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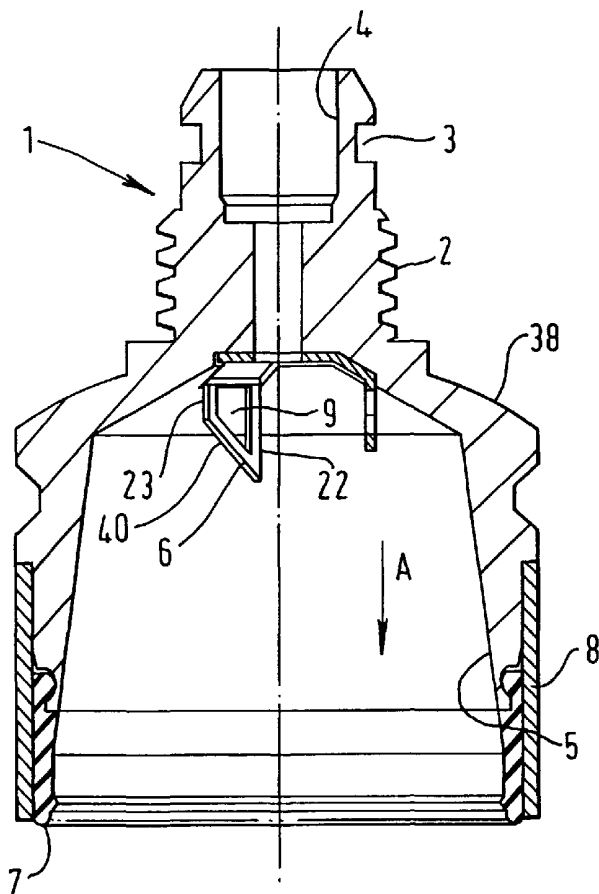
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(54) Title: CAPSULE CAGE



(57) Abstract: The present invention relates to a capsule cage (1) which can be fitted in a coffee machine, comprising a water intake channel (4) and a housing (5) for the capsule to be extracted, and, directly at the outlet of the water intake channel and in the housing, a system (6) which pierces the capsule, is independent of the water intake channel and is formed by at least one blade, said blade comprising two side edges (23, 23) and a cutting edge, one of the two side edges of the blade having a direction substantially parallel to the direction of piercing A of the capsule to be extracted.



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Capsule cage

The present invention relates to a capsule cage which can be fitted in a coffee machine, comprising a water
5 intake channel and a housing for the capsule to be extracted.

Systems already exist for extracting capsules or
10 cartridges, said systems comprising a housing for the cartridge to be extracted and a needle, for example the systems forming the subject of patents CH 605,293 and EP 242,556. In this system, the needle has a dual
15 function. On the one hand, it allows the upper part of the capsule to be opened and, on the other hand, it forms the water intake channel. The disadvantage of this device is that the injection needle can become
20 blocked up over the course of time, on the one hand by the chalk in the water and on the other hand by the coffee grounds. A second disadvantage is that the injection needle makes quite a large hole in the upper
part of the cartridge, which means that at the moment when the extracted cartridge is released there is a large discharge of coffee grounds, which soils the
system.

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The patent US 3260190 also relates to a device for extracting closed capsules, in which device the top and the bottom of the capsule are pierced by blades. The problem with this system is that, at the moment of
30 piercing, the blades deform the capsules presently available on the market, for example those forming the subject of the patent EP 512468, and this does not afford a good perforation, especially as regards cleanness at the end of extraction. Moreover, the
35 patent 5649472 also mentions the possibility of carrying out extraction using bevelled cylindrical points. In this case, the problem is that circular openings are created which are too large, and this is detrimental in respect of cleanness of extraction.

It is an object of the present invention to make available a capsule cage in which there is no risk of blockage and with which it is possible to release the used capsule while at the same time limiting the escape of coffee grounds into the coffee machine.

The present invention relates to a capsule cage which can be fitted in a coffee machine, comprising a water intake channel, a housing for the capsule to be extracted, and, directly at the outlet of the water intake channel and in the housing, a system which pierces the capsule, is independent of the water intake channel and is formed by at least one blade, said blade comprising two side edges and a cutting edge, one of the two side edges of the blade having a direction substantially parallel to the direction of piercing of the capsule to be extracted.

