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(73) Patenthaver: **maglassX GmbH, Stadtplatz 1, 94078 Freyung, Tyskland**

(72) Opfinder: **FRITZ, Christoph, Speltenbach-Steinäcker 8, 94078 Freyung, Tyskland**

(74) Fuldmægtig i Danmark: **NORDIC PATENT SERVICE A/S, Bredgade 30, 1260 København K, Danmark**

(54) Benævnelse: **KUNSTSTOFBEHOLDER MED INDEHOLDT METALELEMENT OG FREMGANGSMÅDE TIL FREMSTILLING AF DENNE**

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US-A- 2 217 514
US-A1- 2004 136 177
US-A1- 2005 087 255

The present invention relates to a plastic vessel comprising an integrated metal element and to a method for producing the same. The present invention relates in particular to a plastic vessel comprising a magnetic metal element for use in interaction with a means of transport and in particular for use in a vehicle of any type, and/or for persons with reduced motor skills and/or attention and/or perception, and/or as a decorative element.

The German utility model DE202014002819U1 discloses a magnetic and metal element for vessels and furnishing elements for a non-slip arrangement of vessels in a vehicle, it being proposed to arrange a magnetic element at the bottom of a vessel, wherein the magnetic element can be embedded in the bottom of the vessel, and wherein the vessel can be made of plastic by means of injection molding.

During the injection molding of plastic such as copolyester, polypropylene and in particular polycarbonate, temperatures of the liquid plastic of more than 300 degrees are reached and the thermoplastic properties of the plastic take full effect during the cooling and solidification of the plastic, wherein its volume shrinks in the case of polycarbonate by approximately 0.5 to 0.7%. By comparison, a metal element has significantly different thermal expansion properties so that an embedded metal element already arranged in its intended position during injection molding, in particular in the vicinity of a surface at the bottom of the vessel, and entirely surrounded by cooling and hardening plastic causes cracks in the plastic which start at the injection point and which continue to increase in size through use in particular when subjected to considerable stress due to use, e.g., in the event of a repeated cleaning of a vessel used as, for example, a drinking glass.

A metal element embedded in a plastic vessel during injection molding thus leads to defective formations of the vessel in the area surrounding the embedded metal element and/or to an undesirably short service life of a macroscopically sound vessel.

As a consequence, such a vessel with undesirable cracks is not able to meet common aesthetic requirements, since it can no longer be maintained or cleaned in a satisfactory manner. There is also a risk that the plastic which does not fully surround the metal element no longer sufficiently protects the metal element from external influences occurring, for example, during cleaning in a dishwasher so that the metal element can also be damaged.

If the metal element also comprises a magnet, which is desirable in particular for the use of the vessel as a slip-resistant vessel in interaction with a means of transport and in particular for use in a vehicle, the magnetic remanence of the magnet will be demagnetized significantly not only at a temperature in the cited temperature range of over 300 degrees (Celsius), but can already be severely adversely affected in a lower temperature range of, e.g., 200°C.

EP0143233A2 discloses a drinking glass with a container part and a base part made of plastic configured as an insert, wherein the base part comprises an insert with a higher specific weight than the plastic for a desirable stability of the drinking glass even in an empty or partially filled state. The insert can be made of metal and formed as a ring or disk.

FR2820963A1 discloses a drinking glass made of plastic with a bottom of a desirable thickness for aesthetic and economic reasons and in particular with a greater height compared to its diameter. By comparison, the thickness of the bottom is at least ten times the thickness of the edge of the drinking glass. The drinking glass is produced in two pieces with a main body comprising a recess in its bottom, into which a solid plug is inserted, by means of which the solid bottom is provided. The main body and plug are connected to one another by means of the shrinkage of the not yet cooled main body.

WO2012/006428A1 discloses a vessel comprising a radio-frequency identification tag (RFID tag), wherein in particular the visual appearance of the vessel is greatly altered as a consequence.

It is thus an object of the present invention to provide a plastic vessel comprising a metal element embedded in the vicinity of the bottom of the vessel, which also satisfies the highest aesthetic requirements so that the vessel is even suitable for use as a decorative element, which has a satisfactorily long service life, which is impervious to external influences such as, for example, weather influences, which can also be readily cleaned, e.g., in dishwashers, and which is also suitable for accommodating a magnetic metal element in the vicinity of its bottom without its intended magnetization being affected during its production so that the vessel is suitable for use as a slip-resistant vessel in interaction with a means of transport and in interaction with suitable furnishing elements, in particular for use in a vehicle of any kind, as well as for use as a slip-resistant, securely standing and manageable vessel for persons with reduced motor skills and/or attention and/or perception and/or as a decorative element.

It is a further object of the present invention to provide a method suitable for producing a plastic vessel according to the invention, in particular a method suitable for a cost-effective industrial mass production.

The objects of the invention are achieved by means of the features of the independent claims. Preferred embodiments of the invention are indicated without limitation in the features of the dependent claims and/or the following description, which is accompanied by schematic drawings.

The invention advantageously relates to a plastic vessel which accommodates a metal element in its base, wherein the plastic vessel is formed in two pieces by a vessel element and a cover, and wherein a recess is formed in the base of the vessel element, which is enclosed by the cover such that a central closed region of the recess is provided, which accommodates the metal element, and wherein the vessel and the cover are connected to one another thermoplastically under pressure.

According to the invention, particularly advantageous is the cited thermoplastic connection by means of thermoplastic contraction of the vessel element during its cooling and hardening whereby the cover has already been completely solidified, or by means of thermoplastic contraction of the cover during its cooling and hardening whereby the vessel element has already been completely solidified, respectively effected at a suitable pressure, which presses the cover onto the vessel element, and at a suitable predetermined temperature, wherein the pressure and in particular the temperature are selected such that, when the vessel element and the cover are connected, no cracks occur in the plastic and the magnetic properties of a magnetic metal element are not impaired.

According to the invention, the recess for accommodating the metal element of a vessel element according to the present invention comprises in particular an outer edge and an inner edge spaced apart from the outer edge, which surrounds the central region of the recess for accommodating the metal element so that a region of the recess, which surrounds the central region, is provided between the inner and the outer edge. The cover comprises an arc which rises relative to a central region of the cover, surrounds the central region of the cover and is formed so as to correspond to the recess surrounding the central region of the vessel element so

that, when the region for accommodating the metal element is covered, the arc of the cover is disposed in the region of the recess of the vessel element which surrounds the region for accommodating the metal element.

In this embodiment of the invention, the aforementioned arc of the cover has an outer edge, which is the outer edge of the cover and which corresponds to the outer edge of the vessel element and is arranged adjacent thereto, and an inner edge, which corresponds to the inner edge of the vessel element and is arranged adjacent thereto.

By means of the structure according to the present invention with an advantageous meandering structure of the cover in cross-section, the profile of which corresponds to the structure of the base of the vessel element, such that an advantageously large contact surface is provided between the vessel element and the cover for their stable and tight connection.

In this preferred embodiment of the invention, it is also advantageous to connect the cover to the vessel element under the action of pressure when the cover is already a completely contracted, cooled and hardened state and the vessel element has its predetermined ductility, temperature and shrinkage, wherein, during the further cooling and shrinkage of the vessel element, forces directed from the outside inwards onto the central region for accommodating the metal element act on the cover and thus promote a particularly reliable and tight connection of the vessel element and the cover, and wherein the meandering structure is also suitable for counteracting said forces acting inwards on the cover.

According to a further advantageous embodiment of the invention, a circumferential ridge is formed on the inner side of the outer edge of the vessel element. In this embodiment of the invention, a step corresponding to the ridge is also formed on the outer side of the outer edge of the cover so that the ridge is latched to the step, whereby a particularly close, tight and stable connection of the vessel element and the cover is achieved.

In this embodiment of the invention, a step is also formed on the inner edge of the arc of the cover, which corresponds to the inner edge of the vessel element surrounding the region for accommodating the metal element, so that the inner edge of the cover is arranged on the inner side adjacent to the protruding inner edge of the vessel element and the inner step further rests on the inner edge of the vessel element, whereby it is advantageously ensured that, despite

contraction of the vessel element in an inward direction towards the central region for accommodating the metal element, the inner edge of the arc of the cover already in a completely contracted state remains in contact with the inner edge of the vessel element so that a connection of the cover and the vessel element is ensured there as well.

