** Further objects, features, effects, advantages and details of the present invention are set forth and illustrated below with reference to a presently most preferred embodiment of the invention and with reference to the accompanying drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

#### **[0010]**

Fig. 1 is a view in angulated cross section of a set of parts according to the invention;

Fig. 2 is an exploded side view in cross section of the device according to Fig. 1; and

Fig. 3 is an exploded isometric view of the device according to Figs. 1 and 2.

### MODES FOR CARRYING OUT THE INVENTION

**[0011]** The theft deterrent assembly as shown in the drawings includes a theft deterrent device 1 and an attachment device 2 including a pin 3 and a disk 4. The pin 3 has a shank 9 adapted for co-operation with a retainer 5 of the theft deterrent device 1.

**[0012]** The theft deterrent device 1 further includes a housing 6 to be attached to an article to be protected in a space 7 between the housing 6 and the disk 4 of the attachment device 2. In attached condition, a connecting side of the housing 6 faces the article to be protected. The retainer 5 is adapted for retaining an end portion 8 of a shank 9 of the connecting pin 3 to be passed through the article to be protected.

**[0013]** The housing 6 includes a first housing part 10 and a second housing part 11. The first housing part 10 is located on the connecting side of the housing 6 and

the housing parts 10, 11 enclose a space 12 between these housing parts 10, 11 accommodating a theft deterrent member 13, in this example equipped with a ring-shaped antenna. On the connecting side of the housing 6, a passage 14 for inserting the end portion 8 of the shank 9 of the pin 3 into the housing 6 is provided. The retainer 5 has a support surface 15 in contact with a support surface 16 of the housing 6.

**[0014]** In operation, the theft deterrent device 1 and the attachment device 2 are initially separate from each other. In order to protect an article, the shank 9 of the pin 3 of the attachment member 2 is passed through the article to be protected - for instance through a textile part or through an eyelet or other opening of such an article - and inserted into the housing 6 via the opening 14 until it projects into the retainer 5, in which it is engaged by retainer members. The construction of retainers such as the retainer 5 is well known as such.

**[0015]** If the article is brought out of the protected area with the theft deterrent device 1 attached thereto, an alarm is activated in response to the antenna 13 passing through a detection port, for instance at the entrance of a shop. If an article is to be brought out of the protected area, for instance because it has been sold to a customer, the theft deterrent device 1 is removed by operating the retainer 5 using a special magnetic device which causes the retainer 5 to release the shank 9 of the pin 3. Such an electromagnetic device and retainers 5 suitable for co-operation therewith are known as such.

**[0016]** Efforts to take an article out of the protected area without being authorised to do so typically include attempts to remove a theft deterrent device from the article or to at least remove the antenna of the theft deterrent device from the article. In the course of such attempts, typically the housing 6 and the disc 4 are pried apart with or without the use of a tool or it is attempted to open the housing 6 to gain access to the antenna 13.

**[0017]** However, since the support surface 16 against which the support surface 15 of the retainer 6 is mounted is part of the second housing part 11 and faces away from the first housing part 10, an unauthorised attempt to pry or pull the housing 6 and the disc 4 apart, merely results in the retainer 5 being pressed against the housing part 11 on the side facing away from the attachment member 2, thereby causing the parts 10, 11 of the housing 6 to be pushed against each other. The construction of the proposed device does not rely on a connection between the retainer 5 and the second housing part 11 to keep the retainer in place, but the retainer 5 is simply supported by the second housing part 11. Thus, an improved resistance of the theft deterrent device 1 against unauthorised removal is achieved by mounting the retainer 5 for retaining the shank 9 of the pin 3 to the outside of the housing 6 on the side facing away from the attachment member 2. Moreover, the retainer 5 reliably keeps the housing parts 10, 11 together, so that the combined flexural strength of housing parts 10, 11 has to be overcome to bend or break the housing 6. This in turn

means that the individual housing parts 10, 11 can be of a relatively light design without sacrificing resistance against tampering.