In a preferred embodiment, the capsule cage comprises a thread for fixing it on the coffee machine. The piercing system formed by at least one blade is oriented in a direction parallel to the axis of the water intake channel.

In a preferred embodiment, the two side edges of each blade are parallel.

It is possible, according to the invention, either for the cage to be fixed and for the capsule to be introduced into said cage or, conversely, for the cage to be movable and the capsule fixed, in which case the cage is set in movement and traps the capsule to be extracted. Direction of piercing is understood to mean either the direction of engagement of the capsule in the housing, or the direction of displacement of the capsule cage just before piercing of the capsule.

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The configuration of the blades means that it is possible to make small slits or larger slits in the capsule to be extracted. The shape of the slits is not square, but instead substantially rectangular: the length-to-width ratio of said slits or said blades is between 2 and 8.

The type of capsules or cartridges which it is conceivable to use according to the invention are sealed capsules or cartridges which open under the effect of pressure, for example the capsules forming the subject of the patent EP 512,468 and also the capsules forming the subject of patent applications WO 00/56629 and EP 00120936.0.

The type of coffee machine on which the capsule cage according to the invention can be fitted can also be a machine with a cartridge holder into which the capsule is introduced, such as the machine forming the subject of the patent EP 512,470, or a machine with a jaw comprising a movable capsule cage, such as that forming the subject of patent application No. EP 1090574 in the name of the Applicant. These all concern extraction of closed capsules, where the extraction is carried out at a pressure of between 2 and 15 bar.

The piercing system normally comprises more than one blade, for example 2, 3, 4, 5 or 6. It is preferable for the piercing system to comprise 3 blades. These are equidistant.

In the piercing system, the blades are openworked with parallel side edges. It is also possible for them not to be openworked. They have a cutting edge forming an angle of between 30 and 60° with the side edges.

The piercing system can be fixed in the housing for the capsule. This arrangement is suitable for the abovementioned machine forming the subject of patent

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application No. 99117107.5. The piercing system can also be movable in rotation about the axis of the water intake channel. This arrangement is suitable for the machine forming the subject of patent EP 512,470.

The material used for the blades is critical. It is preferable to have blades which have good resistance to piercing of aluminium capsules. The blades are thus preferably made of metal (iron, brass, chromium-plated brass) or of steel, preferably stainless steel. They are made by stamping and folding, which makes them easy and inexpensive to produce and they have a service life equivalent to the service life of the machine on which they are fitted.

To guarantee good leaktightness, it is important that the lower part of the housing for the capsule to be extracted should comprise a dynamic seal, that is to say a seal having a certain flexibility. This seal is made of any plastic. This seal is preferably made of elastomer.

The size of the capsules to be extracted is normally of the order of 30 mm. It is therefore necessary for the blades to have corresponding sizes. The blades have a length of between 5 and 15 mm, a width of between 2 and 8 mm, and a thickness of between 0.2 and 1 mm. It is preferable to use blades which are not openworked.

The setting of the capsule cage according to the invention in the coffee machine is not critical. It is equally possible to provide for the water to arrive from above or from below, or any other possibility.

The present invention finally relates to a method of extracting a capsule closed in the capsule cage as described above, in which method the capsule is extracted in a direction of piercing substantially parallel to one of the side edges of the piercing

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blades. The piercing is carried out to obtain a slit for the intake of water. This slit has a ratio of its two dimensions, namely length to width, of greater than 1, and this ratio is preferably between 2 and 8.

In the remainder of the description, reference is made to the drawings in which:

Fig. 1 is a partial sectional view of the capsule cage according to the invention,

Fig. 2 is a perspective view of the cage in Figure 1 from underneath,

Fig. 3 is a perspective representation of the piercing system according to a first embodiment,

Fig. 4 is a perspective representation of the piercing system according to a second embodiment,

Figures 5 and 6 are partial sectional views showing the capsule cage in a machine according to patent application EP 1090574.