In order to provide increased stability to the meandering structure described in the foregoing, it is also advantageous to provide, between the outer edge and the inner edge of the arc of the cover, fixed links which connect said outer and inner edges, wherein the fixed links, in particular in the event of an axially symmetrical design of the vessel element and/or of the cover corresponding to the vessel element and/or of the cover, are likewise arranged in an axially symmetrical manner.

In order to provide vessels that can be stacked one inside the other in a simple manner, the vessel element is preferably designed as a cone tapering towards the base of the vessel, which can also appropriately turn into a cylinder in the region of the base. The cover is preferably formed so as to be disk-shaped, wherein the vessel element and the cover each have an axial symmetry with an identical axis of symmetry, and wherein the metal element is preferably symmetrically formed in a correspondingly flat manner.

In this embodiment, which is particularly suitable as a drinking glass, at least three fixed links as described in the foregoing are advantageously formed radially as well as symmetrically relative to the axis. In particular in the embodiment of the vessel as a drinking glass, the vessel is preferably made of a copolyester such as, for example, Tritan (TM) of Eastman Chemical Company or a polycarbonate so that the vessel is largely scratch-resistant, transparent as well as accordingly durable and aesthetic. Moreover, the metal element is advantageously a magnet so that the vessel can be used advantageously in interaction with a suitable means of transport and in particular in interaction with suitable furnishing elements as a slip-resistant vessel in a vehicle of any kind and/or as a slip-resistant and safely manageable vessel for persons with reduced motor skills and/or attention and/or perception. A particularly well-suited magnet to this end is in particular formed as a flat, disk-shaped cylinder with an axial polarity, which can in particular advantageously be a neodymium magnet provided with a protective copper-nickel coating.

In addition to the metal element, the vessel can further accommodate an RFID tag in the central closed region of its recess, the visually aesthetic overall impression of the vessel thus not being adversely affected thereby.

Means of transport is to be understood in the foregoing as well as in the present disclosure in general in particular as a means of transport for transporting drinking vessels in gastronomy and/or at social functions, e.g., suitably designed serving carts, serving trays, etc., which respectively comprise suitable metal elements that interact with a magnet and/or which interact with such.

A vehicle or a vehicle of any kind is invariably to be understood in the foregoing as well as in the present disclosure in general as including both any type of land vehicle such as road or rail vehicles as well as other types of vehicles such as ships, yachts, boats, cable cars, airplanes, etc., which respectively comprise suitably designed furnishing elements.

Persons with reduced motor skills and/or attention and/or perception are understood in the foregoing in particular as people, such as children or people in need of care, whose secure handling of vessels with liquids such as in particular drinking glasses in an intended manner may be uncertain and for whom a slip-resistant vessel is particularly suitable.

Usage as a decorative element is to be understood in the foregoing as well as in the present disclosure in general in particular as, for example, use of a vessel comprising a magnetic metal element in interaction with metallic furnishing elements such as, e.g., wall and ceiling elements, cabinets, shelves, lights, etc. For example, one or more vessels adhering to metal frames of ceiling lights can interact optically in a particularly aesthetic manner with the light sources of the lights.

Polycarbonate or copolyester is particularly suitable as the plastic and neodymium is particularly suitable as a powerful magnetic element when the vessel is used as an aesthetic decorative element, for example on vertical walls or ceilings and in interaction with light sources. A selected weight ratio of the magnetic element in relation to the vessel element made of the comparatively lightweight plastic can be especially advantageous, in particular in the range of approximately 5:1 plastic:magnet with a corresponding volume ratio .

The present invention further relates in particular to a method for producing a plastic vessel according to the invention described in the foregoing, wherein
in a first step, the cover is produced by means of injection molding, and wherein
in a second step, the cover is supported until the contraction thereof is completed, and wherein
in a third step, the vessel element is produced by means of injection molding, and wherein
in a fourth step, the vessel element is cooled down to a predetermined working temperature at which the vessel element still has a predetermined ductility and at which the contraction of the vessel element during cooling is not yet completely terminated, and wherein
in a fifth step, at the predetermined working temperature of the vessel element, the metal element is fitted on the vessel element, wherein the metal element is arranged in the central region of the vessel element; and wherein
in a sixth step, approximately at the predetermined working temperature, the contracted cover is connected to the vessel element under the action of pressure on the cover while the vessel element simultaneously shrinks thermoplastically,
so that the vessel element forms a permanent connection with the cover and the complete plastic vessel is provided, which comprises the metal element accommodated in its base.

The embodiment of the method according to the invention described in the foregoing is particularly advantageous in that it in particular allows a complete accommodation of a metal element in a plastic vessel and in particular in the base of a plastic vessel, even together with an RFID tag, without cracks occurring in the plastic.

The embodiment of the method according to the invention described in the foregoing is also particularly advantageous in that it allows a cost-effective mass production of vessels according to the invention. A pre-fabricated cover also allows the cover to be provided, e.g., with a predetermined color in a simple and cost-effective manner.

The embodiment described in the foregoing is also particularly advantageous in that it also allows a complete accommodation of a magnetic element in the base of a plastic vessel essentially without adversely affecting the intended use of the vessel with the magnetic element in interaction with a suitable means of transport and in particular as a non-slip drinking vessel in a vehicle.

In the event of the advantageous use of copolyester or polycarbonate as the plastic material for the vessel as described in the foregoing, a working temperature of approximately 120 degrees in the interior of the plastic is particularly suitable, as at this temperature the magnetic properties of the magnetic element are largely preserved in particular when a neodymium magnet is used, and as the ductility and further contraction of the plastic in this temperature range, in particular in interaction with a suitable application of pressure during the further cooling and solidification, further enable a permanent connection of the vessel element with the cover without the formation of undesirable cracks in the plastic and thus a sealing of the metal element, which can be a magnet.

Furthermore, as in particular the entire surface of the metal element is not surrounded by the predetermined working temperature so that the metal element is accordingly barely heated during the connection of the vessel element and the cover, the temperature behavior of the metal element does not interfere with the hardening of the plastic while the magnetization of a magnetic metal element is only adversely affected to a minimal degree.

The embodiment described in the foregoing is also particularly advantageous in that the vessel element and the cover are injection-molded independently of one another in different steps, whereby a separate coloring, in particular of the cover, is possible in a simple manner, which enables in particular a cost-effective aesthetic optical customization of individual vessels as well as of different vessel series. The use of the vessel as a decorative element according to the invention is also facilitated hereby.

The magnetic metal element, or alternatively a non-magnetic metal element, can also be visible from the outside through the bottom or base of the vessel when a transparent plastic is used such as, e.g., advantageously a copolyester or polycarbonate, and can in this case also be provided with decorative elements or customizations such as, for example, names, logos, data, etc. and make its own contribution to an individual overall aesthetic impression of the vessel.

The embodiment described in the foregoing is further particularly advantageous as, when the thermoplastic properties in particular of the vessel element are exploited at the predetermined working temperature in interaction with a completely contracted cover, the cover can be designed to be appropriately smaller than the vessel element and in the process can be designed in terms of its relative dimensions in relation to the dimensions of the vessel element in such a

manner that, in particular when the vessel element and the cover are formed so as to be axially symmetrical, the shrinkage of the vessel element also acts radially on the cover and thus contributes to a permanent connection of the vessel element and the cover. In this manner, an aesthetically desirable overall impression of the plastic vessel is also promoted.

According to a variant of the previous embodiment, the vessel element can also be prefabricated and connected under pressure as a completely contracted vessel element to a not yet completely hardened/cooled cover, although by comparison this method is more complex and less reliable; as a consequence, the embodiment according to the invention described in the foregoing with the prefabricated cover is advantageous and thus preferred.

According to a further advantageous embodiment of the invention, in a further step of the method according to the present invention after the connection of the vessel element and the cover, the contact line between the vessel element and the cover can be further provided with a weld seam, whereby the sealing of the accommodated metal element is further reinforced.