**[0018]** By arranging the retainer 5 on the side of the second housing part 11 facing away from the first housing part 10 and by providing that the second housing part 11 has a passage 17 for passing the end portion 8 of the shank 9 of the pin 3 through the second housing part 11 and into the retainer 5, the retainer 5 contacts the second housing part 11 with a portion 15 closest to the connecting side of the housing 6. This in turn avoids the need of high ribs of the housing parts 10, 11 extending parallel to the shank 9 of the pin 3. Such ribs would be prone to buckling and would therefore have to be of important dimensions to resist buckling. Furthermore, such high ribs, which would typically project in opening direction of a mould for forming the housing parts, would increase injection moulding cycle times and thereby manufacturing costs.

**[0019]** The housing 6 includes a third housing part 18. The retainer 5 is enclosed between the second housing part 11 and the third housing part 18. This third housing part 18 shields the retainer 5, which is located outside the space 12 between the main housing parts 10, 11 against tampering.

**[0020]** The third housing part 18 is connected to the first housing part 10 and the second housing part 11 is sandwiched between the first housing part 10 and the third housing part 18. Due to this constructional configuration, the third housing part 18 forms an additional reinforcement which effectively contributes to keeping the first housing part 10 and the second housing part 11 together and thereby increases the resistance of the housing 6 against unauthorised opening.

**[0021]** The first housing part 10 and the second housing part 11 are held together by the third housing part in a particularly effective manner, because the area 20 where the third housing part 18 is connected to the first housing part 10 and the area 19 where the third housing part 18 contacts the second housing part 11 are located peripherally spaced from the retainer 5. Thus, the first housing part 10 and the second housing part 11 are also held together in an area more peripheral than the position of the retainer 5. The second housing part 11 is sandwiched particularly effectively between the third housing part 18 and the first housing part 10, because top ends of the support projections 24 of the first housing part 10 contact the second housing part 11 directly opposite the location where the third housing part 18 contacts the second housing part 11.

**[0022]** In order to connect to the first housing part 10, the third housing part 18 is provided with snap fingers 21 which engage snap members 22 of the first housing part 10 when in mounted condition. The snap fingers 21 of the third housing part 18 project through openings 23 in the second housing part 11. To urge the snap fingers 21 of the third housing part 18 into engagement with the snap members 22 of the first housing part 10, the first

housing part 10 is further provided with support projections 24 located in positions closely spaced from the snap members 22 of the first housing part 10. To provide a particularly positive connection between the first housing part 10 and the third housing part 18, the snap members 22 of the first housing part 10 are of an inverted U-shaped design. Since the snap fingers 21 of the third housing part 18 project through the openings 23 in the second housing part 11, in mounted condition, the snap fingers 21 of the third housing part 18 are shielded from unauthorised attempts to release these snap fingers 21.

**[0023]** The second housing part 11 is provided with lowered side portions 27 and a raised central portion 28. Such raised and lowered portions, which may also form a different pattern than the pattern as shown, counteract skewness and reduce the requirements regarding fairness of outer surface of the second housing part 11 for obtaining a visually appealing appearance.

**[0024]** Along the periphery of the housing, the first housing part 10 and the second housing part 11 are connected to each other by a snap connection 25 as well. Thus, the advantage that the connections between the housing parts 10, 11 need not fulfil particularly high requirements is used to provide connections which can be made easily and quickly without any special tools. This substantially reduces the manufacturing costs of the proposed theft deterrent device 1.

**[0025]** Tearing the first housing part 10 and the second housing part 11 apart is made even more difficult, because the housing 6 of the theft deterrent device 1 and the disk shaped part 4 - which parts are disposed in essentially coaxial positions when the pin 3 is attached to the housing 6 - have essentially identical contours. This makes it very difficult to grip either the second housing part 11 or the disk 4 for tearing these parts apart. Introduction of a prying instrument between the housing parts 10, 11 is made more difficult because the disk and a portion of the garment to be protected against theft cover the peripheral seam between the housing parts 10, 11. Access to this seam is thereby made difficult. Efforts to forcefully gain access to this seam will generally cause damage to the protected garment making it virtually worthless and thus unattractive to those intending to steal it.

