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(54) **PACKAGE FOR CHANGING A STORED PRODUCT TEMPERATURE PRIOR TO THE OPENING THEREOF**

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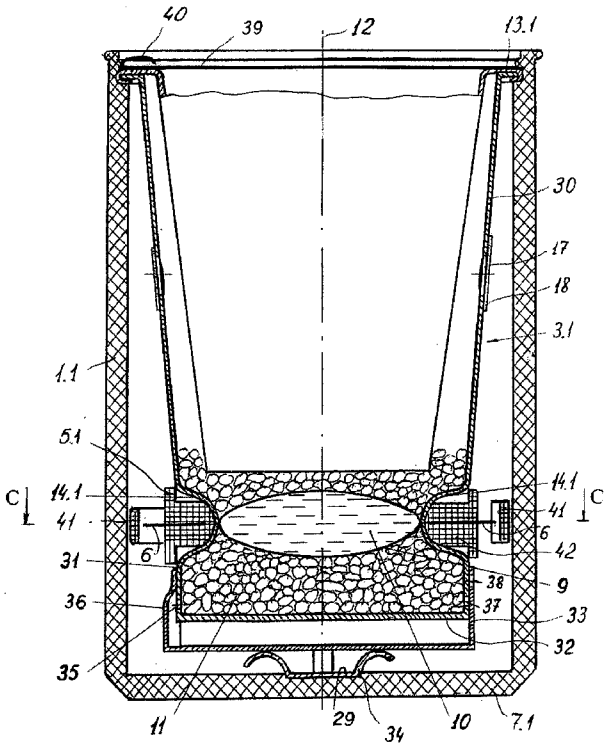
(57) **ABSTRACT**

The invention relates to the food industry. The inventive package comprises a thermal module (**3**) placed in a heat insulating body (**1**) and having an activator including holder, (**5**) with at least one piercing member (**6**) installed thereon and having a tip. Arranged in a thermal module case are: a stored product container (**4**) hermetically connected thereto, a solid reagent (**11**), and a closed compartment (**9**) formed of a material capable to be pierced, containing a liquid reagent (**10**). Recesses (**14**) are formed as grooves or holes at equal angular distances relative to each other in a sidewall of the thermal module case at least oppositely to the closed compartment (**9**) arranged therein. An internal surface area of each recess (**14**) is arranged at a minimum gap or closely to the closed compartment. The heat insulating body (**1**) is formed with a bottom (**7**) and a sidewall flexed at application of a radially directed external load by a user, while the holder (**5**) of the activator is installed to sense the external load when the sidewall of the heat insulation case flexes and to move the piercing member (**6**) installed on the holder (**5**) under action of said load in a radial direction, the tip of said piercing member being arranged in its respective recess (**14**) formed in the sidewall of the thermal module case oppositely of the closed compartment (**9**). A distance between the tip of the piercing member (**6**) and the closed compartment (**9**) with the liquid reagent (**10**) is smaller than a maximum flexure value of the sidewall of the heat insulating body (**1**).



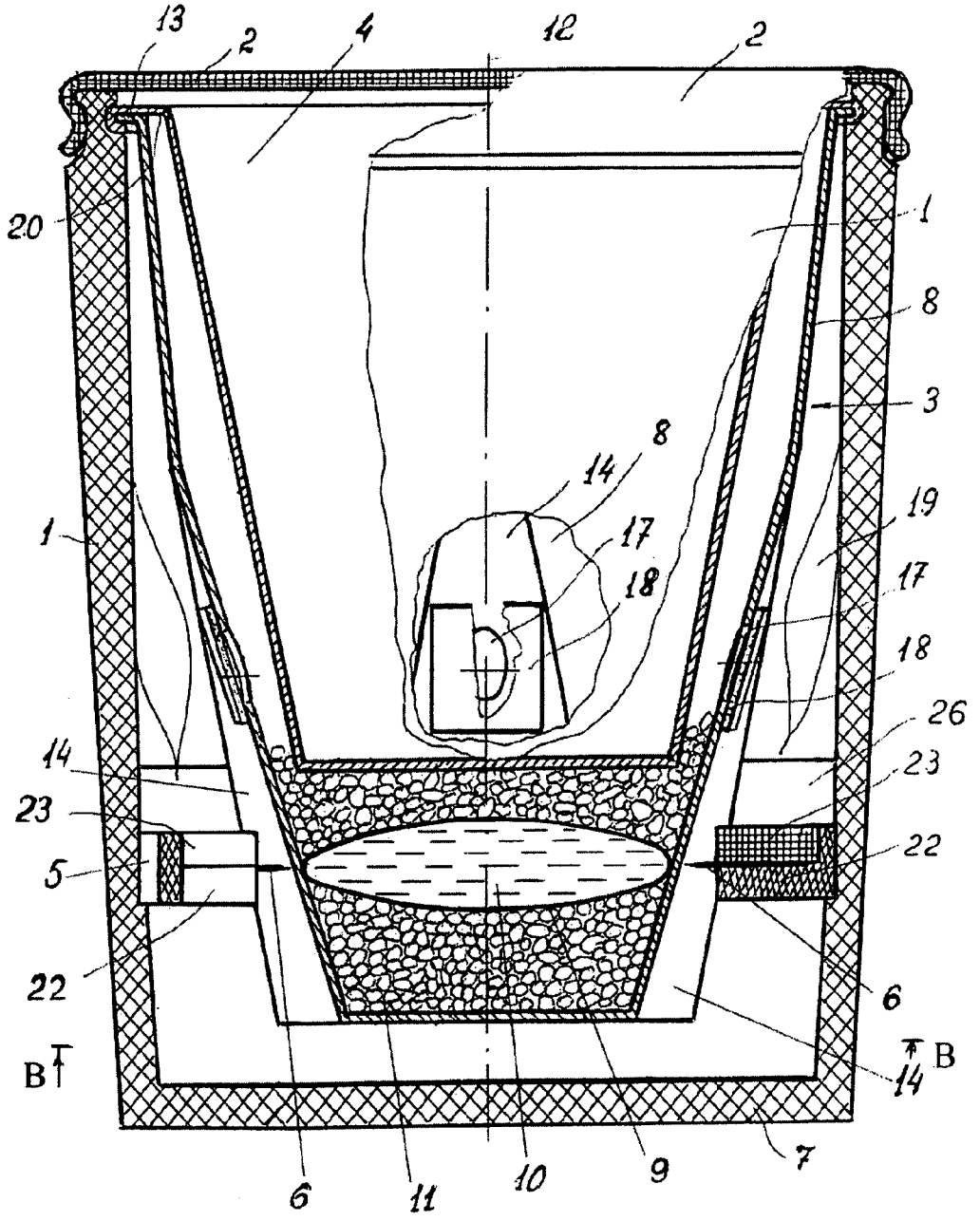

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Fig.1

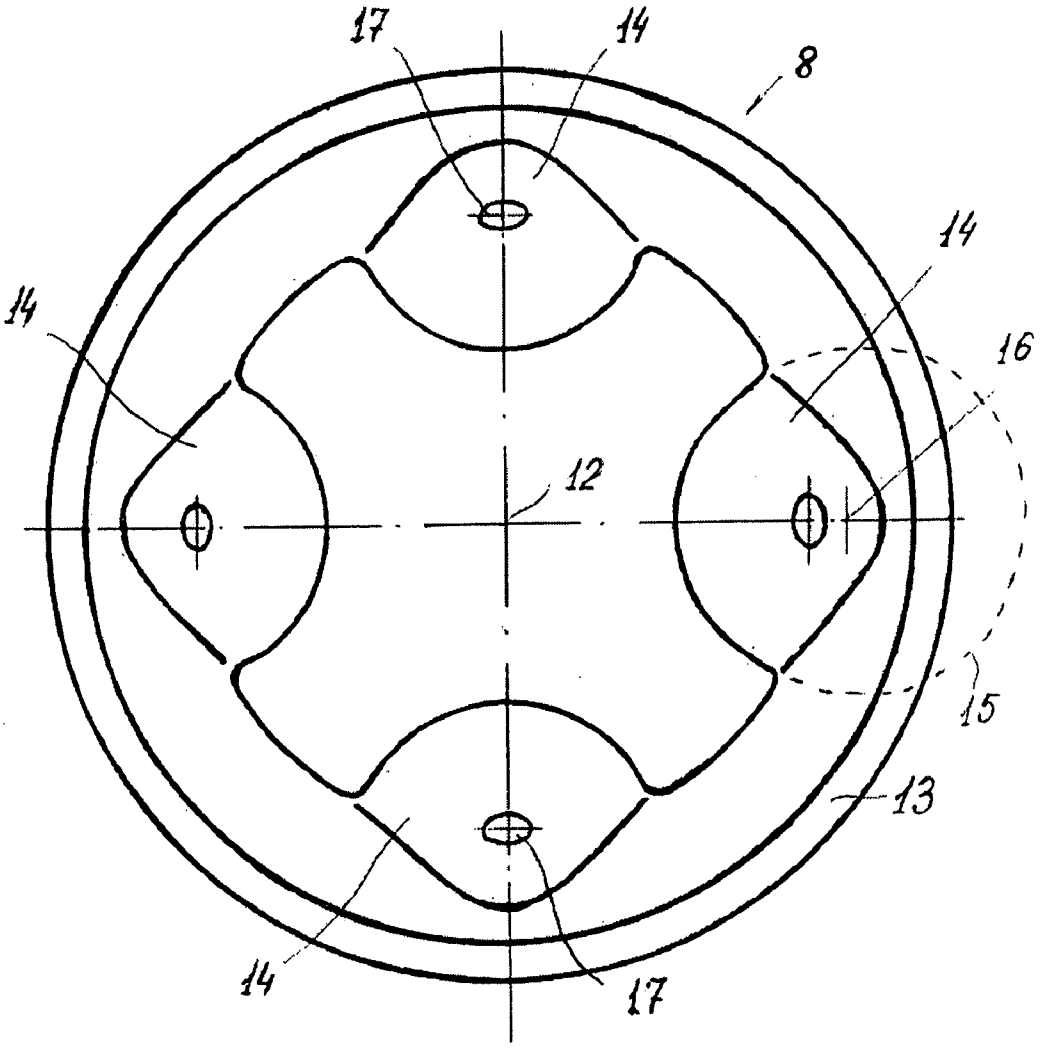
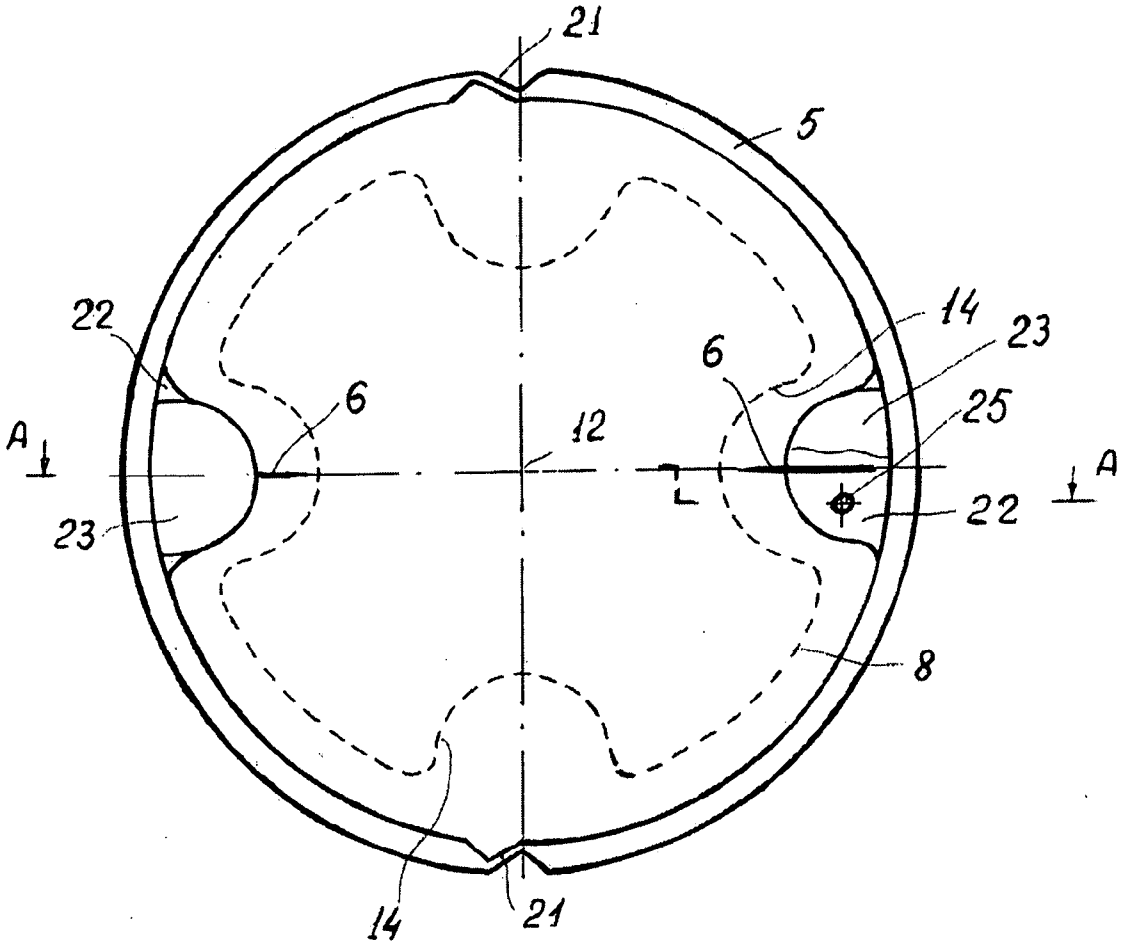