According to a further advantageous embodiment of the invention, the vessel element is arranged on a magnetic mandrel with its base upturned at least during the fitting of the metal element comprising a magnet on the vessel element so that, when the metal element is fitted on the vessel element, a predetermined polarity of an axially polarized magnet is particularly advantageously defined in a simple and cost-effective manner, which renders superfluous an elaborate care with regard to storage and positioning during the fitting of the metal elements so that this embodiment is accordingly cost-effective.

When also accommodating an appropriately essentially two-dimensionally formed RFID tag together with the metal element, the RFID tag can be connected to the metal element first and, subsequently, the vessel can be fitted with the RFID tag and the metal element. For example, the RFID tag can be adhesively bonded to the metal element to this end or alternatively a metallic antenna element of the RFID tag can adhere to a magnetic metal element due to its magnetic properties.

According to a further advantageous embodiment of the invention, a plastic vessel according to the present invention accommodates a metal element comprising a magnetic element as

described in the foregoing and is used in particular as a drinking vessel in interaction with a suitable means of transport and in particular in a vehicle of any kind.

According to a further advantageous embodiment of the invention, a plastic vessel according to the invention which accommodates a metal element and which in particular accommodates a metal element comprising a magnet is in particular used according to the invention as a drinking vessel in interaction with a suitable means of transport and in particular in a vehicle of any kind and/or by persons with impaired motor skills and/or attention and/or perception and/or as a decorative element, as described in the foregoing.

In order to better illustrate the invention, the embodiments cited in the foregoing are described in detail in the following together with further advantageous embodiments with reference to schematic accompanying drawings.
The figures show:

Fig. 1a a schematic perspective illustration of a vessel according to an embodiment of the invention viewed obliquely from above,

Fig. 1b the vessel of Fig. 1a viewed obliquely from below,

Fig. 1c a plan view of the vessel of Figs. 1a and b,

Fig. 1d a side view of the vessel of Figs. 1a and b,

Fig. 1e a schematic enlarged perspective illustration of the metal element of the vessel of Figs. 1a, b, c and d; and

Fig. 1f a cross-section through the metal element of Fig. 1e along the line V-V of Fig. 1e;

Fig. 2a an enlarged section A of Fig. 1d in cross-section through the vessel of Fig. 1d along the line V-V of Fig. 1d,

Fig. 2b the base of the vessel element of Fig. 2a,

Fig. 2c the metal element of Fig. 2a, and

Fig. 2d the cover of the vessel element of Fig. 2a;

Fig. 3a the vessel element of Fig. 2b viewed from below,

Fig. 3b the cover of the vessel element of Fig. 2d viewed from the side facing away from the vessel element,

Fig. 3c the cover of the vessel element of Fig. 2d viewed from the side facing the vessel element, and

Fig. 3d a perspective illustration of the section A of Fig. 1d of the vessel of Fig. 1d viewed obliquely from below;

Fig. 4a an enlarged illustration of the section A of the vessel element of Fig. 2b according to a further advantageous embodiment of the invention,

Fig. 4b an enlarged illustration of the section A of the cover of Fig. 2d corresponding to the embodiment of Fig. 4a,

Fig. 4c an illustration of the section A1 of Figs. 4a and 4b viewed together with the cover arranged on the vessel element,

Fig. 4d the section A1 of Fig. 4c according to a further advantageous variant of the invention, and

Fig. 4e the section A2 of Figs. 4a and 4b viewed together with the cover arranged on the vessel element,

Fig. 5a an advantageous variant of the cover of Fig. 3c,

Fig. 5b the other side of the cover of Fig. 5a, and

Fig. 5c a cross-section through the cover of Fig. 5a along line S-S of Fig. 5a;

Fig. 6a and 6b a schematic illustration of an advantageous step of an embodiment of the method according to the invention for producing the present invention, and

Fig. 6c the vessel of Fig. 1d further comprising an RFID tag; and

Fig. 7 a schematic flowchart of the essential steps of an embodiment of a method for producing a vessel according to the invention.

Fig. 1a shows a schematic perspective illustration of a vessel G according to an embodiment of the invention viewed obliquely from above with the vessel element 1 and the cover 2 arranged on the base 10 of the vessel element 1, wherein a space is provided for accommodating the metal element 3, while Fig. 1b shows a corresponding perspective illustration of the vessel G of Fig. 1a viewed obliquely from below. Fig. 1c shows a schematic plan view of the vessel G of Figs. 1a and b and Fig. 1d shows a side view of the vessel G of Figs. 1a, b and c, respectively likewise with the vessel element 1, its base 10, the cover 2 and the metal element 3, wherein details of the cover 2 have been omitted for the sake of clarity in particular in the illustration of Fig. 1d. The line V-V of Figs. 1c and d respectively indicates a longitudinal cross-section through the center of the vessel G, which in the embodiment of Fig. 1 is illustratively and advantageously formed so as to be axially symmetrical with the line V-V of Fig. 1d as an axis of symmetry and which has the form of a cone tapering towards the base 10 of the vessel element 1, which is advantageous for a vessel G readily stackable into one another and which can in particular be a drinking vessel.

Fig. 1e shows an enlarged perspective illustration of the metal element 3 of Figs. 1a to d, which is appropriately formed so as to have the shape of a flat, cylindrical disk, wherein its flat cylinder corresponds approximately to a central recess between the vessel element 1 and the cover 2, which is described in detail in the following with reference to Fig. 2. Fig. 1f shows a section through the metal element 3 of Fig. 1e along the line V-V of Fig. 1e, wherein the metal element 3 is illustratively and advantageously a magnetic element 30 covered by a protective layer 31.

In particular for use of the vessel as a drinking glass and in particular for use as a non-slip vessel in a vehicle, the vessel element 1 and the cover 2 of the plastic vessel G of Fig. 1 are advantageously made of copolyester or polycarbonate, and thus transparent with a long service life, so that the vessel G is also suitable in particular for persons with reduced perception and/or attentiveness and/or motor skills. The metal element 3 can in particular advantageously be a neodymium magnet 30 with a protective copper-nickel coating. Copolyester or polycarbonate is particularly suitable as the plastic and neodymium is particularly suitable as a powerful permanent magnet for use of the vessel as a decorative element, for example on vertical walls of, for example, a refrigerator and/or in the vicinity and in interaction with light sources. In this connection, a weight ratio of plastic to magnetic element of approximately 5:1 and a volume ratio of plastic:metal corresponding to the weight ratio can be particularly suitable so as to allow the vessel to also be suspended or stored upside down over a longer period of time with its base facing upwards and its opening downwards, for example in the gastronomy sector, so that the interior of the vessel is largely protected from dust and dirt.

Fig. 2a shows the enlarged section A of Fig. 1d in cross-section through the vessel G of Fig. 1 along the line V-V of Fig. 1d with the bottom 101 of the vessel element 1 and the base 10 of the vessel element 1 with its cover 2 and with its embedded metal element 3.

Fig. 2b shows the base 10 of the vessel element 1 of Fig. 2a, Fig. 2c shows the metal element 3 of Fig. 2a, and Fig. 2d shows the cover 2 of the vessel element 1 of Fig. 2a, wherein Figs. 2b, c and d, when viewed together, show the base 10 of the vessel element 1 with the accommodated metal element 3 and with the cover 2 as an exploded illustration of Fig. 2a, and wherein the arrows S13 and S12 further indicate the direction of their assembly to form the completed base 10 of the vessel element 1 of Fig. 2a, as well as successive steps of the method for producing a plastic vessel G according to the invention, wherein in one step the metal element 3 is positioned in its intended position on the vessel element 1 in the direction S13, whereupon in a further step the cover 2 is connected to the vessel element 1 in the direction S12 and the magnet element 3 is enclosed and accommodated by the vessel element 1 and the cover 2 in the process.

The vessel element 1 of Figs. 2a and b comprises a lower outer edge 11, which encloses a lower recess 12 formed in its base 10. The cited vessel element 1 comprises an inner edge 13 spaced apart from the outer edge 11, which surrounds a central region 14 of the recess 12 for

accommodating the metal element 3, wherein a region 15 of the recess 12 is provided between the inner edge 13 and the outer edge 11, which surrounds the central region 14.