**[0026]** The provision of a disk shaped portion with identical contours as the housing 6 and in line with the housing 6 is particularly advantageous in connection with housing parts 10, 11 which are held together by the pin 3 and the retainer 5 for protecting a relatively weak connection along the peripheral edge of the housing 6. However, having an attachment member 2 with a disk shaped portion 4 with identical contours as the housing 6 and in line with the housing 6 is also advantageous for counteracting tampering with a housing of a theft deterrent device of which the housing parts are connected to each other by another connection, such as an ultrasonically welded connection.

**[0027]** To further counteract taking the theft deterrent

device 1 and the attachment member 2 apart, it is advantageous that both the housing 6 of the theft deterrent device 1 and the disk 4 of the attachment member 2 have circular contours coaxial with the shank 9 of the pin 3. Due to these features rotation of the housing 6 and of the disk 4 relative to each other about the axis of the shank 9 of the pin 3 does not cause one of these parts to project relative to the other which would allow to exert substantial forces to these parts 4, 6 tearing or prying these parts apart from each other.

**[0028]** Prying the housing parts 10, 11 apart is further counteracted by the provision of a sharp outer edge 30 of the first housing part 10. Tools entered into the slit 7 between the theft deterrent device 1 and the attachment member 2 are deflected past the sharp edge 30 and the bevelled peripheral surface 29 contiguous with that sharp edge 30.

**[0029]** Since the outer edge 30 is virtually in line with the outer contour of the second housing part 11 in the direction of the shank 9 of the pin 3, prying the housing parts 10, 11 apart by forcing a tool between the second housing part 11 and the disk 4 is also counteracted.

**[0030]** A particular advantage of the low structural requirements the connections have to meet is, that the step of welding of the parts 10, 11, 18 to each other is not necessary so that no welding apparatus is necessary. Another advantage of dispensing with the welding step is, that the housing parts 10, 11 can be made of material which is not weldable ultrasonically or even not weldable at all. This provides the possibility of using for instance other, lower cost and higher modulus and strength plastic materials, such as Pa, PC, PPO and ABS in non-flammable versions. A particular advantage of the ability to use non-weldable plastics is, that plastics can be used which have a better resistance against heat and fire. Softening, melting or burning are a methods which are often used in attempts to remove or open theft deterrent devices.

**[0031]** The pin 3 has a head 31 of which peripheral portions are enclosed in a cage portion 32 of the disk 4 by clicking cams 34. The disk 4 is weakened closely around the cage portion 32 along a line 33. This provides the advantage that even if the disk 4 is broken, the periphery of the head 31 of the pin 3 and the shank of the pin 3 are not exposed, so that it is still difficult to insert a prying tool between the theft deterrent device 1 and the (remainder of) attachment member 2 - in particular without damaging the article to be protected -, to exert large pulling forces onto the (remainder of) the attachment member 2 and to cut off the pin 3 at the shank 9. Furthermore, the leftovers of the broken disk 4 still help to prevent the theft deterrent device 1 from being removed from the article to be protected. The head 31 of the pin could for instance pass through a small slit, but the remainders of the disk require a larger hole to be passed through. In addition, the broken edges will typically be sharp and easily damage the article.

**[0032]** The theft deterrent member 13 surrounds a

passage 26 through which the shank 9 of the pin 3 extends. This makes removal of the theft deterrent member 13 from the housing more difficult. This is of particular advantage in situations in which the housing 13 has been damaged and the theft deterrent member would otherwise be removable from the housing 6.