The capsule cage (1) has a thread (2) so that it can be screwed onto the coffee machine. The housing (3) is needed in order to arrange a seal in it to permit good leaktightness of the system. The channel (4) permits intake of water into the housing (5) for the capsule. Arranged directly at the outlet of the channel (4) is the piercing system (6) consisting of 3 openworked blades. In this figure, the piercing system is fixed. The bottom of the housing (5) comprises a dynamic seal (7) of elastomer. The outer part of the housing (5) is made of rigid metal. The principal characteristic of the extraction system according to the invention is that instead of making a hole, slits are made in the top of the capsule to be extracted. The apertures (9) permit a good passage of water into the capsule. The

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spherical ball (38) on the outside of the capsule housing has a function which will be explained below. The arrow A shows the direction of piercing which is parallel to the side edges (22, 23) of the piercing blades (6). The cutting edge of the blades is represented by reference number (40).

Figure 2 is closely related to Figure 1 and clearly shows the piercing system comprising the ring (10), with its central opening (11) which permits intake of water, and the 3 openworked blades (6).

Figure 3 shows a piercing system with points (15) which have apertures (16). Here too there is a ring (17) with a central opening (18). The cutting edge (41) of the blades forms an angle x of between 30 and 60° . In this case, the length of the cut in the capsule is not greater than the width y of the blade. In the present case, the angle x is 45° . The piercing direction A parallel to the side edge (27) of the blade (15) is also clearly shown.

Figure 4 shows a piercing system with blades (24). Here too there is a ring (25) with a central opening (26). The angle of the cutting edge of the blades is 45° . In this case, the width of the cut in the capsule is not greater than the width y of the blade. Blades with y of the order of 2 mm, a blade length of 4 to 5 mm and a thickness of 0.5 mm are advantageous. This gives the slit a length-to-width ratio of the order of 4. The direction of piercing A parallel to the side edge (28) of the blade (24) is also clearly shown.

Figures 5 and 6 show in diagrammatic form the capsule cage (1) in a coffee machine of the type according to patent application EP 99117107.5. The machine comprises a fixed part (31) and a movable part (32), the movable part being fitted so as to rotate on the axis (33). The capsule cage is in particular represented so as to show

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clearly the spherical ball (38) from Figure 1. This ball serves to ensure a certain degree of spherical mobility of the capsule cage in order to compensate for certain anomalies which could lead to a defect in the leaktightness of the system. The movable part (32) comprises a housing (35) with a lower peripheral border (30). The capsule to be extracted is represented as (20). The housing (35) is movable on the spherical ball (38), the centre (21) of which is substantially at the centre of the housing (21). When the piece (32) is closed, the housing (35) can move along the contours of the capsule (20) and the border (30), that is to say the dynamic seal (7) in Figure 1 adapts so as to bear firmly against the shoulder of the fixed part (31). When the part (32) is closed, the blades pierce the top of the capsule (20) and the hot water can flow in and extract said capsule. It is necessary in this case to provide raised and recessed elements under the lower part of the capsule, as in patent EP 604,615.

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The device works in the following way. The capsule to be extracted is placed in the device according to patent EP 1090574 and the capsule cage is moved towards the capsule to be extracted. The piercing blades perform their function, that is to say they pierce the top of the capsule. The hot water arrives and passes through the bed of coffee via the openings made by the blades. As a result of a rise in pressure in the capsule, the lower membrane of the capsule will bear on the raised and recessed elements according to patent EP 604615 and the capsule opens and the coffee flows into the cup placed under the capsule cage.

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Claims

1. Capsule cage which can be fitted in a coffee
5 machine, comprising a water intake channel and a
housing for the capsule to be extracted, characterized
in that it comprises, directly at the outlet of the
water intake channel and in the housing, a system which
pierces the capsule, is independent of the water intake
10 channel and is formed by at least one blade, said blade
comprising two side edges and a cutting edge, one of
the two side edges of the blade having a direction
substantially parallel to the direction of piercing of
the capsule to be extracted.
- 15 2. Capsule cage according to Claim 1, characterized
in that it comprises a thread for fixing said cage on
the coffee machine.
- 20 3. Capsule cage according to either of Claims 1 and
2, characterized in that the piercing system formed by
at least one blade is oriented in a direction parallel
to the axis of the water intake channel.
- 25 4. Capsule cage according to one of Claims 1 to 3,
characterized in that the piercing system comprises
three equidistant blades.
5. Capsule cage according to one of Claims 1 to 4,
30 characterized in that the piercing system comprises
three openworked blades, with parallel side edges and a
cutting edge forming an angle of between 30 and 60°
with the side edges.
- 35 6. Capsule cage according to one of Claims 1 to 4,
characterized in that the piercing system comprises
three blades which are not openworked, with a cutting
edge forming an angle of between 30 and 60° with the
side edges.