The cover 2 of Figs. 2a and 2d comprises an arc 25 which rises relative to its central region 24 and which surrounds the central region 24, wherein the arc 25 is formed so as to correspond to the recess 15 so that, when the region 14 is covered with the cover 2, the arc 25 is arranged in the recess 15, and wherein the arc 25 of the cover 2 has an outer edge 21, which is the outer edge 21 of the cover 2, and which corresponds to the outer edge 11 of the vessel element 1 and which is arranged adjacent thereto. The arc 25 of the cover 2 also has an inner edge 23, which corresponds to the inner edge 13 of the vessel element 1 and which is arranged adjacent to the inner edge 13. The cover 2 thus has a meandering structure in the sectional illustration of Figs. 2a and d, the profile of which corresponds to the profile of the base 10 of the vessel element 1. The meandering structure thus enables by means of its surface, which is brought into direct contact with the surface of the profile of the base 10 of the vessel element 1, a particularly stable connection of the cover 2 with the vessel element 1.

The cited structure of the cover 2 and of the vessel element 1 is particularly advantageous for the production of a plastic vessel according to a preferred embodiment of the invention in which an already completely contracted cover 2 is connected to an incompletely hardened vessel element 1 at a predetermined temperature inside the plastic of approximately 120 degrees for copolyester and polycarbonate under the action of pressure and wherein, during the remaining contraction of the vessel element 1, the vessel element 1 in this embodiment of the invention presses radially from the outside in the direction R against the cover 2 and a permanent connection is thereby facilitated.

The central region 14 for accommodating the metal element 3 appropriately corresponds essentially to the metal element 3 of Figs. 2a and 2c, which is formed so as to be flat and cylindrical, so that the accommodated metal element 3 is arranged adjacent to the bottom of the inner region 14, to the inner edge 13 of the vessel element 1 and to the central region 24 of the cover, and is supported by the latter.

In the embodiment of the invention of Fig. 2, the edge 11 of the vessel element 1 and the adjacent edge 21 of the cover 2 further appropriately form approximately one level 110 on which a mounted vessel G rests.

Fig. 3a shows a schematic illustration of the vessel element 1 of Figs. 2a and b from below, i.e. from the side facing the cover 2 with the recess 12, the central region 14 of the recess 12, the inner edge 13, the outer region 15 of the recess 12 and the outer edge 11.

Figs. 3b and c respectively show the cover 2 of the vessel element 1 of Figs. 2a and d from the side facing away from the vessel element 1 and from the side facing the vessel element 1 with the central region 24, the arc 25, the inner edge 23 of the arc 25 and the outer edge 21 of the arc 25, whereby the cover 2 with the meandering structure according to Figs. 2a and d is essentially formed in the shape of a disk.

Fig. 3d shows an enlarged perspective illustration of the section A of the assembled vessel G of Fig. 1d in an oblique view from below with the base 10 of the vessel element 1, the outer edge 11 of the vessel element 1 and with the outer edge 21, the annular arc 25 and the central region 24 of the cover 2 and with the accommodated metal element 3.

Fig. 4a shows an enlarged illustration of the section A of the base 10 of the vessel element 1 of Fig. 2b, which is axially symmetrical with the axis of symmetry V-V, according to a further advantageous embodiment of the invention, and Fig. 4b shows an enlarged illustration of the section A of the accordingly modified cover 2 of Fig. 2d corresponding to the embodiment of the vessel element 1 of Fig. 4a.

The vessel element 1 of Fig. 4a, which is likewise axially symmetrical with the axis of symmetry V-V, is formed analogously to the vessel element 1 of Figs. 2a and b as a cone tapering towards its base 10, which turns into a cylinder in the region B of its base 10. Unlike the embodiment of Figs. 2a and b, a ridge 11A is additionally formed on the inner side of the outer edge 11, and the inner ring 13 is reduced by a predetermined amount relative to the ring 13 of the embodiment of Figs. 2a and b. The vessel element 1 of Fig. 4a otherwise corresponds to the vessel element 1 of Figs. 2a and b so that reference is made to the corresponding description of said figures in this connection.

The cover 2 of Fig. 4b, which is likewise axially symmetrical with the axis of symmetry V-V, is also formed in the shape of a disk in accordance with the embodiment of Figs. 2a and d with an essentially meandering section through its plane, which comprises the axis of symmetry V-

V of Fig. 1d. Unlike the embodiment of Figs. 2a and d, a step 21A is formed on the outer edge 21, which corresponds to the ridge 11A of the outer edge 11 of the embodiment of Fig. 4a so that, when the cover 2 is arranged on the base 10 of the vessel element of Fig. 4a, the step 21A of the edge 21 latches to the ridge 11A of the edge 11. This is illustrated in Fig. 4c, which shows the section A1 of the cover 2 of Fig. 4b in a view together with the section A1 of the vessel element 1 of Fig. 4a. Fig. 4d shows a variant of the embodiment of the cover 2 of Figs. 4b and c, wherein the step 21A is formed as a groove.

Unlike the embodiment of Figs. 2a and d, a step 23A is further formed on the inner side of the inner edge 23 of the cover 2 in this embodiment, which corresponds to the inner edge 13 so that, when the cover 2 is arranged on the base 10 of the vessel element 1 of Fig. 4a, the step 23A rests on the edge 13. This is illustrated in Fig. 4e, which shows a section A2 of the cover 2 of Fig. 4b in a view together with the section A2 of the vessel element 1 of Fig. 4a.

Otherwise, the cover 2 of Fig. 4b corresponds to the cover 2 of Figs. 2a and d so that reference is made to the corresponding description of said figures in this connection.

The embodiments of the vessel element 1 described in the foregoing with reference to Figs. 4a to e with the ridge 11A and the edge 13 of a predetermined height and the cover 2 formed so as to correspond to the vessel element 1 with the step 21A, which can also be designed as a groove, and with the step 23A, which rests on the edge 13, is particularly advantageous as it allows in particular a secure, durable and tight connection of the cover 2 and the vessel element 1, in particular when an already contracted cover 2 is connected to an incompletely hardened vessel element 1 at a predetermined temperature and with a corresponding thermoplastic shrinkage of the vessel element 1, in particular a radially acting thermoplastic contraction, under the action of an external, in particular axially acting means of pressure during production.

Fig. 5a shows a further advantageous variant of the cover 2 from the side facing the vessel element 1 of Fig. 3c, Fig. 5b shows the other side of the cover of Fig. 5a, and Fig. 5c shows a cross-section through the cover of Fig. 5a along the line S-S of Fig. 5a.

The cover 2 of the embodiment of Fig. 5 is essentially disk-shaped like the cover 2 of Figs. 3b and c and further comprises, unlike the cover 2 of Figs. 3b and c, radial fixed links 26 arranged

so as to be axially symmetrical in relation to the axis of symmetry V-V of Figs. 1d and 5c, which connect the outer edge 21 of the arc 25 to its inner edge 23 and stabilize the cover 2 in particular vis-à-vis forces acting radially from the outside on the edge of the cover 2 during thermoplastic shrinkage of an incompletely hardened vessel element 1 and/or caused by an external means of pressure for providing a predetermined pressure during the connection of the cover 2 to the vessel element 1. In the embodiment of Fig. 5a, three trigonally arranged fixed links 26 are advantageously formed by way of example. Moreover, the fixed links 26 also facilitate an exact positioning of the cover 2 at its predetermined position on the vessel element 1 during production by means of a fitting tool. Otherwise, the cover 2 of Fig. 5 corresponds to the cover 2 of Figs. 2, 3 and 4 so that reference is made to the corresponding description of said figures in this connection.

Fig. 6a and 6b show a schematic illustration of an advantageous step of an embodiment of the method according to the invention for producing the present invention during the fitting of a metal element 3 comprising a magnet with an axial polarity onto the vessel element 1. The vessel element 1 is arranged on a magnetic mandrel 4, which can appropriately be a permanent magnet. The magnetic mandrel 4 is polarized in such a manner that a predetermined orientation of the polarity of the metal element 3 is defined when the metal element 3 is fitted in its predetermined position on the base 10 of the vessel element 1.

Fig. 6a shows the fitting of the metal element 3 by means of a fitting tool (not shown for the sake of clarity), wherein the polarity of the metal element 3 is oriented so that the metal element 3 is attracted by the magnetic mandrel 4.