Fig.2



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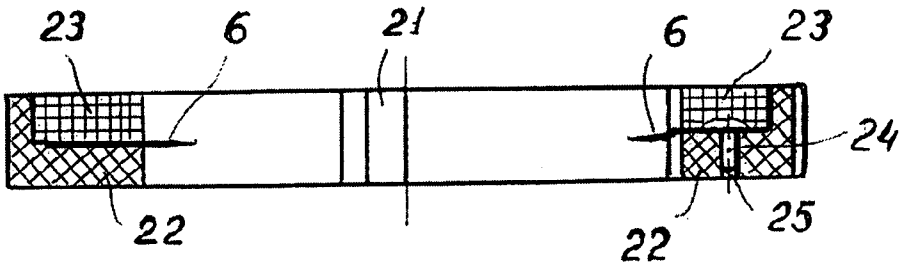

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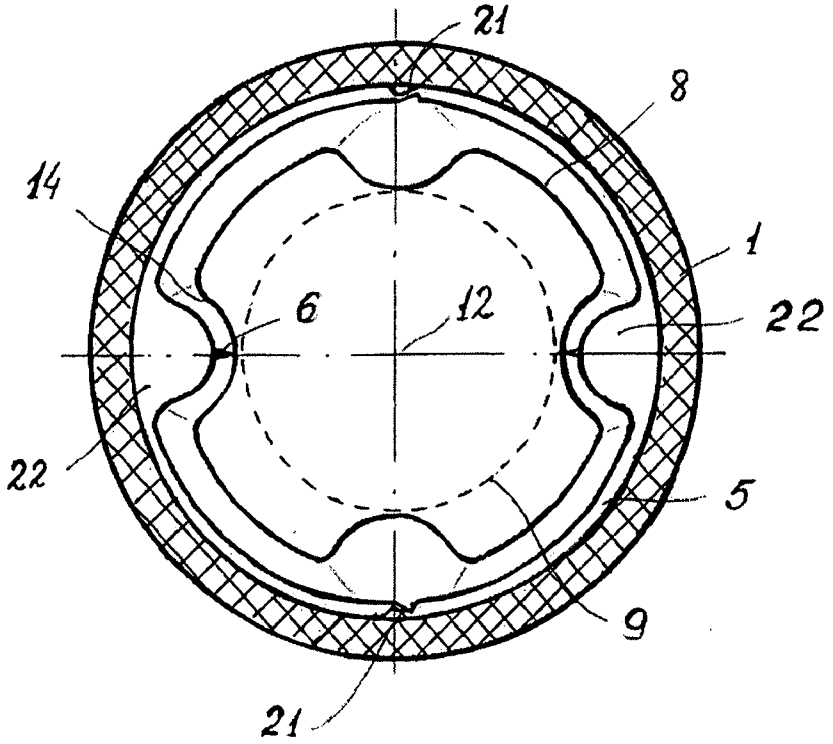

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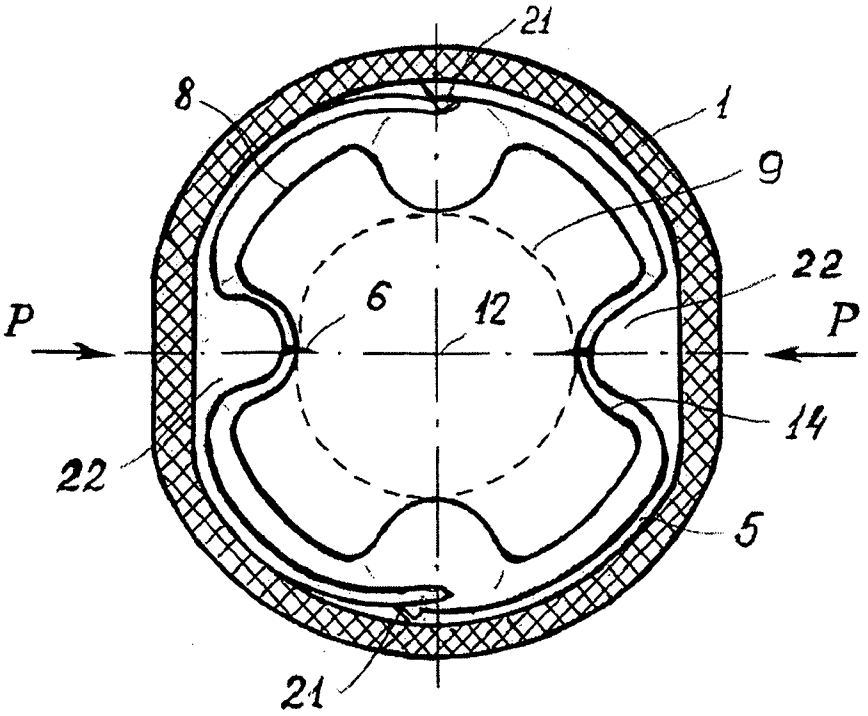
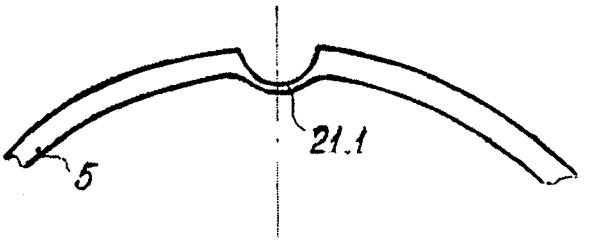


Fig.6



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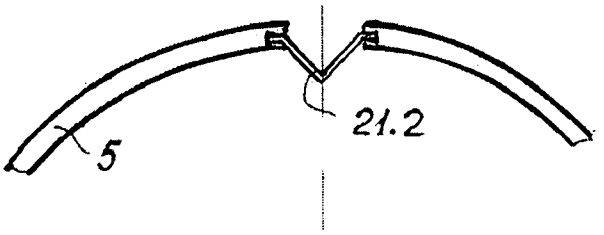
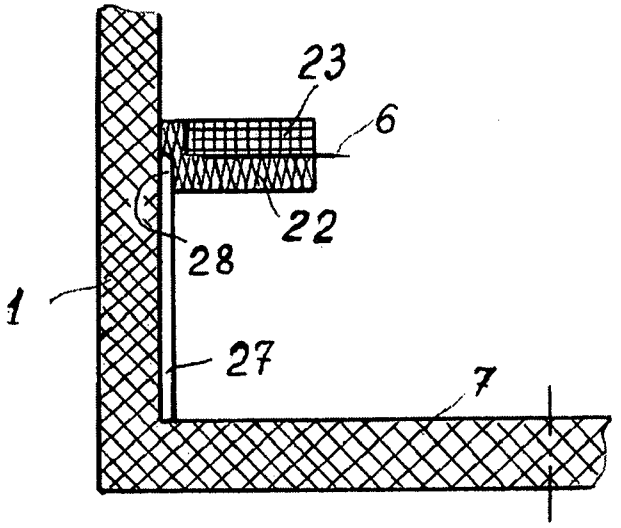