7. Capsule cage according to one of Claims 1 to 6, characterized in that the piercing system is fixed.
- 5 8. Capsule cage according to one of Claims 1 to 6, characterized in that the piercing system is movable in rotation about the axis of the water intake channel.
- 10 9. Capsule cage according to one of Claims 1 to 8, characterized in that the blades of the piercing system are made of metal or of steel.
- 15 10. Capsule cage according to one of Claims 1 to 9, characterized in that the lower part of the housing for the capsule to be extracted comprises a dynamic seal.
11. Capsule cage according to Claim 10, characterized in that the dynamic seal is made of elastomer.
- 20 12. Capsule cage according to one of Claims 1 to 11, characterized in that the blades have a length of between 3 and 15 mm and a width of between 2 and 8 mm.
- 25 13. Capsule cage according to Claim 12, characterized in that it comprises three blades, each having a length of about 4 mm, a width of about 2 mm, a thickness of about 0.5 mm, and the cutting edge of each blade forms an angle of about 45°.
- 30 14. Method of extracting a capsule closed in the capsule cage according to any one of Claims 1 to 13, characterized in that the capsule is extracted in a direction of piercing substantially parallel to one of the side edges of the piercing blades.
- 35 15. Method according to Claim 14, characterized in that the piercing is carried out to obtain a slit for the intake of water, said slit having a ratio of its two dimensions of greater than 1.

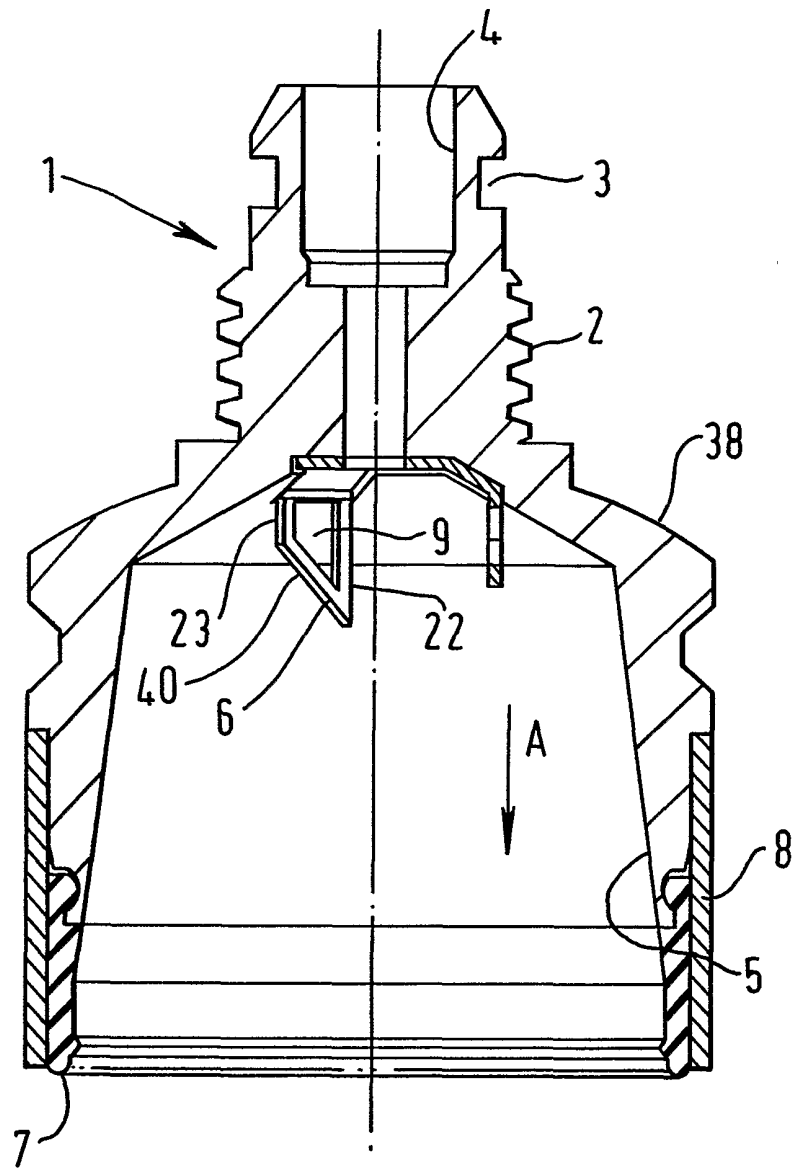


FIG. 1.