Fig. 6b shows the fitting of the metal element 3, wherein the polarity of the metal element 3 exhibits an inverse orientation relative to the polarity of the metal element 3 of Fig. 6a during the fitting with the result that a torque M is exerted on the metal element 3 by the magnetic mandrel 4, whereby the metal element 3 is rotated into an orientation corresponding to the orientation of the metal element 3 of Fig. 6a so that the metal element 3 is likewise attracted by the mandrel 4 and is arranged in its predetermined position on the base of the vessel element 1.

The provision and use of a mandrel 4 according to the invention as described above during the fitting of a magnetic metal element 3 on the vessel element 1 is particularly advantageous for a

simple and cost-effective production of stackable vessels G with integrated magnetic metal elements 3, as an identical orientation of the polarity of the metal element 3 is ensured.

By providing a second mandrel 4 (not shown in Fig. 6 for the sake of clarity) with a permanent magnet with an inverse polarity, it is also possible, for example, to define the polarity of the magnetic metal element 3 of a predetermined first series of vessels G, while a predetermined second series can be provided in a simple manner with an inversely poled magnetic metal element 3. The first and second series can also differ in an appropriate manner by the formation of further distinguishing features such as, for example, a different simple coloration according to the invention of the coverings 2 respectively prefabricated for a series.

The production of different series of vessels G with inversely poled magnetic metal elements 3 can be desirable in particular for a use as a decorative element according to the invention, as such vessels can be implemented so as to adhere to one another in pairs at their base. For instance, two vessels G which are formed so as to be particularly flat, for example in the shape of a shell, can adhere to one another on opposite sides of, e.g., a shower curtain; alternatively, such vessels of different series can be used not only individually but also, for example, as composite vessels G such as, for example, elevated drinking vessels or flower vases, wherein one vessel respectively acts as an enlarged base of the thus assembled vessel, etc..

In order to provide a first and second magnetic mandrel 4 for producing in a simple manner in particular different series of vessels G with a predetermined different polarity of the magnetic metal element 3, instead of differently poled mandrels 4 with permanent magnets, it is also possible to provide a suitable electromagnet for providing a defined predetermined orientation of the polarity of the magnet element 3 in merely one mandrel 4, the polarity of the electromagnet being easily reversible.

Fig. 6c shows a variant of the vessel 1 of Fig. 1d in which the vessel 1 further accommodates an RFID tag 5 together with the metal element 3, wherein the RFID tag 5 is illustratively arranged underneath the metal element 3.

Fig. 7 shows a schematic flowchart of the essential steps of an embodiment of a preferred method for producing a vessel G according to the invention, the cover 2 is produced wherein in a first step S1 by means of injection molding. After its production, the cover 2 is supported in a

second step S2 until its contraction is completed. In a third step S3, the vessel element 1 is produced by means of injection molding and is cooled down in a fourth step S4 to a predetermined working temperature at which the vessel element 1 still has a predetermined ductility, at which the shrinkage of the vessel element 1 is not yet completely terminated.

Subsequently, at the predetermined working temperature of the vessel element 1, the vessel element 1 is fitted in a fifth step S5 with the metal element 3, wherein the metal element 3 is arranged in the central region 14 of the vessel element 1. In a further sixth step S6, the completely shrank cover 2 is connected at the predetermined working temperature with the vessel element 1 under the action of pressure and cooled down so that the vessel element 1 forms a permanent connection with the cover and the complete plastic vessel is provided with the metal element 3 accommodated in its base 10.

When an RFID tag 5 is also accommodated together with the metal element 3, the RFID tag 5 can first be appropriately connected to the metal element 3 and, subsequently, the vessel 1 can be fitted with the RFID tag 5 and the metal element 3 in step S5. For example, the RFID tag 5 can be adhesively bonded to the metal element 3 to this end and/or a metallic antenna element of the RFID tag can adhere to a magnetic metal element 3 due to its magnetic properties.

The present invention is described in an illustrative manner in the foregoing with reference to Figs. 1 to 7 on the basis of a vessel G advantageously formed in an axially symmetrical manner and comprising a conical vessel element 1 tapering towards its base 10, although it is nevertheless clear that a plastic vessel which accommodates a metal element 3 according to the invention can also be formed and produced in many other conceivable geometries and shapes with, e.g., a square, hexagonal or oval cross-section of the vessel element 1 and/or of the cover 2, etc.

Reference Signs

1	Vessel element
10	Base
101	Bottom
11	Outer edge
11A	Inner ridge

110	Lower level, base level
12	Recess
13	Inner edge
14	Central region
15	Outer region
2	Cover
21	Outer edge
21A	Step
23	Inner ridge
23A	Step
24	Central region
25	Arc
26	Fixed link
3	Metal element
30	Magnet
31	Layer
4	Mandrel
5	RFID tag

PATENTKRAV

1. Kunststofbeholder, der i sin bund (10) indeholder et metalelement (3), hvor

kunststofbeholderen i to dele er udformet med et beholderelement (1) og en afdækning (2), hvor der i beholderelmentets (1) fod (10) er udformet en udskæring (12), hvor udskæringen er dækket af afdækningen (2) på en sådan måde, at et centralt aflukket område (14) af udskæringen (12) er til rådighed, der indeholder metalelementet (3), kendetegnet ved, at beholderelementet (1) og afdækningen (2) under trykpåføring på grund af beholderelementets (1) termoplastiske sammentrækning ved hærdet afdækning (2) eller på grund af afdækningens (2) termoplastiske sammentrækning ved hærdet beholderelement (1) er forbundet termoplastisk med hinanden, hvorved afdækningen (2) har en i gennemsnit mæanderformet struktur, hvis profil korresponderer med strukturen for beholderelementets (1) fod (10), og hvor

beholderelementet (1) omfatter en nedre ydre rand (11), der omslutter udskæringen (12) og omfatter en indre rand (13) med afstand til den ydre rand (11), der omgiver det centrale område (14), hvor der imellem den indre (13) og ydre rand (11) er et område (15) af udskæringen (12) til rådighed, der omgiver det centrale område (14), og hvor afdækningen (2) har en bue (25), der hæver sig over et centralt område (24) af afdækningen (2), og som omgiver det centrale område (24), og hvor buen (25) er udformet korresponderende med udskæringen (15) på en sådan måde, at buen (25) ved afdækning af området (14) med afdækningen (2) er anbragt i udskæringen (15).

2. Kunststofbeholder ifølge krav 1, hvor

afdækningens (2) bue (25) har en ydre rand (21), der er den ydre rand (21) af afdækningen (2),

og som korresponderer med beholderelementets (1) ydre rand (11) og er anbragt ved siden af denne, og afdækningens (2) bue (25) har en indre rand (23), der korresponderer med beholderelementets (1) indre rand (13) og er anbragt ved siden af denne.

3. Kunststofbeholder ifølge krav 2, hvor

der ved beholderelementets (1) ydre rand (11) på indersiden er udformet en omløbende vulst (11A), og hvor der ved afdækningens (2) ydre rand (21) på ydersiden er udformet et trin (21A), der korresponderer med vulsten (11A), og hvor

vulsten (11A) er låst sammen med trinnet (21A), og hvor

der ved buens (25) indre rand (23) er udformet et trin (23A), der korresponderer med beholderelementets (1) indre rand (13) på en sådan måde, at den indre rand (23) er anbragt ved

siden af den indre rand (13) og trinnet (23A) dermed derudover ligger på den indre rand (13).

4. Kunststofbeholder ifølge et af kravene 2 eller 3, hvor beholderelementet (1) er udformet som en mod foden (10) af beholderen tilspidset konus, der i fodens (10) område går over i en cylinder, og hvor

afdækningens (2) ydre rand (21) er forbundet med den indre rand (23) i afdækningens (2) bue (25) ved hjælp af mindst tre radiale mellemstykker (26), der er anbragt symmetrisk i forhold til hinanden.

5. Kunststofbeholder ifølge et af foregående krav 1 til 4, hvor:
kunststofbeholderen er et drikkeglas af polykarbonat eller copolyester, og
metalelementet (3) er en neodymmagnet med en kobber-/nikkelbelægning.

6. Kunststofbeholder ifølge et af foregående krav 1 til 5, hvor:
udskæringens (12) centrale, aflukkede område (14) foruden metalelementet (3) derudover indeholder et RFID-tag (5).