Fig.8



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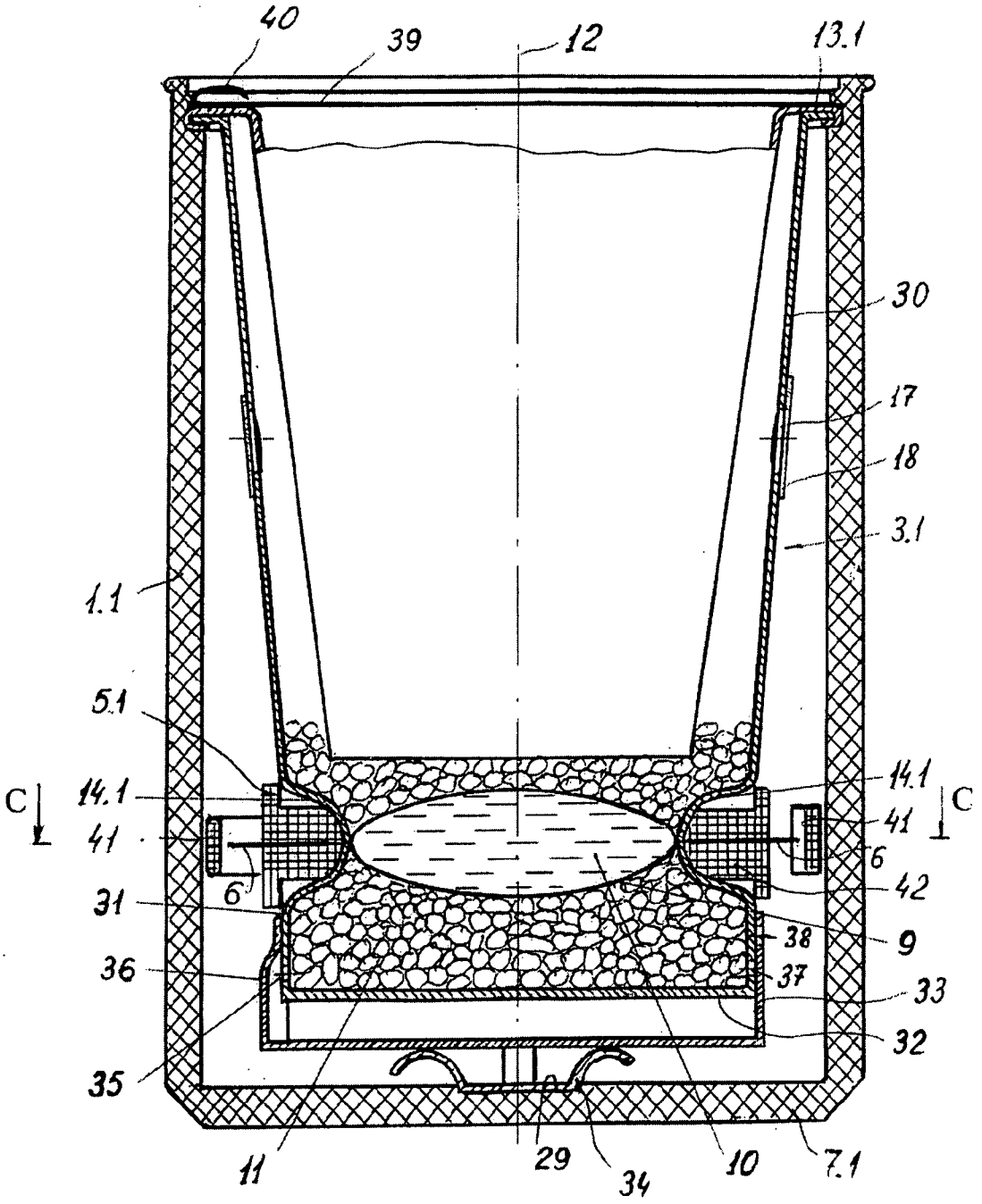
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Fig.10

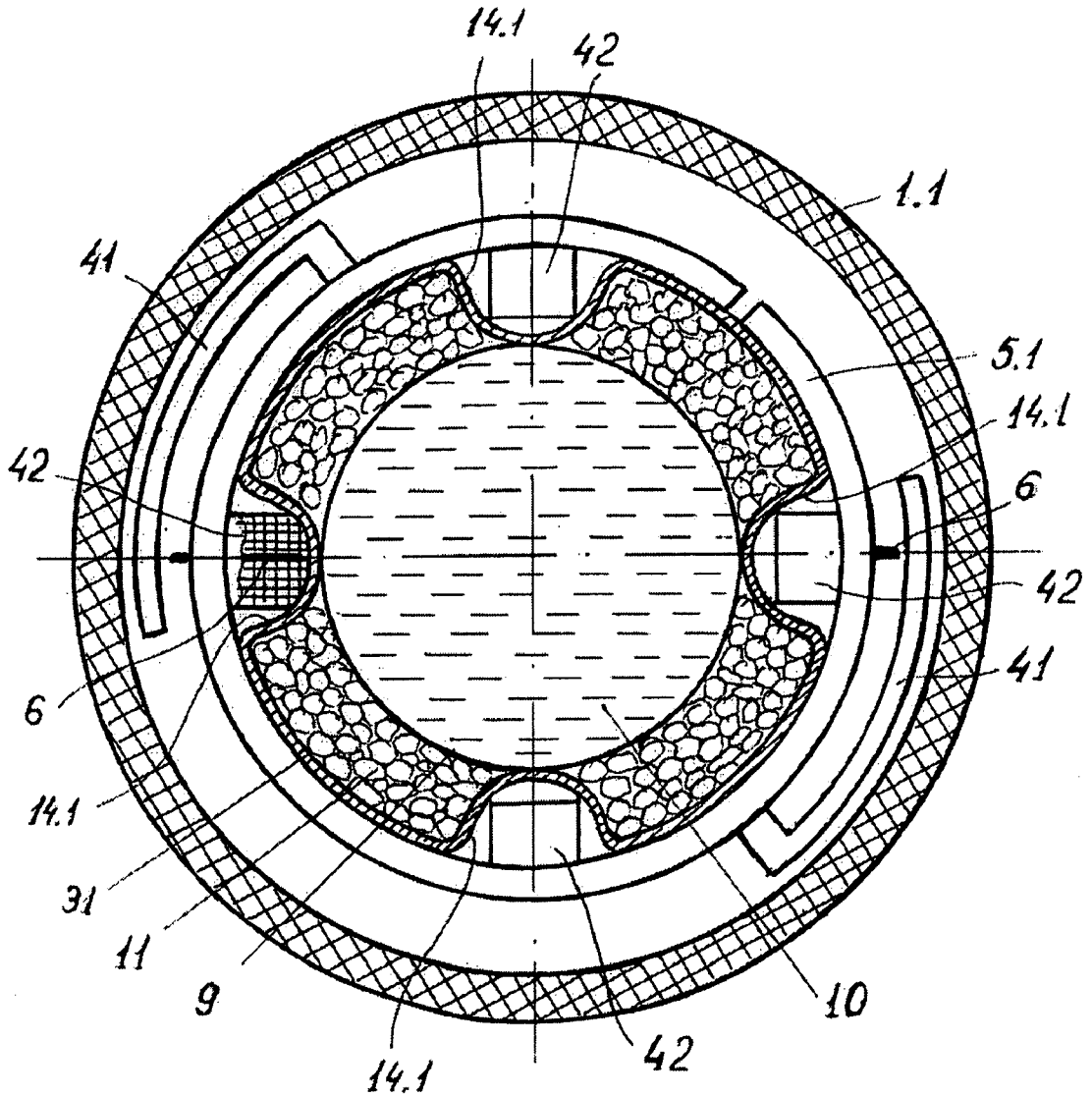

Fig.11

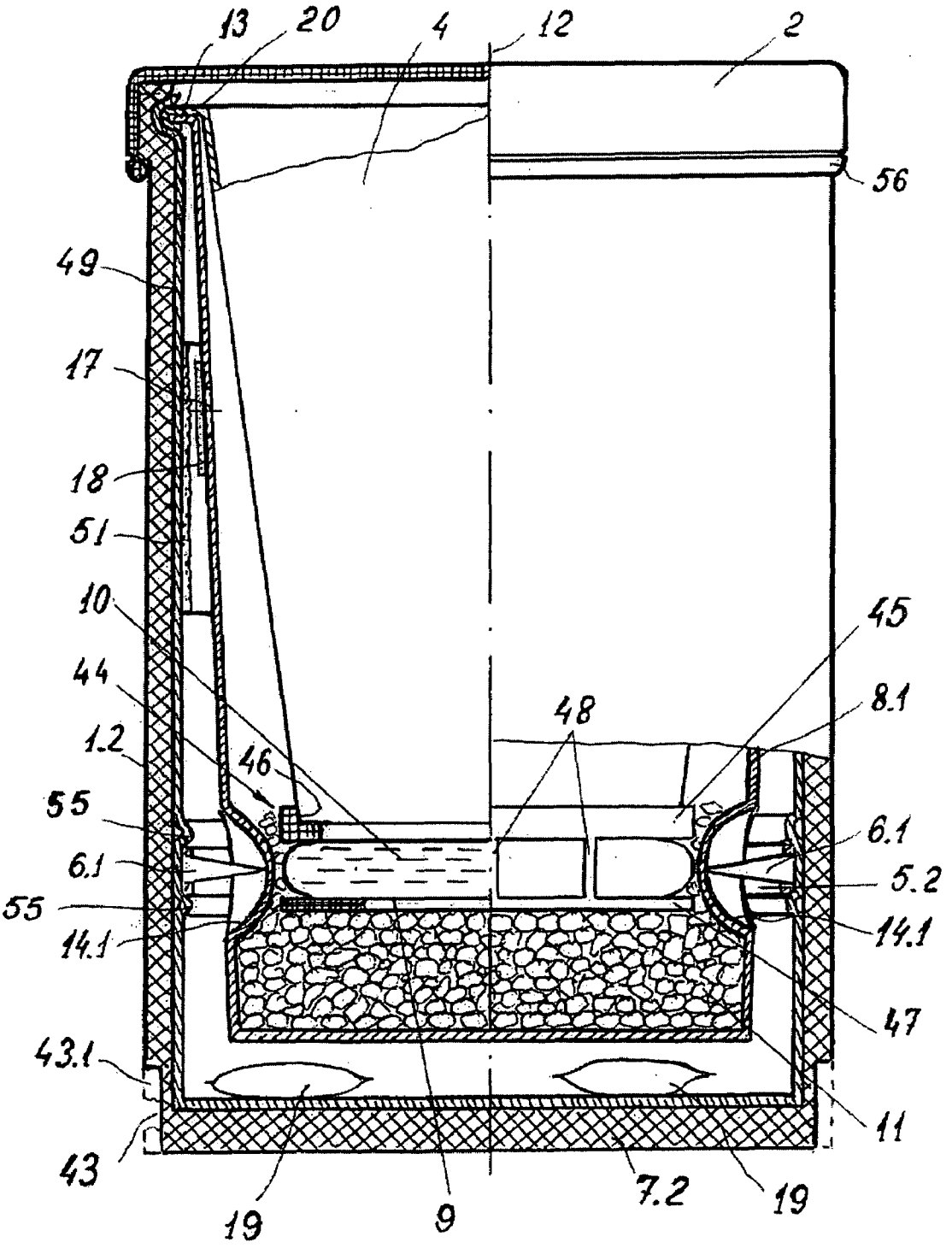
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Fig.12