**[0033]** It will be apparent from the above description that within the framework of the present invention, many other modes of carrying out the invention are available. The connections can for instance be of another type, for instance including locking members to be inserted after assembly which can not be reached after having been mounted or include more conventional fasteners, which are preferably not releasable.

### Claims

1. A theft deterrent device including a housing (6) to be attached to an article to be protected with a connecting side of said housing (6) facing said article and a retainer (5) for retaining an end portion of a shank (9) of a connecting pin (3) to be passed through the article to be protected, said housing (6) including: a first housing part (10), a second housing part (11), said first housing part (10) being located on said connecting side of said second housing part (11), said housing parts (10, 11) enclosing a space (12) between said housing parts (10, 11) for accommodating a theft deterrent member (13), and a passage (14) on said connecting side for inserting the end portion (8) of the shank (9) of the pin (3) into said housing (6), said retainer (5) having a support surface (15) in abutment with a support surface (16) of said housing (6),

**characterized in that**, said support surface (15) of said retainer (5) is in abutment with a support surface (16) of said second housing part (11) facing away from said first housing part (10).

2. A theft deterrent device according to claim 1, wherein said retainer (5) is located on a side of said second housing part (11) facing away from said first housing part (10), said second housing part (11) having a passage (17) for passing the end portion of the shank (9) of the pin (3) through said second housing part (11) and into said retainer (5).

3. A theft deterrent device according to claim 1 or 2, wherein said housing (6) includes a third housing part (18), said retainer (5) being enclosed between said second housing part (11) and said third housing part (18).

4. A theft deterrent device according to claim 3, wherein said third housing part (18) is connected to said first housing part (10), said second housing part (11) being sandwiched between said first and said third

housing parts (10, 18).

5. A theft deterrent device according to claim 4, wherein an area (20) where said third housing part (18) is connected to said first housing part (10) and an area (19) where said second housing part (11) is sandwiched between said first and said third housing part (18) are located peripherally spaced away from said retainer (5).

6. A theft deterrent device according to any one of the preceding claims, wherein at least said first and second housing parts (10, 11) are connected to each other by a snap connection.

7. A theft deterrent device according to any one of the preceding claims, wherein at least one of said housing parts (10, 11, 18) is made from a non-weldable plastic material.

8. A theft deterrent device according to any one of the preceding claims, wherein at least one of said housing parts (10, 11, 18) is made from a plastic material which is not ultrasonically weldable.

9. A theft deterrent device according to any one of the preceding claims, wherein said theft deterrent member (13) surrounds a passage through which said shank (9) extends.

10. A theft deterrent set of parts including a theft deterrent device (1) according to any one of the preceding claims and an attachment device (2) including a pin (3) member having a shank (9) adapted for co-operation with said retainer (5) of said theft deterrent device (1).

11. A theft deterrent set of parts according to claim 10, wherein the attachment device (2) further includes a disk shaped portion (4) from which said shank (9) of said pin (3) projects, said housing (6) of said theft deterrent device (1) and said disk shaped portion (4) being disposed in essentially coaxial positions when said pin (3) is attached to said housing (6) and said housing (6) and said disk shaped portion (4) having essentially identical contours, said contours being essentially in-line with each other in a direction of projection of said pin (3).

12. A theft deterrent set of parts according to claim 11, wherein said contours are circular and coaxial with said shank (9) of said pin (3).

13. A theft deterrent set of parts according to claim 11 or 12, wherein said first housing part (10) terminates peripherally in the form of a sharp edge (30).

14. A theft deterrent set of parts according to any one

of the claims 11-13, wherein said first housing part (10) has an outer edge (30) essentially in line in a direction of projection of said shank (9) of said pin (3) with an outer contour of said second housing part (11).

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15. A theft deterrent set of parts according to any one of the claims 10-14, including a disk (4) having a cage portion (32) enclosing at least a peripheral portion of a head (31) of the pin (3), said disk (4) being weakened closely around said cage portion (32).