7. Fremgangsmåde til fremstilling af kunststofbeholderen ifølge et af kravene 1 til 6, med trinnene:

- i et første trin (S1) fremstilles afdækningen (2) ved sprøjtestøbning;
- opbevaring af afdækningen (2) i et andet trin (S2) så længe, indtil dens sammentrækning er afsluttet;
- i et tredje trin (S3) fremstilles beholderelementet (1) ved sprøjtestøbning;
- i et fjerde trin (S4) afkøles beholderelementet (1) til en forudbestemt arbejdstemperatur, hvor beholderelementet (1) stadig har en forudbestemt duktilitet, og hvor beholderelementets (1) sammentrækning stadig ikke er helt afsluttet;
- i et femte trin (S5) bestykkes beholderelementet (1) ved beholderelementets (1) forudbestemte arbejdstemperatur med metalelementet (3), hvor metalelementet (3) anbringes i beholderelementets (1) centrale område (14); og
- i et sjette trin (S6) presses den stadigt sammentrækkende afdækning (2) ved den forudbestemte arbejdstemperatur sammen med beholderelementet (1) under trykpåføring og afkøles, således at beholderelementet (1) indgår en uløselig forbindelse med afdækningen, og den komplette kunststofbeholder er til rådighed med metalelementet (3), der er indeholdt i dens fod (10).

8. Fremgangsmåde til fremstilling af kunststofbeholderen ifølge et af kravene 1 til 6, med trinnene:

- i et første trin (S1) fremstilles beholderelementet (1) ved sprøjtestøbning;
- opbevaring af beholderelementet (1) i et andet trin (S2) så længe, indtil dets sammentrækning er afsluttet;
- i et tredje trin (S3) fremstilles afdækningen (2) ved sprøjtestøbning;
- i et fjerde trin (S4) afkøles afdækningen (2) til en forudbestemt arbejdstemperatur, hvor afdækningen (2) stadig har en forudbestemt duktilitet, og hvor afdækningens (2) sammentrækning stadig ikke er helt afsluttet;
- i et femte trin (S5) bestykkes beholderelementet (1) med metalelementet (3), hvor metalelementet (3) anbringes i beholderelementets (1) centrale område (14); og
- i et sjette trin (S6) presses afdækningen (2) ved dens forudbestemte arbejdstemperatur sammen med beholderelementet (1) under trykpåføring og afkøles, således at beholderelementet (1) indgår en uløselig forbindelse med afdækningen (2), og den komplette kunststofbeholder er til rådighed med et metalelement (3), der er indeholdt i dens fod (10).

9. Fremgangsmåde ifølge krav 7 eller 8 med en forudbestemt arbejdstemperatur på omkring 120 grader og med polykarbonat eller copolyester som anvendt kunststof.

10. Fremgangsmåde ifølge et af kravene 7 til 9 derudover indeholdende et yderligere trin efter sammenpresning af beholderelement (1) og afdækning (2), hvor samlingen imellem beholderelement (1) og afdækning (2) derudover forsynes med en svejsning.

11. Fremgangsmåde ifølge et af kravene 7 til 10, hvor beholderelementet (1) mindst ved bestykningen er anbragt med et metalelement (3) omfattende en magnet (30) på en magnetisk dorn (4) med dens fod opad, således at i det femte trin ved bestykning af beholderelementet (1) med metalelementet (3) angives en forudbestemt polaritet for en aksialt polet magnet (30).

12. Anvendelse af en kunststofbeholder med et metalelement (3) omfattende en magnet (30) ifølge et af kravene 1 til 6 som drikkebeholder i samspil med et transportmiddel og/eller i enhver form for køretøj og/eller til håndtering af personer med begrænset motorik og/eller varetagelse og/eller opmærksomhed og/eller som dekorativt element.