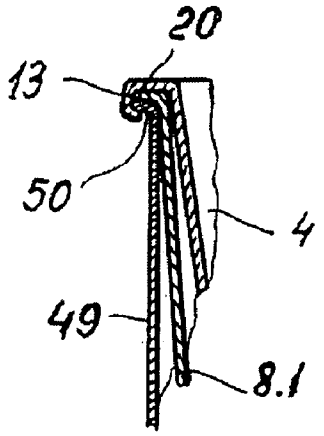

Fig.13

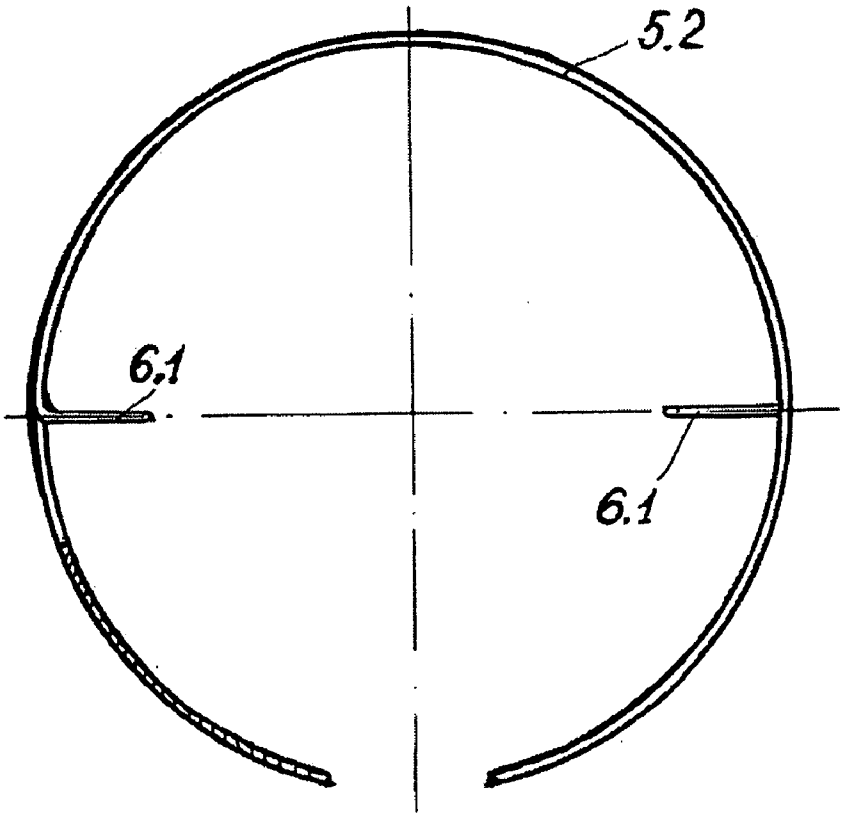

Fig.14

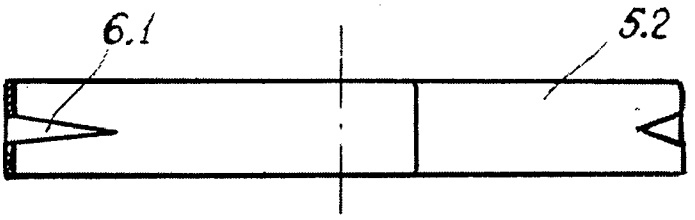

Fig.15

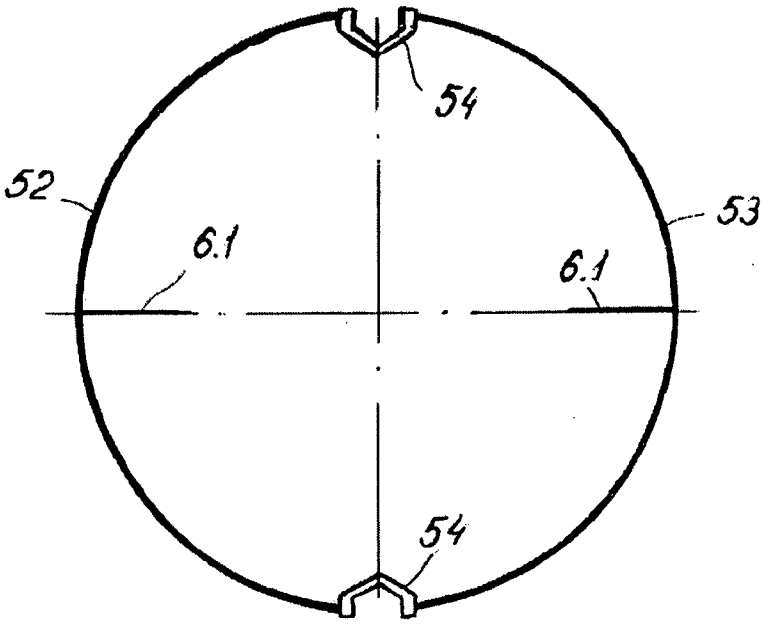

Fig.16

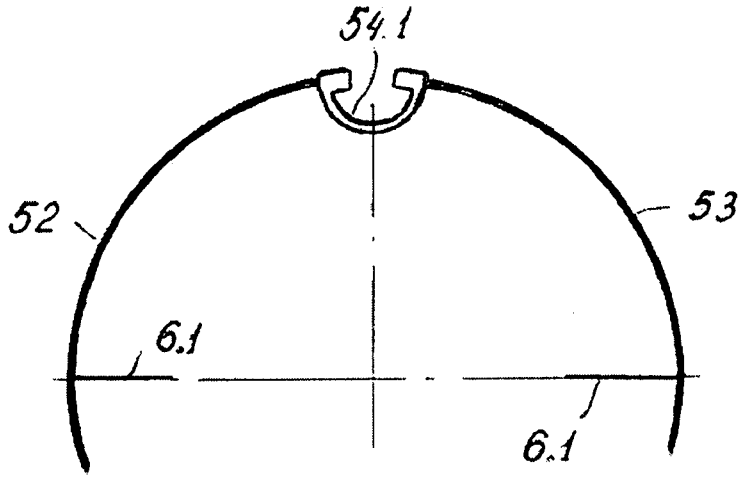

Fig.17

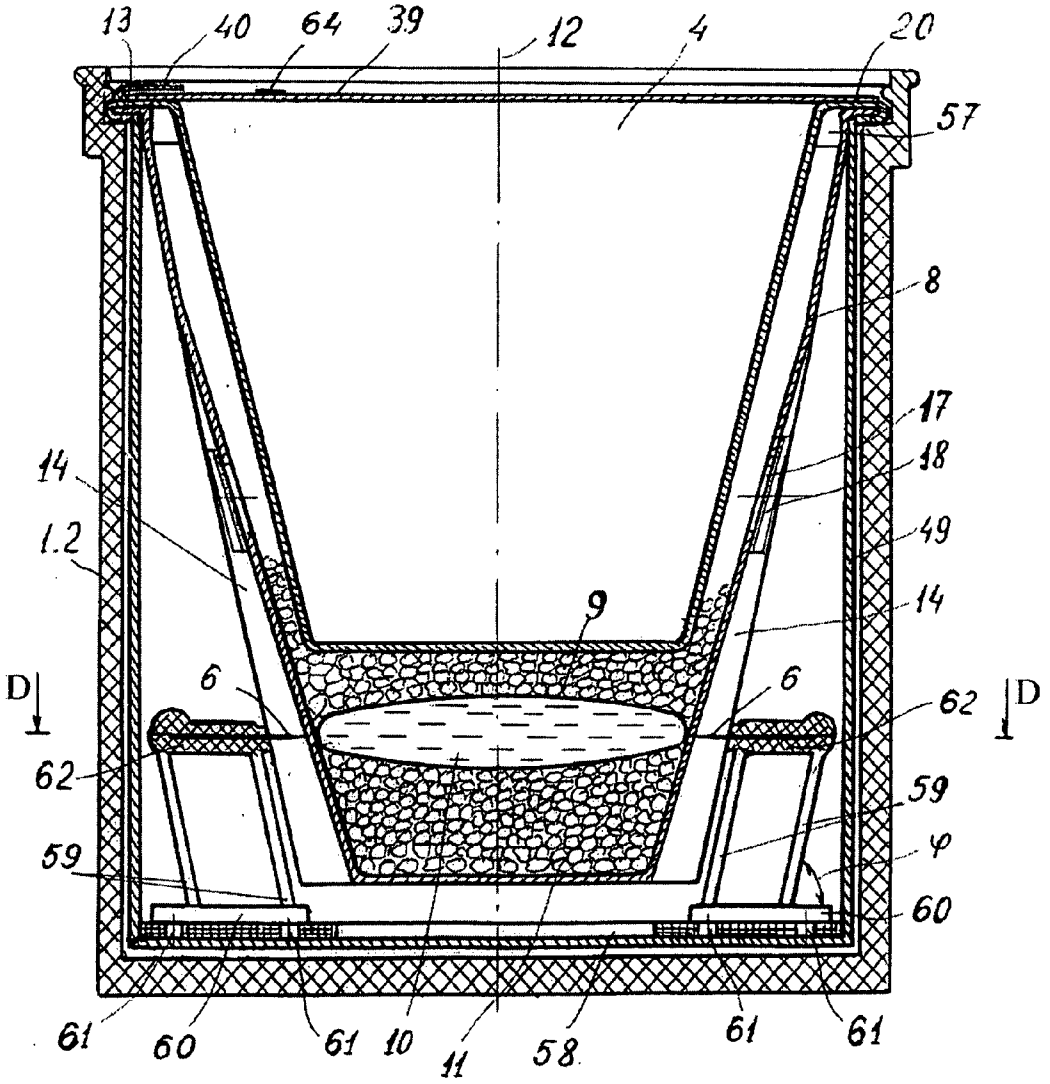
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Fig.18

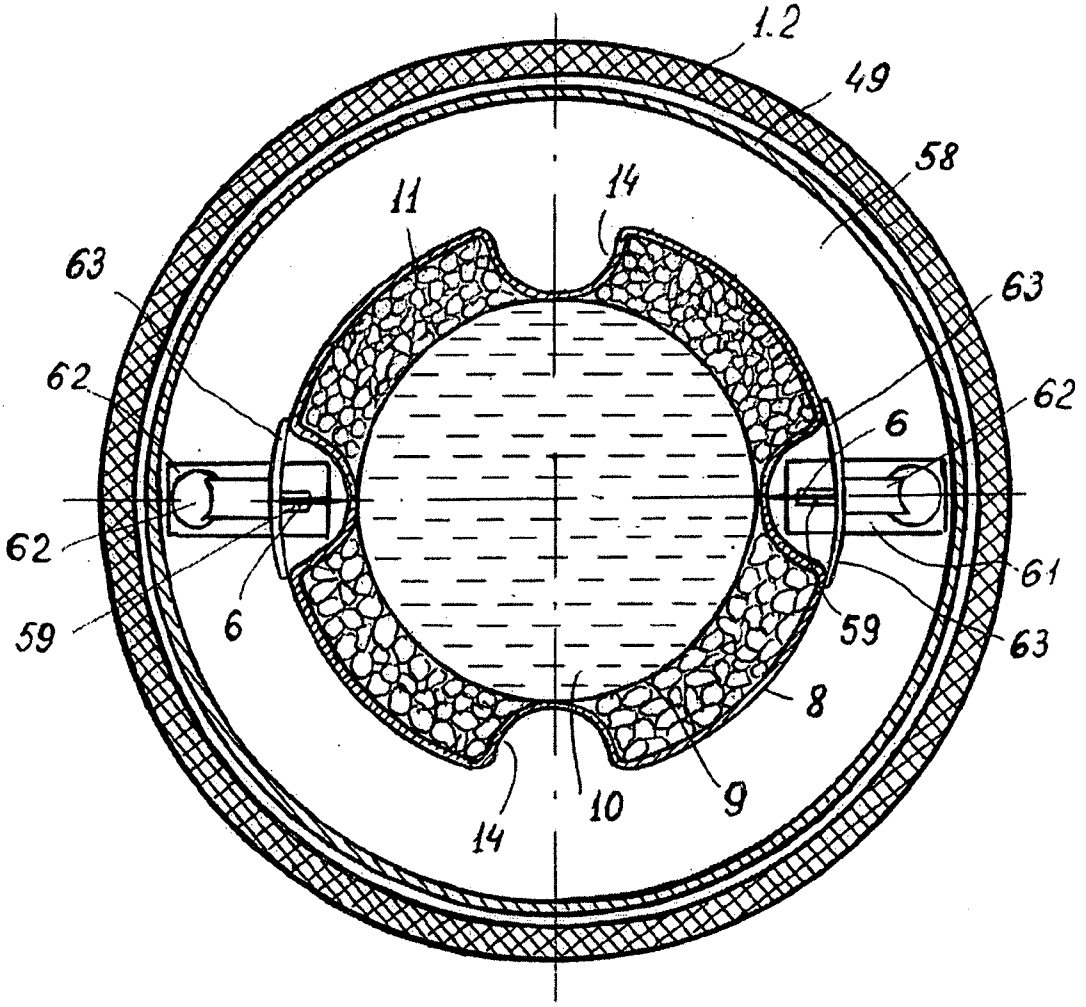

Fig.19

PACKAGE FOR CHANGING A STORED PRODUCT TEMPERATURE PRIOR TO THE OPENING THEREOF

FIELD OF THE INVENTION

[0001] The invention relates the food industry, more specifically to packages for such objects that should be heated up or cooled down to a required temperature prior to consumption or use.