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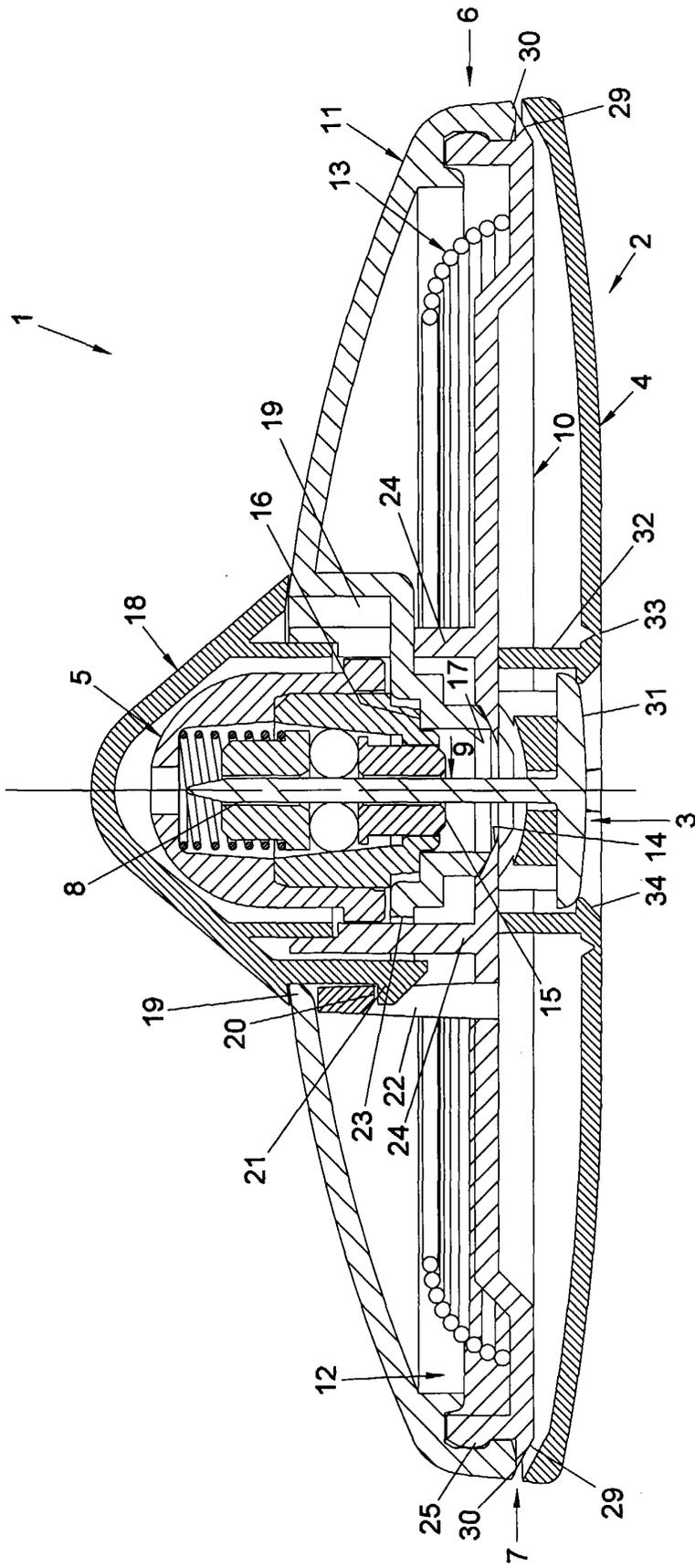