Fig. 1a

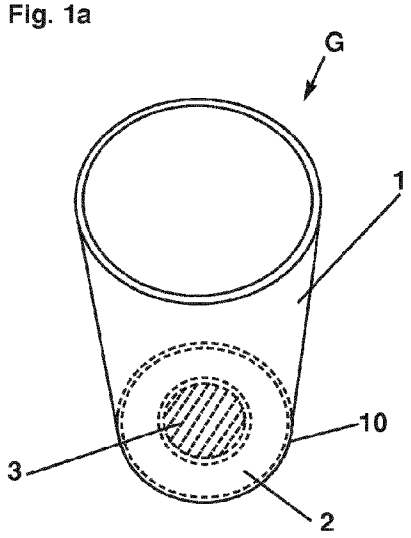

Fig. 1b

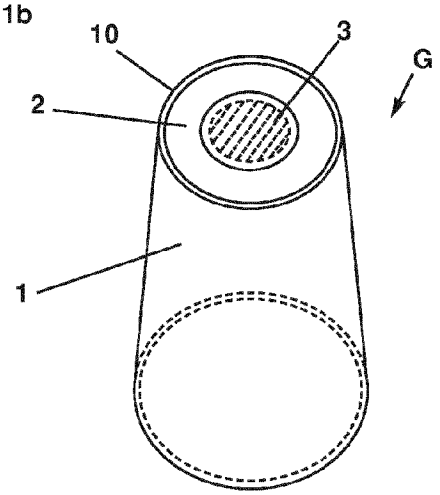

Fig. 1c

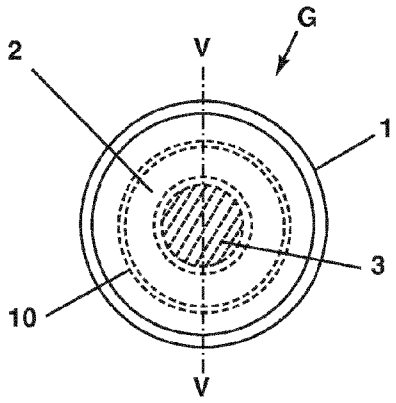

Fig. 1d

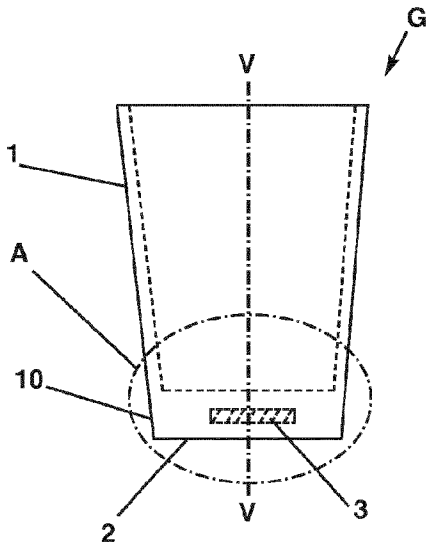

Fig. 1e

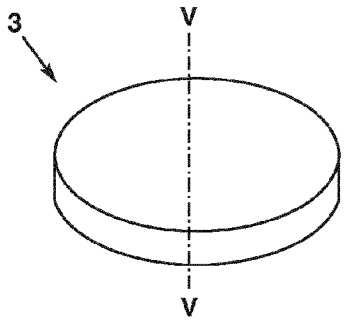

Fig. 1f

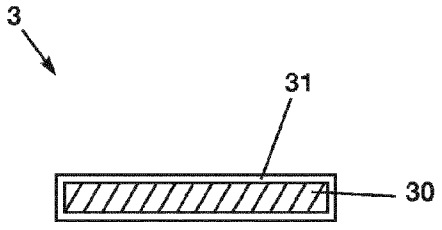

Fig. 2a

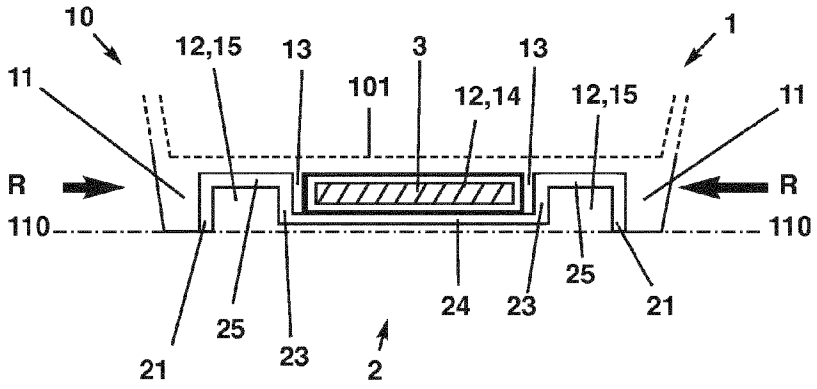

Fig. 2b

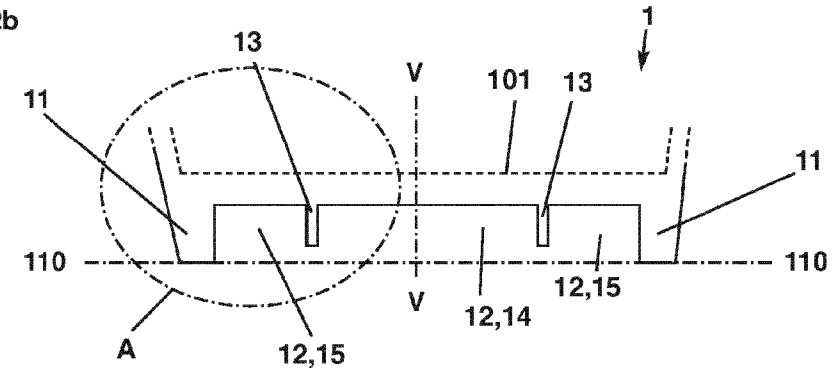

Fig. 2c

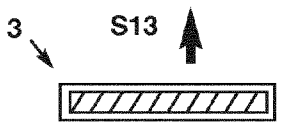

Fig. 2d

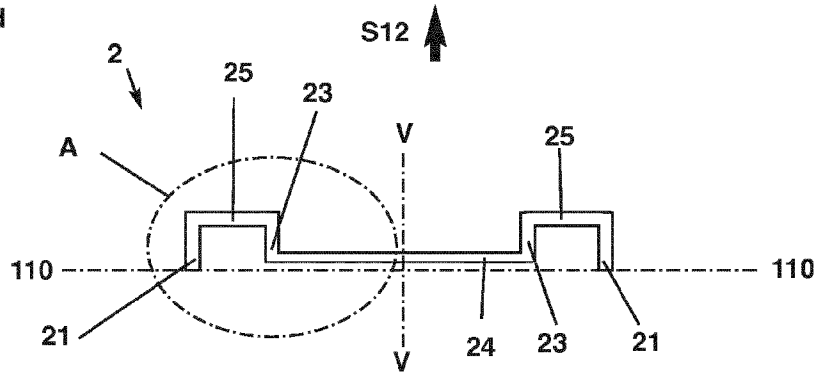

Fig. 3a

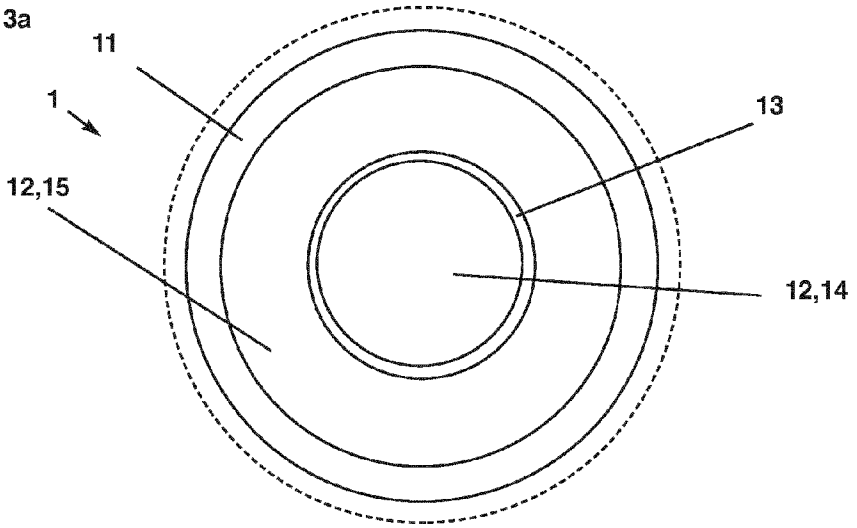

Fig. 3b

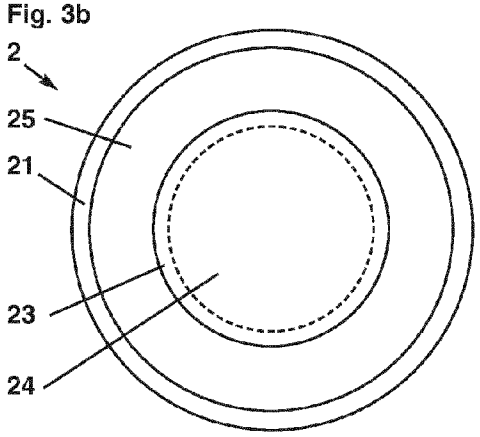

Fig. 3c