BACKGROUND OF THE INVENTION

[0002] Different designs of packages are known from the prior art, said packages being provided with means which allow the heating of a stored product up to a predetermined temperature as a result of the course of the exothermic reaction, or the cooling of a stored product down to a predetermined temperature as a result of the course of the endothermic reaction.

[0003] Thus, a package is known for changing a stored product temperature prior to the opening thereof, said package comprising: a cylindrical case with a heat insulating coating at an external lateral surface and with a bottom having a central portion extending into the case; a sealed container for the stored product, said container being coaxially installed within the case closely to its bottom central portion extending into the case to form an annular cavity between its external lateral surface and an internal lateral surface of the case, wherein a lower portion of the annular cavity is filled with a solid reagent while a chamber of an elastic material, for example plastic, is located in an upper portion of the annular cavity and is filled with a liquid reagent. The annular cavity is closed at the top by an annular lid hermetically connected along its external contour to the case and along its internal contour—to the container, wherein an annular strip of an elastic material is placed between the annular lid and the elastic material chamber. The annular lid is provided with two dents to perforate it while the upper portion of the container is provided with a closure (see U.S. Pat. No. 5,542,418, 1996).

[0004] The basic disadvantage of said package for changing prior to the opening thereof consists in that it does not allow high effectiveness of using heat evolved as a result of the exothermic reaction because the heat supply to the container with the stored product takes place only via the lateral surface of the container and is accompanied with a large heat loss via the case bottom where the heat insulation is absent. Further, when gases evolved during the exothermic reaction ascend to the top of the annular cavity, they form a gas space between reagents, said gas space decelerating the process of mixing the reagents. This results in reduction of a maximum reaction temperature. It should be also noted, that the presence of the elastic material strip does not exclude the ability of the high-temperature products of the exothermic reaction to arrive at the upper surface of the container, which generates additional problems and inconveniences in use of the package.

[0005] A package is also known for changing a stored product temperature prior to the opening thereof, said package being taken as a prototype and comprising: an upper detachable cap, a heat insulating body and a thermal module with an activator including a piercing member fastened on a central portion of a bottom of a thermal module case, said central portion being formed flexible and convex outwardly. Arranged in a thermal module case are a stored product container hermetically connected thereto around an entire perimeter of own upper portion, a solid reagent, and a liquid reagent storage section comprising a closed cylindrical compartment with a protrusion in its upper portion, said protrusion providing the fixation of said section relative to a bottom of the stored product container. Further, the closed compartment in its lower portion is provided with an annular flange and radially arranged channels. The closed compartment is filled with a liquid reagent, is formed of a material capable to be pierced, and is installed to interact with a tip of the activator of the thermal module in actuation thereof. To this end, the annular flange of said section is arranged at an internal surface of the bottom of the thermal module case while a bottom portion arranged oppositely to the tip of the piercing member is concaved into the closed compartment to form a cavity in communication via said radial channels with a cell in the cavity of the thermal module case filled with the solid reagent (U.S. Pat. No. 3,970,068, 1976, FIGS. 8, 9).

[0006] The prototype package for changing a stored product temperature prior to the opening thereof has disadvantages as follows:

[0007] it is inconvenient in use because the actuation of the thermal module activator requires, first, to turn the package upside-down, second, to remove the bottom safety cover, third, to destroy (to pierce) the bottom of the closed cylindrical compartment filled with the liquid reagent with the piercing member by applying a user's force in the axial direction to the convex area in the bottom of the thermal module case;

[0008] it is characterized by significant heat loss in the course of the exothermic reaction because the reagents are mixed near the bottom of the thermal module case, in other words, at a place where the heat insulation is absent;

[0009] the liquid reagent section has a complicated design (there are the flange and the radial channels) which gives rise to the package cost.

[0010] Further, the prior art package does not comprise means to provide reduction in a peak value of the gas-vapor mixture in the cavity of the thermal module case in the course of the endothermic reaction. In other words, the increased requirements in part of the mechanical strength are imposed upon a material of the stored product container and the thermal module case integrated therewith.

SUMMARY OF THE INVENTION

[0011] The present invention is aimed at solution of the technical problem to improve the convenience in use of a package for changing a stored product temperature prior to the opening thereof at simultaneous increase of effectiveness of using the heat effect of a reagent reaction due to reduction in heat exchange with environment and also lowering of the requirements to the strength parameters of a stored product container and a thermal module case by lowering a peak value of a gas-vapor medium pressure in the course of the reaction.

[0012] The problem of the invention is solved by that, in a package for changing a stored product temperature prior to the opening thereof, said package comprising a thermal module placed in a heat insulating body and having an activator including a piercing member with a tip, wherein arranged in a thermal module case are a stored product container hermetically connected thereto around an entire perimeter of own upper portion as well as a solid reagent and a closed compartment formed of a material capable to be pierced, containing a

liquid reagent and installed to interact with the tip of the piercing member of the activator of the thermal module when the latter is driven, according to the invention, there are recesses formed at equal angular distances relative to each other in a sidewall of the thermal module case at least oppositely to the closed compartment arranged therein, wherein an internal surface area of each recess bottom is arranged at a minimum gap or closely to the closed compartment, the heat insulating body is formed with a bottom and a sidewall flexed at application of a radially directed external load by a user, the thermal module activator additionally comprises a holder having an annular shape and installed coaxially with the thermal module case to sense the external load when the sidewall of the heat insulation case flexes and to move the piercing member installed thereon under action of said load in a radial direction, the tip of said piercing member being arranged in its respective recess formed in the sidewall of the thermal module case oppositely of the closed compartment, and a distance between the tip of the piercing member and the closed compartment with the liquid reagent is smaller than a maximum flexure value of the sidewall of the heat insulating body.

[0013] The problem of the invention is additionally solved by that:

[0014] the thermal module further comprises a protective gas-watertight housing hermetically connected around a perimeter of own upper portion to the thermal module case and the stored product container, said protective gas-watertight housing being arranged between the thermal module case and the heat insulating body;

[0015] the protective gas-watertight housing is arranged closely to an internal surface of the heat insulating body;

[0016] the protective gas-watertight housing is arranged with a gap relative to the internal surface of the heat insulating body;

[0017] the holder of the thermal module activator is annularly shaped with at least one resiliently deformable area having a weakened mechanical strength;

[0018] the holder is fastened at the internal surface of the sidewall of the heat insulating body;

[0019] the holder is fastened at an internal surface of the protective gas-watertight housing;

[0020] the holder of the thermal module activator is formed as an open ring and is integrated with piercing members arranged oppositely to each other and having an elongated triangular shape;

[0021] the holder is fastened at the internal surface of the sidewall of the heat insulating body;

[0022] the holder is fastened at an internal surface of the protective gas-watertight housing;

[0023] the thermal module case is formed with a cylindrical lower, portion having said recesses arranged in the sidewall thereof, the holder of the thermal module activator is formed as an open ring of a resiliently deformable material with two identical arched pushers fastened as cantilevers and arranged at its external cylindrical surface, and with identical protrusions arranged uniformly around a circumference of an internal cylindrical surface of the open ring, a number of said protrusions being equal to a number of recesses in the lower cylindrical portion of the thermal module case, the holder has two through openings positioned radially and coaxially and each passing via a respectively protrusion of a pair of protrusions arranged oppositely to each other, each of the two piercing members is formed as a thin metal rod pointed from one side and is located to perform a sliding longitudinal displacement in a through opening corresponding thereto and formed in the holder, the tips of the piercing members are arranged oppositely to each other on both sides of the thermal module case and closely to a bottom of a respective recess, wherein a length of the piercing members is greater than a length of said through openings in the holder at least by a value of a distance between their tips and the closed compartment while free ends of the arched pushers are arranged to interact with non-pointed faces of the piercing members protruding beyond the open ring when said free ends flex towards the open ring, the open ring is arranged outwardly of the lower portion of the thermal module case, wherein the protrusions at the internal surface of said ring are arranged in respective recesses in the sidewall of the lower portion of the thermal module case and are pressed to their bottom surfaces by forces of the resilient strain of the open ring;

[0024] the thermal module further comprises a casing head in the form of a cylindrical cup spring-loaded from the side of its bottom relative to the bottom of the heat insulating body and tightly encompassing the lower portion of the thermal module case with the possibility of axial movement relative to said lower portion, a radial through opening is formed near the bottom of the lower portion of the thermal module case, wherein a corrugation open only from below is arranged on a sidewall of the casing head oppositely to said radial through opening and forms a channel with the external surface of the sidewall of the thermal module case while a cavity of the casing head communicates with a cavity of thermal module via said channel and said radial opening, wherein at least one pair of openings are formed in sidewalls of the casing head and the lower portion of the thermal module and are arranged to provide their coincidence with each other at the lowermost position of the casing head;

[0025] the recesses in the sidewall of the thermal module case are formed as grooves arranged along a generatrix of said sidewall;

[0026] the recesses in the form of grooves are shaped as a conical surface area having a vertex facing upwardly;

[0027] a bottom of at least one recess has a through opening formed therein and covered by a plate of a porous material from the external side of the thermal module case;

[0028] the recesses in the sidewall of the thermal module case are formed as holes;

[0029] the recesses formed as holes have a shape of a surface of revolution of a second-order curve arc;

[0030] the upper portion of the thermal module case has an least one through opening formed therein and covered by a plate of a porous material from the external side of the thermal module case;

[0031] the thermal module further comprises a mount fastened from the external side of the stored product container, and the closed compartment is placed in the mount;

[0032] the holder of the thermal module activator is formed as a ring with two posts arranged oppositely to each other in a diametric plane of the package, said plane being a symmetry plane of the two recesses arranged

oppositely to each other in the sidewall of the thermal module case, wherein each post includes two flexible rods parallel to each other and tilted away from a package axis, lower ends of said rods being fastened on the ring and upper ends of the rods being connected to each other by a crosspiece parallel to a ring plane and having a piercing member fixedly fastened therein;

[0033] the heat insulated body is provided with an opening in the bottom thereof;

[0034] the stored product container is provided at the top with a discoverable closure of a sheet material having an external surface area with a thermal paint applied thereto and having an irreversible color variation in heating up to a respective temperature;

[0035] containers of gas-water-permeable material are placed between the heat insulating body and the thermal module case and filled with a substance that sorbs steam and gases evolved when the reagents react with each other;

[0036] at least containers of a gas-water-permeable material are placed between the protective gas-watertight housing and the thermal module case and filled with a substance that sorbs steam and gases evolved when the reagents react with each other.