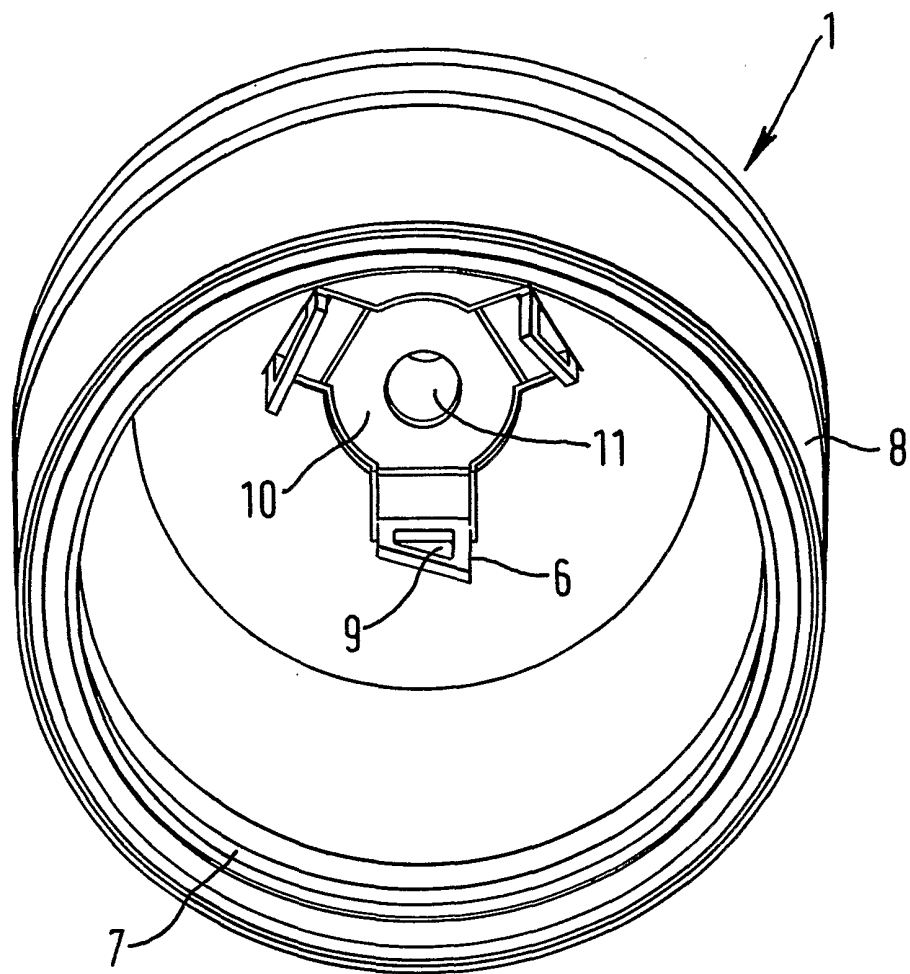


FIG. 2.