Fig. 1

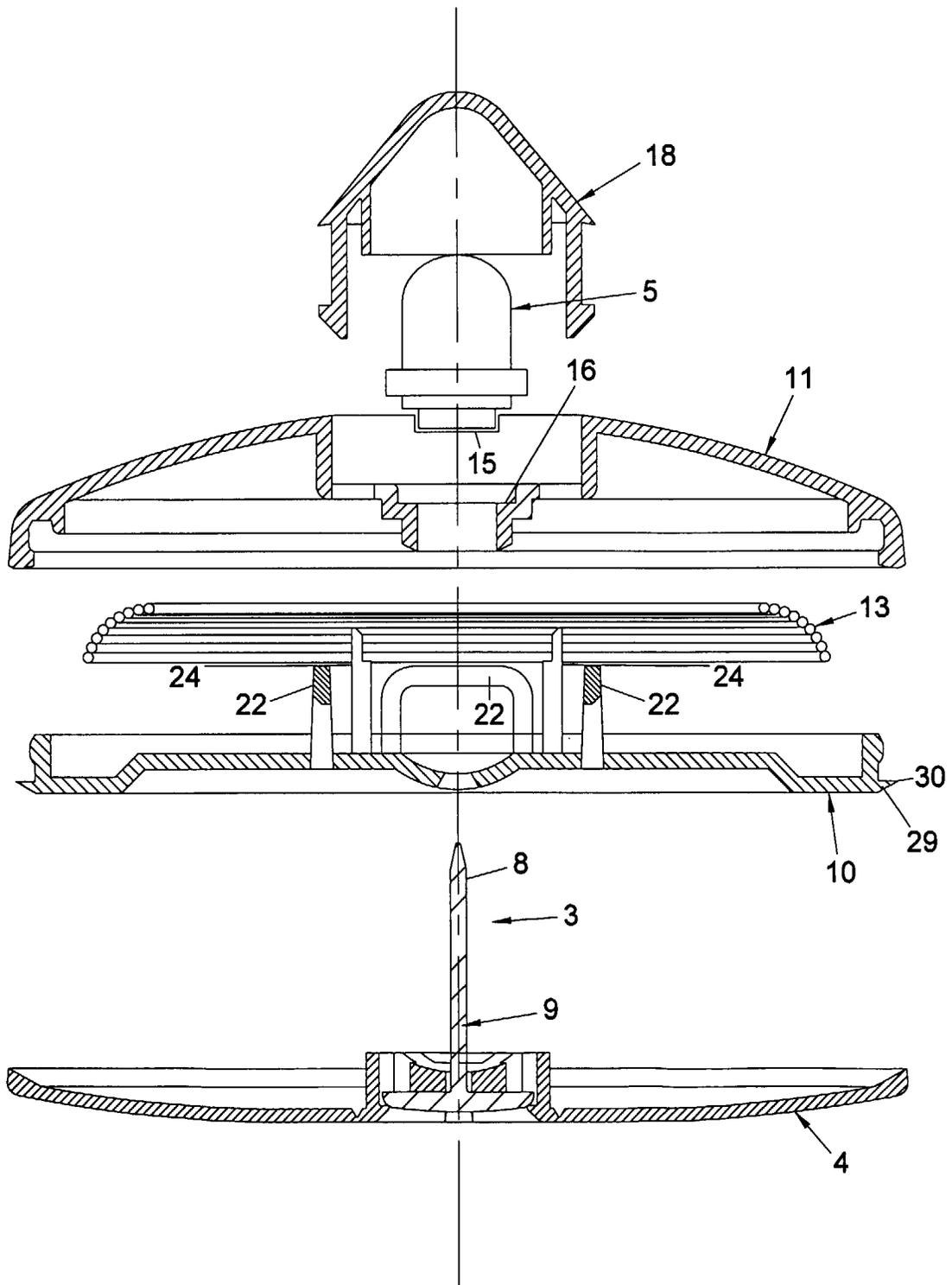


Fig. 2

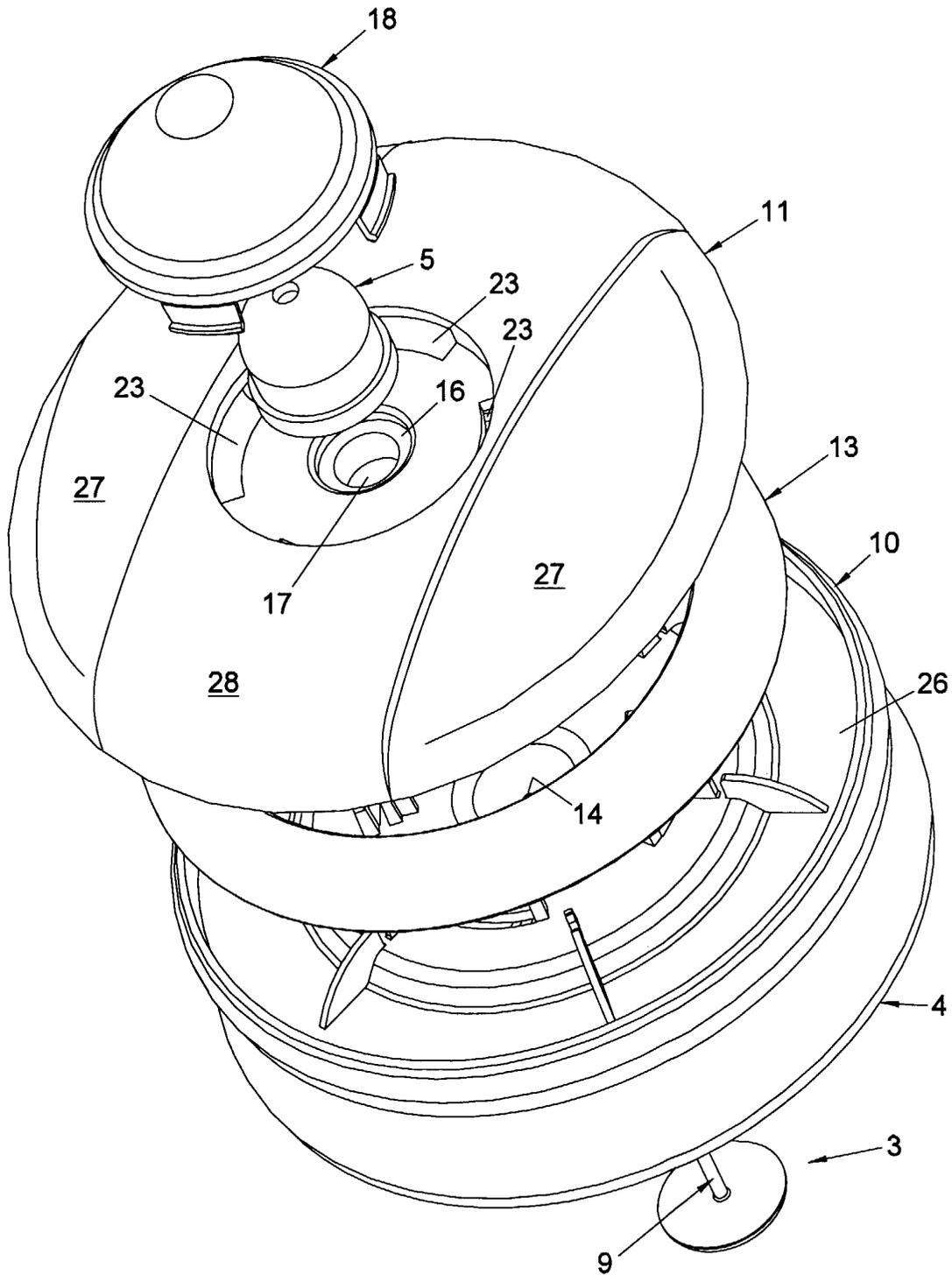


Fig. 3



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EUROPEAN SEARCH REPORT

Application Number  
EP 99 20 2187

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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ANNEX TO THE EUROPEAN SEARCH REPORT  
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