[0037] The advantage of the inventive package for changing a stored product temperature prior the opening thereof over the prototype consists in that an embodiment of the liquid reagent section without a flange and radial channels and simply in the form of the closed compartment allows not only simplification of the package design and therefore reduction of its cost but also placement of the thermal module activator not below but from the side of the closed compartment. As a result, the use of the packages becomes more convenient because it is not necessary now to turn it upside-down when the thermal module is driven. An embodiment of the thermal module activator to be annularly-shaped, installed coaxially with the thermal module case and capable of sensing an external load when the sidewall of the heat insulating body flexes and of displacing the piercing members installed on the holder in a radial direction when they are subjected to said external load, the tips of said members being in the vicinity of the closed compartment with the liquid reagent due to presence of recesses in the sidewall, makes it possible to drive the thermal module in a very simple manner, exactly, by flexing with hand fingers from one or two (depending upon a number of piercing members fastened on the holder) oppositely arranged sides of the sidewall of the heat insulating body for several millimeters (2 to 4 mm on average, as experiments have shown). At the same time, the recesses in the sidewall of the thermal module case, arranged at least oppositely to the closed compartment arranged within the thermal module case, provide not only the possibility to drive the thermal module by small flexure of the sidewall of the heat insulating body but also to fix a position of the closed compartment with the liquid reagent when the piercing members act thereto.

[0038] An embodiment of the heat insulating body with the bottom makes it possible to decrease significantly heat exchange in a reaction zone with environment accompanied with a heat effect (heat evolution or absorption). This allows improvement in effectiveness of using the heat effect of the reacting reagents and therefore reduction in consumption thereof to obtain a required change of a stored product temperature.

[0039] Use of the protective gas-watertight housing makes in possible to extend the range of materials used to manufacture the heat insulating body.

[0040] The disclosed modifications of embodying the ring-shaped holder of the thermal module activator illustrate the possibility to fasten it on both the heat insulating body and the protective gas-watertight housing or the thermal module case to obtain the expected result—convenient use of the package—in any case.

[0041] The presence of the through openings in the side surface (in its upper portion) of the thermal module case, said openings being covered by plates of a porous material from the external side of the thermal module case, and also the presence of containers with sorbents allows essential decrease of a peak pressure value in the reaction zone and therefore lowering of the requirements to the strength parameters of the thermal module case, the heat insulating body and the protective gas-watertight housing.

[0042] Other advantages of the inventive package will become fully apparent from the following description.

[0043] The invention will no be described with reference to embodiments thereof that are not solely possible but clearly demonstrate the possibility to accomplish the required technical result by said combination of essential features.

BRIEF DESCRIPTION OF DRAWINGS

[0044] FIG. **1** shows a front cross-sectional view of a package for changing a stored product temperature prior to the opening thereof;

[0045] FIG. **2** shows a bottom view of a thermal module case;

[0046] FIG. **3** shows a plane view of a holder;

[0047] FIG. **4** shows a cross section taken along line A-A in FIG. **3**;

[0048] FIG. **5** shows a cross section taken along line B-B in FIG. **1**;

[0049] FIG. **6** shows the same cross section after application of an external load P;

[0050] FIG. **7** shows embodiment of a holder crosspiece;

[0051] FIG. **8** shows another shows embodiment of the holder crosspiece;

[0052] FIG. **9** shows an embodiment of fastening an activator on a heat insulating body;

[0053] FIG. **10** shows the first modification of the inventive package;

[0054] FIG. **11** shows a cross section taken along line C-C in FIG. **10**;

[0055] FIG. **12** shows the second modification of the inventive package;

[0056] FIG. **13** shows an embodiment of hermetically sealed connection of a stored product container with a case and a protective housing of a thermal module;

[0057] FIG. **14** shows a plane view of the holder;

[0058] FIG. **15** shows a front view of the same;

[0059] FIGS. **16** and **17** show inserts for the holder of FIG. **14**;

[0060] FIG. **18** shows the third modification of the inventive package; and

[0061] FIG. **19** shows a cross section taken along line D-D in FIG. **18**, wherein upper crosspieces are not hatched.

DISCLOSURE OF THE INVENTION

[0062] A package for changing a stored product temperature prior to the opening thereof comprises a heat insulating body with a detachable cap **2**, a thermal module **3** which is placed within the heat insulating body **1** (preferably coaxially therewith), a stored product container **4** as well as an activator of the thermal module **3**, said activator including a holder **5** and at least one piercing member **6** (FIG. **1**).

[0063] The heat insulating body **1** is formed as a cup having a flat or concave bottom **7** of a moisture-gas-watertight, lightweight, shock- and flexure-proof material of low heat conduction and thermal stability at a temperature not lower than 200° C., for example, foamed polystyrene. A sidewall of the heat insulating body **1** can have any shape—cylindrical, conical, barreled, and so on, —but should be capable of flexing, preferably resiliently, when a user applies an external load in a radial direction thereto.

[0064] To make the package more convenient in use, it is possible to provide the heat insulating body **1** with a lateral handle, particularly a detachable handle (not shown in the drawings).

[0065] The thermal module **3** includes a thermal module case **8** having a closed (hermetically sealed) compartment **9** arranged in a cavity thereof and designed to place a liquid reagent **10**, for example water, and a solid reagent **11** (in the form of granules of a powder) therein

[0066] In the preferred embodiment of the invention, the thermal module case **8** is axially symmetrical relative to a package axis **12** and is in the form of a hollow truncated cone with a smaller base facing downwardly and being the bottom of the thermal module case **8**. Principally, the thermal module case can have other shape as well, for example, a shape of a right circular cylinder as that in the prototype. An annular bead **13** is formed at an external surface of the thermal module case **8** and is arranged flush with an upper end face of a sidewall of the thermal module case **8** (in other words, flush with a major base of the truncated cone, see FIGS. **1** and **2**). Recesses **14** are formed as grooves in the sidewall of the thermal module case **8** and are arranged along a generatrix of said wall at equal angular distances from each other (in other words, uniformly along a circumference), said recesses being shaped (in the preferred embodiment) as an area of a conical surface (that has a base **15** shown by dashed line in FIG. **2**) with an apex facing upwardly and an axis **16** parallel to the package axis **12**. At the same time, a length of the recesses **14** is at least 3% less than a length of the generatrix of the external side surface of the thermal module case **8**. It should be noted here that the recesses **14** should be formed at least in areas of the sidewall of the thermal module case **8**, arranged oppositely to the closed compartment **9**, wherein the recesses **14** formed as grooves can be formed as areas of any (circular, parabolic, and so on) surface having an axis arranged at an acute angle to the axis **12**, said angle being higher than a half angle at vertex of the conical sidewall of the thermal module case **8**.

[0067] Preferably, a number of the recesses **8** in the form of grooves should be even: 4, 6.

[0068] The thermal module case **8** can be formed of polyethylene, processed polyethylene (PPE) as well as aluminum used in food industry. In case if the thermal module case **8** is formed of a polymeric material, it is expedient to clad at least an internal surface thereof with a foil.

[0069] The closed compartment **9** is formed of a film polymeric material capable to be pierced, for example polyethylene, and is placed within the cavity of the thermal module case **8** to provide a minimum gap between areas of an external surface thereof and corresponding areas of internal surfaces of bottoms in all recesses **14** (in preferable embodiments, closely thereto). In other words, with said even (4, 6) number of the recesses **14**, fixation of the closed compartment **9** filled with the liquid reagent **10** is provided in the transverse direction when radially directed forces destroying walls of the compartment **9** act to said compartment. In the preferred embodiment, the upper portion of the sidewall of the thermal module case **8** has at least one through opening **17** of 3 to 10 mm in diameter formed therein. At the same time, the through openings **17** are covered by respective plates **18** preferably of a paper having a sufficiently high density (a density not higher than 60 g/m^2) from outside of the sidewall of the thermal module case **8**. Containers **19** (bags or pouches) of a gas-permeable material filled with a substance (active coal, silica gel, and so on) that sorbs vapors and gases evolved in the reaction of the reagents **10** and **11** with each other are placed oppositely to each through opening **9** in a cavity between the heat insulating body **1** and the thermal module case **8**, for example, are glued to the internal surface of the sidewall of the heat insulating body **1**. In a preferred embodiment (FIGS. **1** and **2**), the through openings **17** are formed in bottoms of the recesses **14** in the form of grooves, which allows decrease in a distance between the sidewalls of the heat insulating body **1** and the thermal module case **8** and therefore increase in a fraction of a useful volume in the cavity of the heat insulating body **1**.

[0070] In the preferred embodiment, the stored product container **4** is in the form of a hollow truncated cone having a major base that faces upwardly and a flange **20** formed around a perimeter of said base. The container **4** is placed in the cavity of the thermal module case **8**, wherein its flange **20** is supported by an end face of the upper portion of the thermal module case **8** while edges of the flange **20** are rolled around the annular bead **13**. Thus, the container **4** is hermetically connected to the upper portion of the sidewall of the thermal module case **8** throughout the perimeter of the major base. The closed compartment **9** is either placed closely to the bottom of the external surface of the container **4** or separated therefrom by a layer of the reagent **11**.

[0071] The thermal module case **8** having the cavity where the reagent **11** and the closed compartment **9** with the reagent **10** as well as the container **4** hermetically connected to the upper portion of the thermal module case **8** are placed is installed within the heat insulating body **1** and is fixed thereto, for example, by placing the flange **20** rolled around the annular bead **13** in a respective annular groove formed in the upper portion of the internal surface of the heat insulating body **1** (FIG. **1**).