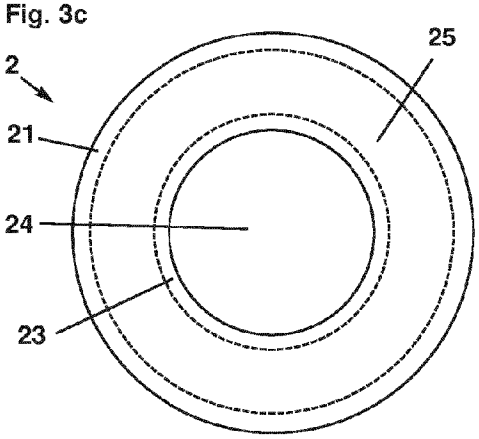

Fig. 3d

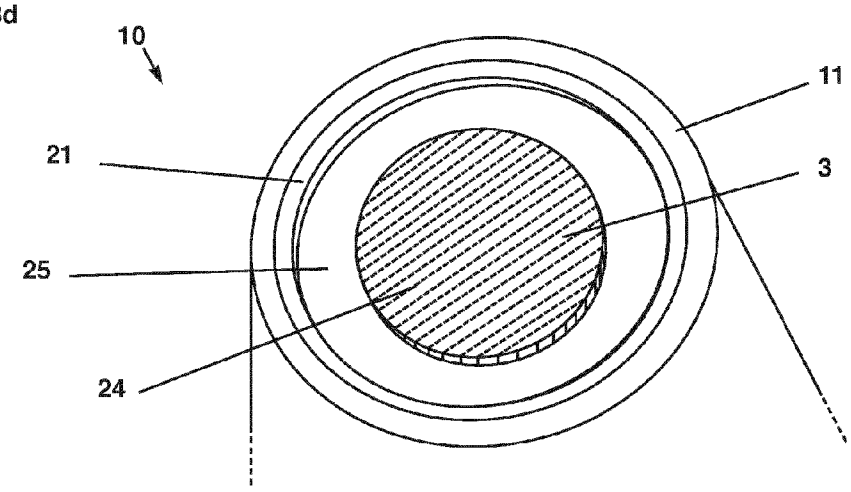

Fig. 4a

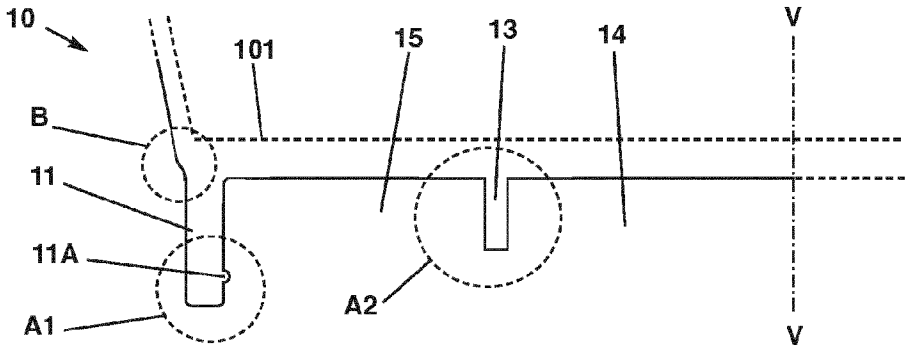

Fig. 4b

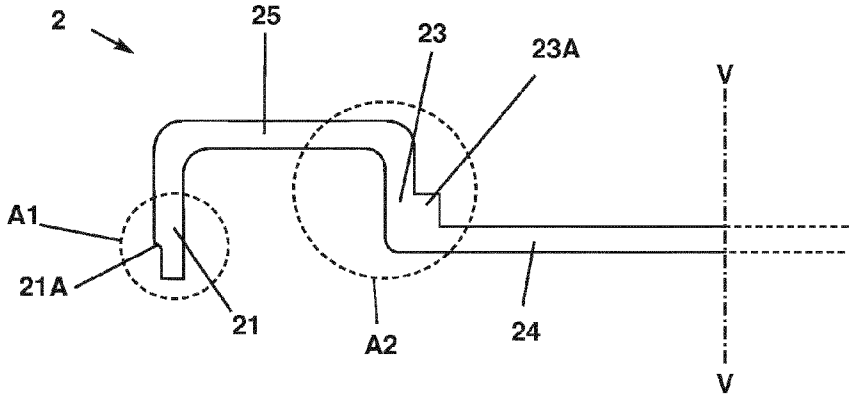

Fig. 4c

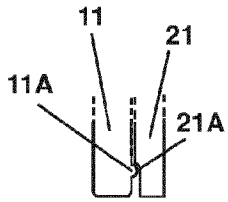

Fig. 4d

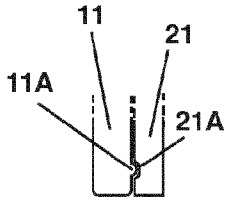

Fig. 4e

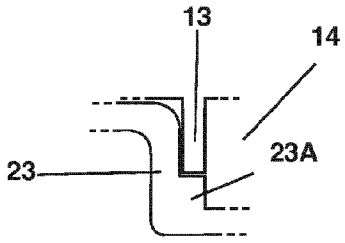

Fig. 5a

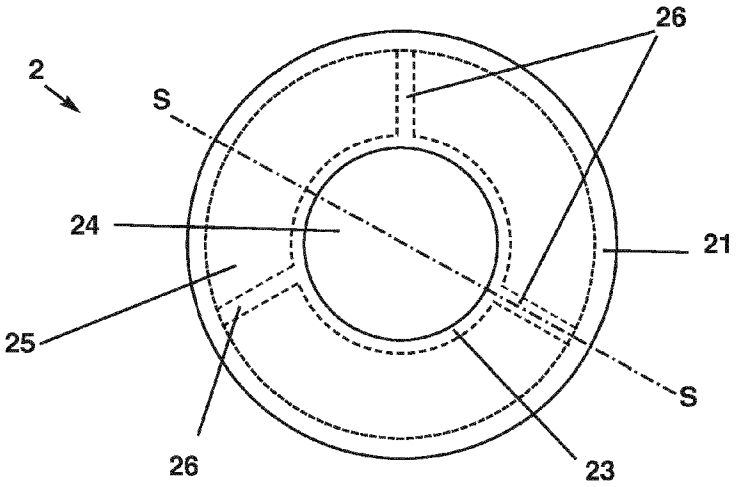

Fig. 5b

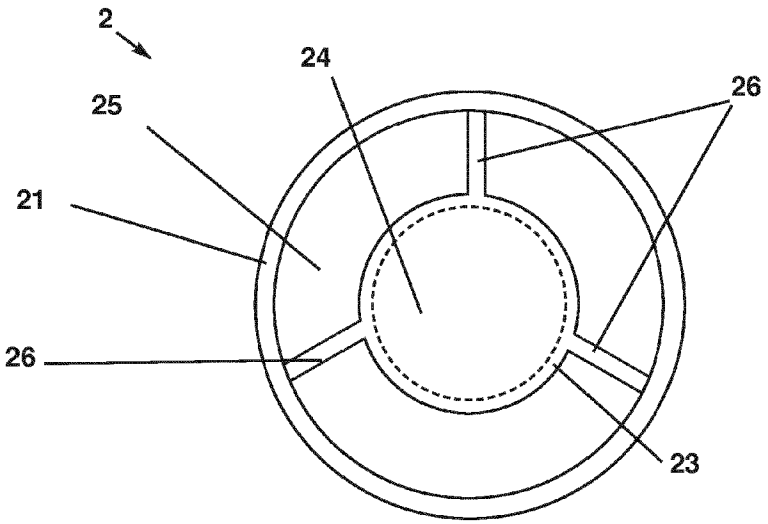

Fig. 5c

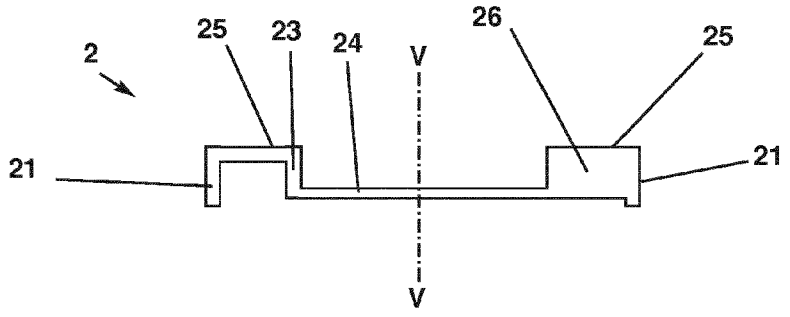

Fig. 6a

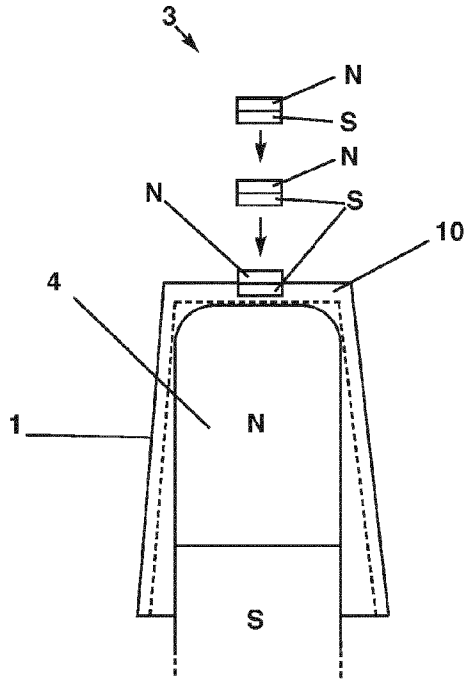

Fig. 6b

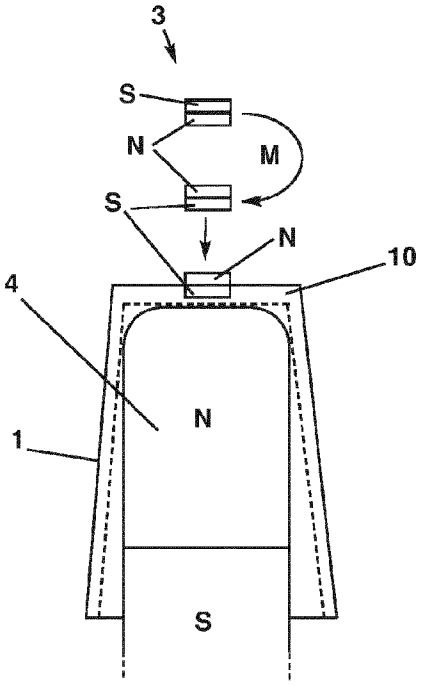

Fig. 6c

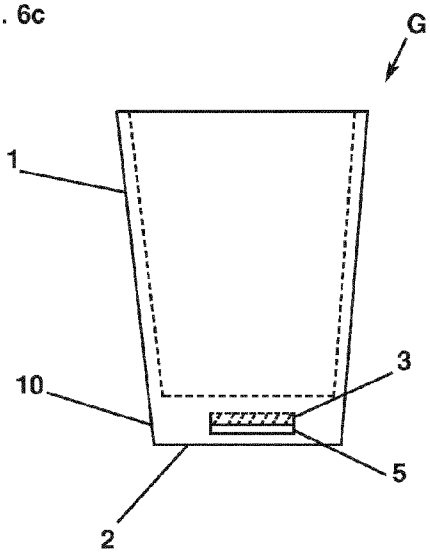

Fig. 7