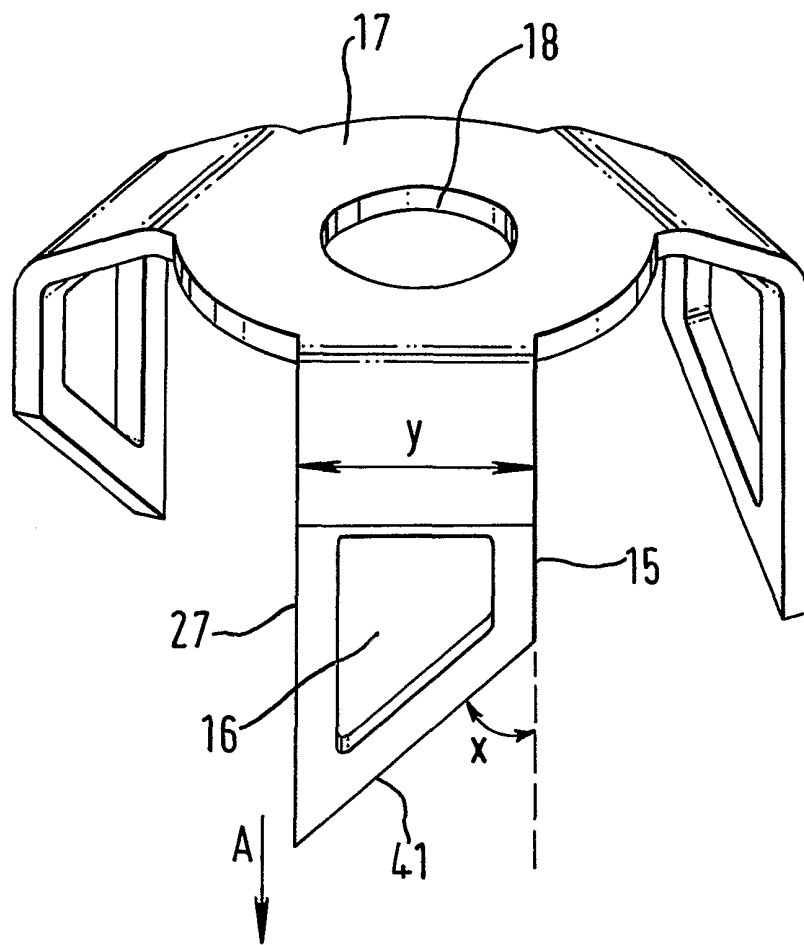


FIG. 3.