[0072] The holder **5** (FIGS. **1**, **3** and **4**) is annular-shaped with at least one resiliently deformed area of a weaken mechanical strength, for example with thin straight-line crosspieces **21** and protrusions **22** facing inwardly (to the axis **12**), wherein a number of said protrusions is equal to a number (preferably two) of the piercing members **6** formed, for example, as thin (0.5 to 2.0 mm in diameter) steel rods (needles) having a tip (pointed) from one side. Each piercing member **6** is placed in a respective slot formed in a surface of

a respective protrusion **22** and is fixed (stationary fastened) using a respective patch piece **23** with fixing protrusions **24** that are inserted into their respective openings **25** formed in each protrusion **22**. The protrusion **22** are arranged oppositely to each other and oppositely to a respective recess **14** in the thermal module case **8** (FIGS. **1**, **3**, **5** and **6**), wherein the piercing members **6** are arranged oppositely to the closed cavity **9** along a straight line passing via the package axis **12** and corresponding to a direction of applying an external load P (FIG. **6**). Principally, the piercing members **6** can be fastened on the holder having no protrusions **22**. In particular, the piercing members **6** can be simply pressed into the material of the holder in molding thereof. Arched crosspieces **21.1** or V-shaped crosspieces **21.2** (FIG. **8**) can be used instead of the crosspieces **21**. The crosspieces **21.1** or **21.2** are either integral with other members of the holder **5** (FIGS. **3** and **7**) or formed as respective inserts of other material, for example, having a less mechanical strength (FIG. **8**).

[0073] The holder **5** can be structurally embodied in other manner, for example, as a hoop having a limited external and/or internal surface.

[0074] The activator of the thermal module **3** (FIG. **1**) is fastened at the internal surface of the sidewall of the heat insulating body **1** in such a manner that ends of the piercing members are located oppositely (and preferably touch) external surface areas of the recesses **14** corresponding thereto, wherein said internal surface areas thereof are located oppositely to the external surface areas while external surface areas of the closed compartment **9** are located at a minimum gap or closely to said internal surface areas of the recesses. In other words, the tips of the piercing members **6** are arranged oppositely to the closed compartment **9** and at a distance that is smaller than a maximum flexure value of the sidewall of the heat insulating body **1**. To fasten the activator, a turned annular groove **26** is formed at the internal conical surface of the sidewall of the heat insulating body **1** and has a diameter that provides a required interference fit of the holder **5**. If the heat insulating body **1** is provided with a sidewall having a cylindrical shape of the internal surface, fixation of the holder **5** within the cavity of the heat insulating body **1** is provided by making an annular bead or support ribs **27** arranged uniformly over a circumference and along the generatrix of the internal surface (FIG. **9**). In this case, slots **28** corresponding to the support ribs **27** are formed on the external surface of the holder **7** while the required interference fit of the holder **5** (being resiliently deformable due to presence of the crosspieces **21.1** and **21.2**) is provided by selecting an appropriate ratio between the diameter of the holder **5** and the diameter of the internal surface of the heat insulating body **1**.

[0075] However, the embodiments of fastening the thermal module activator on the heat insulating body **1**, as described above, are not exhaustive for the disclosed technical solution that allows fastening of the activator on other package components, for example, on the thermal module case thus, the embodiment of the package for changing a stored product temperature prior to opening thereof shown in FIGS. **10** and **11**, a heat insulating body **1.1** is made with a cylindrical sidewall being a truncated cone in the lower portion to provide reduction in the thickness of the material in the heat insulating body **1.1** within a zone where its sidewall mates a bottom **7.1** where a blind opening **29** is formed.

[0076] A case of a thermal module **3.1** is axially symmetrical relative to the package axis **12** and includes an upper portion **30** and a lower portion **31** preferably integrated with each other. The upper portion **30** of the case of the thermal module **3.1** and is in the form of a hollow truncated cone with a major base facing upwardly and an annular bead **13.1** designed (similarly to that described above) to provide a hermetically sealed connection (particularly, by rolling) of the thermal module case with the stored product container **4**. The lower portion **31** is in the form of a cylinder with a bottom **32** and mates a smaller base of the truncated cone of the upper portion **30** from the top. At least two (preferably four, six) recesses **14.1** formed as holes, arranged uniformly over a circumference, and preferably having a shape of a surface of revolution of a second-order curve arc, for example, an arc of a circle, are formed in the sidewall of the lower portion **31**. At the same time (similarly to the embodiment of the recesses **14** formed as grooves and described above), the closed compartment **9** with the liquid reagent **10** is placed within the cavity of the lower portion **31** oppositely to the recesses **14.1** (and preferably closely thereto) and allows a minimum gap between the external surface areas of said lower portion and respective internal surface areas of all recesses **14.1**. The thermal module **3.1** further comprises a casing head **33** in the form of a cylindrical cup tightly encompassing the lower portion of the case, being capable of moving relatively thereto and spring-loaded from the side of its bottom, for example, by a four-lobe spring **34** installed in the opening **29**. A radial through opening **35** is formed near the bottom **32** of the lower portion **31**, wherein a corrugation **36** open only from below is arranged on a sidewall (along a generatrix thereof) of the casing head **33** oppositely to said radial through opening and forms a channel with the external surface of the lower portion **31** while a cavity of the casing head **33** communicates with a cavity of the thermal module **3.1** via said channel and then via the opening **35**. Furthermore, at least one pair of openings **37** and **38** are formed in sidewalls of the casing head of the lower portion **31** of the case of the thermal module **3.1** and the casing head **33** and are arranged to provide their coincidence with each other at the lowermost position of the casing head **33**. The stored product container **4** is provided at the top with a discoverable closure **39**, for example of aluminum foil, with a tab **40** for convenient removal thereof prior to use of a product present in the container **4**. An activator of the thermal module **3.1** comprises a holder **5.1** and two piercing member **6** that are formed as thin steel rods (having a diameter of 0.5 to 2.0 mm) having a tip (pointed) from one side, as described above. The holder **5.1** of a resiliently deformable material, advantageously a plastic material, is formed as a open (split) ring with two identical arched pushers **41** fastened as cantilevers and arranged at its external cylindrical surface, and with identical protrusions **42** arranged uniformly around a circumference of an internal cylindrical surface of the open ring, a number of said protrusions being equal to a number of recesses **14.1**. The holder **5.1** has two through openings positioned radially and coaxially and each passing via a respectively protrusion **42** of a pair of protrusions **42** arranged oppositely to each other. Each piercing member **6** is located to perform a sliding longitudinal displacement in a through opening corresponding thereto and formed in the holder **5.1**, the tips of the piercing members **6** are arranged oppositely to each other and on both sides of the lower portion **31**. A length of the piercing members is greater than a length of said through radially-positioned openings at least by a value of a distance between their tips. In a preferred embodiment of the invention, the arched pushers are arranged equidistantly relative to the external cylindrical surface of the open ring and are

capable (when subjected to forces directed radially to an axis of the open ring) to interact at their non-fastened end faces with non-pointed faces of the piercing members **6** protruding beyond the open ring. In a preferred embodiment of the inventions, the arched pushers are rotated for 180° relative to each other. The activator of the thermal module **3.1** is place outside of the lower portion **31** of the case, wherein the protrusion **42** of the holder **5.1** are arranged in respective recesses **14.1** and pressed to their bottom surfaces by forces of the resilient strain of the open ring, while the tips of the piercing members are arranged closely to surfaces of respective recesses **14.1**.

[0077] As noted above, the materials of the heat insulating body **1** and **1.1** should be moisture-gas-watertight, lightweight material of sufficient thermal stability and low heat conduction. At the same time, to provide a value of a flexure, in other words, a radial strain of the sidewall of the heat insulating body, necessary for the thermal module activator to operate, a thickness of the sidewall itself must not be large because increase in the thickness will inevitably lead to increase in the force applied by a user to drive the thermal module an therefore to creation of additional inconveniences in use of the package. The offered embodiment of the thermal module with the protective has-watertight housing as well as other aspects of the present invention will now be explained below in conjunction with FIGS. **12** to **19**.

[0078] A package for changing a stored product temperature prior to the opening thereof (FIG. **12**) comprises a heat insulating cylindrical body **1.2** with an turned annular groove **43** from the side of a bottom **7.2**, a length of said turned annular groove being 1.05 to 1.5 times larger than a thickness of the bottom **7.2**. During transportation and storage, a safety collar **43.1** shown in FIG. **12** by dashed line is removably installed in the turned groove **43**.

[0079] A thermal module case **8.1** is in the form of a hollow truncated cone with a smaller base facing downwardly and being the bottom of the thermal module case **8.1**. An annular bead **13** is formed at an external surface of the thermal module case **8.1** and is arranged flush with an upper end face of a sidewall of said case. One or two recesses **14.1** (according to a number of piercing members **6.1**) are formed as holes preferably having a shape of a surface of revolution of a second-order curve arc on the sidewall (the conical wall) of the thermal module case **8.1**. There are through openings **17** of 3 to 10 mm in diameter formed in the upper portion of the sidewall of the thermal module case **8.1**, said openings **17** being covered by respective plates **18** preferably of a paper having a density not higher than 60 g/m^2 from outside of the sidewall of the thermal module case **8.1**.

[0080] A stored product container **4** is placed in the cavity of the thermal module case **8.1** and (similarly to that described above) is in the form of a hollow truncated cone having a major base that faces upwardly and a flange **20** formed around a perimeter of said base. A smaller base of the truncated cone is a bottom of the container **4**, and there is a mount **44** fit outside of said bottom and designed for the closed compartment **9** with the liquid reagent **10**. The mount **44** is in the form of "a squirrel cage," exactly, in the form of two annular members, that is, a higher annular member **45** with a turned conical groove **46** for an interference fit of the mount **44** onto the container **4**, and a lower annular member **47**, said members being connected between each other by vertical crossbars **48** arranged along circumferences of the annular members **45** and **47**. The mount **44** can be ether a monolith of polymeric material or made of separate parts connected to each other by known means. The mount **44** provides fixation of a position of the closed compartment **9** relative to the thermal module case **8.1** in both axial (towards the axis **12**) and radial directions not only during transportation of the package but also in the course of driving the thermal module as a result of which the closed compartment **9** is destructed in interaction with the piercing members **6.1** and then the reagents **10** and **11** react with each other.

[0081] To provide convenient use of the package, the thermal module comprises a protective gas-waterproof housing **49** arranged between the heat insulating body **1.2** and the thermal module housing **8.1**. The protective gas-waterproof housing **49** is in the form a cylindrical cup having a bottom. Aluminum, polyethylene, etc., can be used as a material for manufacturing the protective gas-waterproof housing **49**. In case of using polymeric materials, an internal surface of the protective gas-waterproof housing **49** is preferably foiled. At its upper portion, the protective gas-waterproof housing **49** is hermetically connected to the flange **20**, for example, is rolled (FIG. **12**).

[0082] FIG. **13** shows another embodiment of the hermetically sealed connection of the stored product container **4** to the thermal module case **8.1** and to the protective has-watertight housing **49** that in the present embodiment has an annular bead **50** made flush with the upper end on the external surface of side wall, In this case, edges of the flange **20** are rolled along the beads **13** and **50** arranged closely. Principally the hermetically sealed connection of the stored product container **4**, the thermal module case **8.1** and its protective has-watertight housing **49** is possible by means of gluing, thermal welding, brazing as well as other means and methods known in the food industry. In a preferred embodiment of the invention, a layer **51** of a gas-vapor-sorption material is placed on an inner surface of the sidewall of the protected gas-watertight housing **49**. The layer **51** is placed oppositely to the openings **17**, wherein containers **19** of a gas-permeable material are additionally placed on the bottom of the protected gas-watertight housing **49**, said container being filed with a substance that similarly to a material of the layer **51** sorbs vapors and gases evolved when the reagents **10** and **11** react with each other. The thermal module activator consists of an annular holder **5.2** formed of a resiliently deformable material and integrated with the piercing members **6.1** of the ring-shaped holder **5.2** (FIGS. **14** and **15**). The piercing members **6.1** have an elongated triangular shape and are formed by pressing out from an original solid tape material of the holder **5.2**.