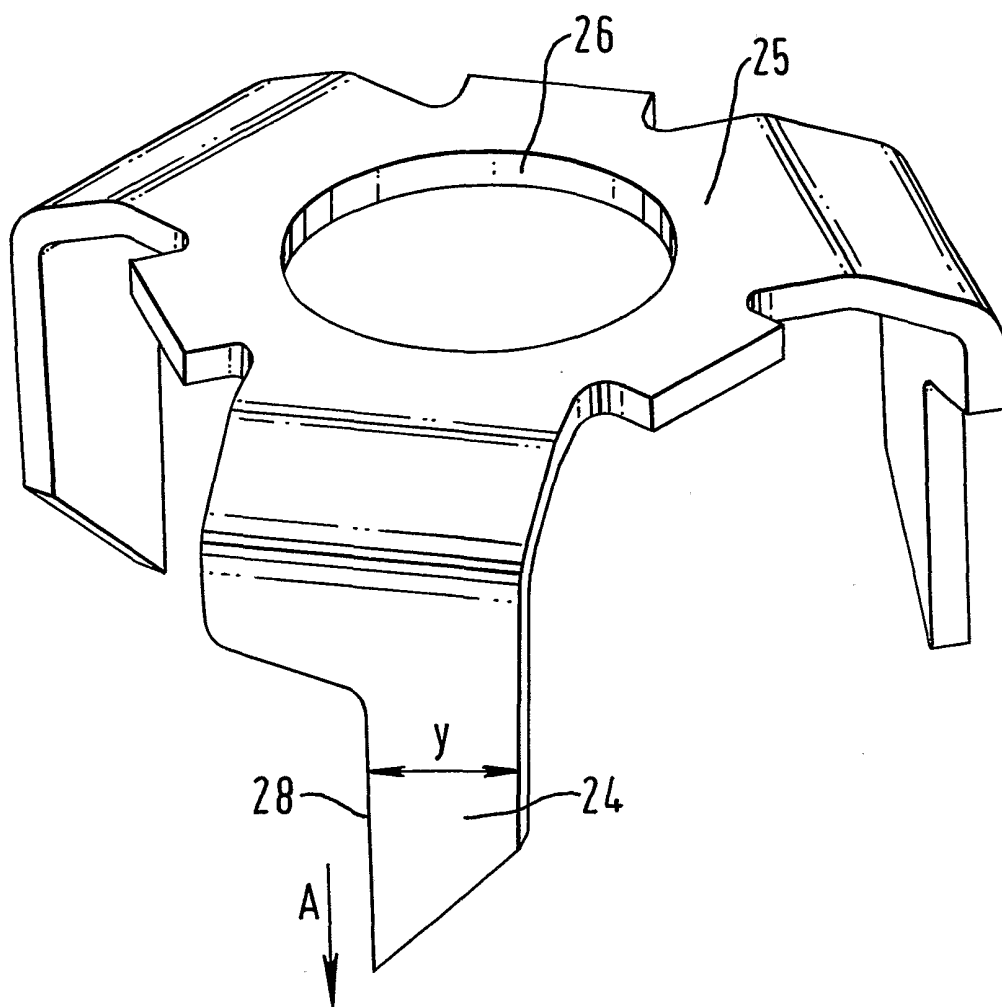


FIG. 4.

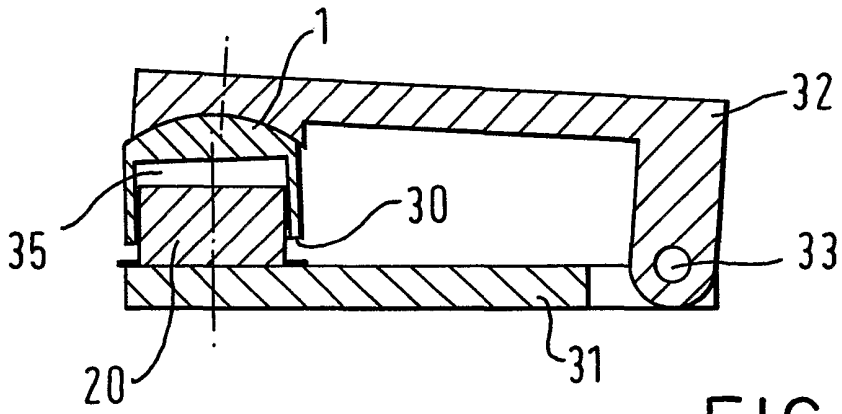


FIG. 5.

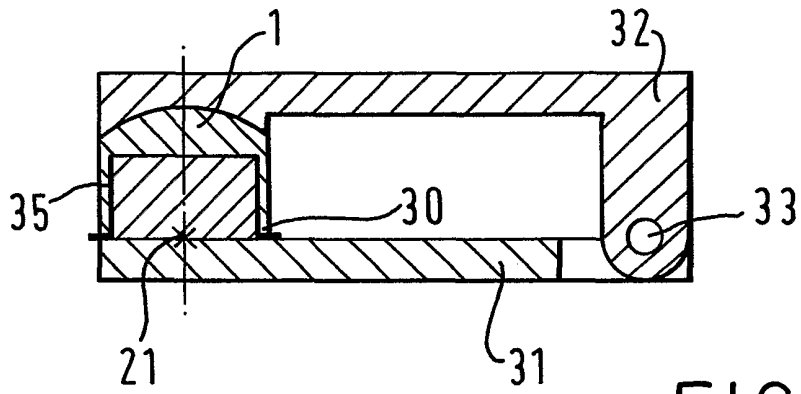


FIG. 6.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/07173

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A47J31/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A47J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X A	US 2 899 886 A (J.J. RODTH) 18 August 1959 (1959-08-18) column 1, line 33 - line 44 column 3, line 52 -column 4, line 18; figures 1,2,9-12	1-4, 8, 9, 12, 14, 15 6
X A	US 2 778 739 A (RODTH JOSEPH J) 22 January 1957 (1957-01-22) column 2, line 67 -column 4, line 18 figure 6	1-3, 9-12, 14, 15 6
X A	US 3 260 190 A (D.J. LEVINSON) 12 July 1966 (1966-07-12) cited in the application column 3, line 62 -column 4, line 29 column 5, line 72 -column 6, line 36; figures 3,9	14, 15 1, 3, 4, 7
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 01/07173

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 649 472 A (O. FOND ET AL.) 22 July 1997 (1997-07-22) cited in the application column 11, line 27 - line 43 figures 2,3 ---	1-4,6,8, 10,11,14
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International Application No

PCT/EP 01/07173

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