[0083] The holder **5.2** is in the form of either an open ring (FIGS. **14** and **15**) or two identical semi-rings **52** and **53** made of a resiliently deformable metal tape and connected between each other by V-shaped or arc-shaped inserts **54** and **54.1** (FIGS. **16** and **17**), respectively. The thermal module activator is placed at the internal surface of the sidewall of the protective gas-watertight housing **49** between two annular folds **55**, wherein the piercing members **6.1** abut (are arranged closely to) a bottom of a respective recess **14.1** The additional fixation of the thermal module case can be provided by forces of resilient deformation of the annular-shaped holder **5.2** itself, said forces providing pressure of the protective gas-watertight housing **49** to the internal surface of sidewall of the holder. It is possible to use the holder **5**, as described above, in the present modification of the package. Similarly, the holder **5.2** can be used in the modification of the holder shown in FIG. **1**. In a preferred embodiment, the detachable cap **2** is

made with an annular lock member **56** opened prior to removal, said lock member being widely used in foodstuff packages. It is necessary to note here that use of the protective gas-watertight housing **49** principally allows embodiment of the heat insulating body **1.2** with an opening in its bottom. However, it inevitably leads to in incomplete use of the heat effect (heating or cooling) occurred as a result of reaction of the reagents **10** and **11** with each other.

[0084] The protective gas-watertight housing **49** can be arranged either closely to the inner surface of the heat insulating body **1.2** or with a gap relative thereto (FIGS. **18** and **19**). The thermal module case **8** (contrary to that shown in FIGS. **1** and **2**) is made with a cylindrical area **57** that serves to provide an interference fit (or a thread fit) of the protective gas-watertight housing **49**. In the modification shown in FIGS. **18** and **19**, the thermal module activator comprises a holder in the form of a ring placed on the bottom of the protective gas-watertight housing **49** with two posts arranged oppositely to each other in a diametric plane being a symmetry plane of the two recesses **14** arranged oppositely to each other (or said ring is provided with one post).

[0085] Each post includes two flexible rods **59** that are parallel to each other, have lower ends connected to a ring **58** either directly (are integrated therewith, for example, by molding) or using a lower crossbar **60** connecting the lower ends of the rods **59** between each other, and are provided with setting protrusions **61**. The setting protrusions **61** are placed in appropriate openings formed in the ring **58**. Upper ends of the rods **59** are connected between each other by an upper crossbar **62** parallel to the lower crossbar **60**. The piercing members **6** are fixedly fastened, for example pressed, in the crossbar **62**. Further, in a preferred embodiment of the invention, each upper crossbar is provided with two flexible strips (lobes) **63** that interact with external surface areas of the thermal module case **8**, said areas being arranged on both sides of a respective recess **14**. The flexible rods **59** together with the crosspieces **60** and **62** form a parallelogram mechanism, wherein the flexible rods **59** are tilted oppositely to the axis **12**, in other words, at an angle ϕ to a plane of the ring **58**. A thermal paint **64** is applied to an external surface area of the discoverable closure **39** and has an irreversible color variation in heating up to a respective temperature.

[0086] The package for changing a stored product temperature prior to the opening thereof operates as follows. In the initial state, a stored product (water, tea, broth, drink, and so on) is placed in the cavity of the container **4** and covered by the discoverable enclosure **39** having the tab **40** and/or the detachable cap **2** depending upon particular storage conditions. The liquid reagent **10** (preferably water) is in the closed (hermetically sealed) compartment **9** formed of a material capable to be disintegrated (punctured) when subjected to at least one of the piercing members **6** or **6.1** arranged oppositely to each other and on two opposite sides relative to the closed compartment **9** (FIG. **12**). The closes compartment **9** is placed in the cavity of the case **8** or in the lower portion **31** (FIGS. **10**, **11**) of the thermal module to provide a minimum gap (and preferably is placed closely) to internal surface areas of the recesses **14** or **14.1** corresponding to bottoms thereof. The closed compartment **9** can be arranged closely to the external surface of the bottom of the container **4** (FIG. **12**) or separated therefrom by a layer of the solid reagent **11** (for example, a mixture of powders of active metals, such as zinc, magnesium, with a non-aqueous non-active metal salt, such as copper sulfate) that also fills all the residual lower portion of the cavity of the thermal module case **8**. The closed compartment **9** can be installed in the special mount **44** (FIG. **12**).

[0087] The serviceability of the can be monitored by a color of the thermal paint **64** having an irreversible color variation (for example, in heating up to a temperature higher than 70° C.) and applied to an external surface area of the discoverable closure **39**. Thus, if the thermal paint **64** is based on cobalt ammonia monohydrate, then, the bright pink color thereof attests the serviceability of the thermal module. If the thermal point **64** has the blue color, then, the thermal module is unserviceable, for example, because of a random actuation during storage or transportation.

[0088] The thermal module is driven by a user who applies a radially directed external load P (FIG. **6**) to the heat insulating body **1** (or similarly to the heat insulating bodies **1.1** and **1.2**). In doing so, a direction of applying the external load coincides with a straight line along which the piercing members **6** (or **6.1**) having tips faced each other are arranged. To provide application of the external load P strictly in a required direction, respective indicators, for example labels (not shown in the drawings) for users are applied on the external surfaces of said heat insulating bodies.

[0089] It is necessary to note here that the most complete use of the internal volume of the heat insulating body is provided in case if the thermal module activator is in the lower portion of said body. However, Because the bottom **7** is set close, however, the lower portion of the heat insulating body **1** is characterized by a higher radial compression rigidity. To provide a larger bending strain in the lower portion of said heat insulating bodies, the sidewall of said bodies either is cone-truncated in its lower portion (FIG. **10**) or has the annular turned groove **43** (FIG. **12**). In the latter case, the safety ring **43.1** (which protects from a random actuation of the thermal module activator) installed within the turned groove **43** is removed.

[0090] As a result of applying an external compressing load H to the heat insulating body **1**, deformation of the latter takes place as a result of which the external load applied by a user to the heat insulating body is transmitted to the holder **5**. First, resilient deformation of the holder **5** takes place due to presence of the resiliently deformable areas (the crossbars **21**, **21.1** or **21.2**) therein having a weakened mechanical strength (as compared to the residual portion of the holder **5**), and then (after achievement of a predetermined threshold value by the applied external load and therefore the flexure of the heat insulating body **1** cased thereby) destruction of at least one of said crossbars takes place. After destruction of at least one of the crossbars **21** (**21.1** or **21.2**), the holder **5** stops to have a significant influence upon the strain of the heat insulating body **1**, and therefore the external load applied thereto is transmitted via the piercing members **6** to the bottoms of the recesses **14**. Since the closed compartment **9** is arranged closely or practically closely (with a small gap) to the internal surface area of the recesses **14** formed as grooves or their modifications **14.1** formed as holes, then interaction of the tips of the piercing members **6** with the closed compartment **9** will take place practically immediately after piercing the walls of the thermal module case **8** by said members, said walls being in the bottoms of the recesses **14** (**14.1**). It is necessary to note here that a wall thickness in regions of the bottoms of the recesses **14** (**14.1**) is minimum. Thus, embodiment of the thermal module case **8** to have the recesses **14** formed as grooves or the recesses **14.1** formed as holes not only allows as follows:

[0091] a) fixation of a position of the closed compartment **9** in the radial direction during interaction thereof with the piercing members **6** or **6.1**; and b) reduction in a flexure value of the heat insulating body **1** as necessary to pierce the closed compartment **9**;

[0092] but also allows reduction in a value of the external compressing load P necessary to pierce the wall of the thermal module case **8**.

[0093] After piercing of the closed compartment **9**, the liquid reagent **10** starts to flow out of the closed compartment **9**. There is mixture of the reagents **10** and **11**. As a result of mixture of the reagents **10** and **11**, either the exothermic or endothermic reaction goes depending upon chemical compositions thereof.

[0094] In case of the exothermic reaction, there is intensive evolvement of heat and steam. The intensive heat evolvement results in quick heating of the product stored in the container **4** due to heat transfer. To exclude negative consequences associated with a large amount of heat evolved for a short time, a number of means which promote both condensation and sorption of said heat are used in the inventive package. Thus, manufacture of the thermal module case **8** of either a metal (aluminum) or a foiled polymeric material allows intensification of the steam condensation process within the thermal module case **8** (at the internal wall thereof). When non-condensed steam passes via the through openings **17**, it is partial sorption thereof in a porous material of the plates **18**. The final sorption of the steam passed via the plates **18** is performed by a material present in the containers **19** as well by a material of the layer **51** (FIG. **12**). Thus, a value of a maximum excessive pressure within the cavity of the package is essentially reduced due to compensation and sorption of the steam in the course of the exothermic reaction.

[0095] To exclude a drastic increase of the pressure in the course of the exothermic reaction within the case of the thermal module **3.1** to a value higher than that accepted from the viewpoint of the thermal module mechanical strength, it is offered to embody the thermal module with the casing head **33** (FIG. **10**), wherein the cavity of the thermal module is in communication with a cavity of the casing head via a channel formed by the corrugation **36** and the opening **35**. As a result, if the pressure within the cavity of the case of the thermal module **3.1** and therefore within the cavity of the casing head **33** communicated therewith becomes higher than the air pressure within the cavity between the heat insulating body **1.1** and the case of the thermal module **3.1**, then, the casing head **33** starts to move downwardly thereby to compress the spring **34**. Further increase of said pressure drop will move the casing head **33** downwardly until the opening **38** is brought into coincidence with the opening **37**. It will be partial "bleeding" of the steam into the cavity between the heat insulating body **1.1** and the case of the thermal module **3.1** to achieve a steam pressure corresponding to a maximum accepted pressure in the zone where the exothermic reaction goes. In other words, the casing head **33** and the openings **37** and **38** fulfill a function of a safety gas valve.

[0096] Operation of the inventive package when cooling a product stored in the container **4** has no distinctions from that described above. In this case, gas-sorption members can be used to eliminate an unpleasant smell occurring in the endothermic reaction. The closure **39** is removed after completion of the reaction between the reagents **10** and **11**. As a result, a user can access the stored product heated up or cooled down to a predetermined temperature.

[0097] As noted above, there is flexure of the heat insulating body **1.1** under action of the external load when the thermal module of the package shown in FIGS. **10** and **11** is driven. To reduce the probability of random driving the thermal module, the arched pushers **41** are positioned with a gap relative to the internal surface of the sidewall of the heat insulating body **1.1**. If a flexure value of the heat insulating body **1.1** is larger than said gap, the arched pushers will begin to flex towards the holder **5.1** and simultaneously act to non-pointed faces of the piercing members **6**. Since the piercing members **6** are places in their appropriate radial openings on the sliding casing head, then, the external load applied by a user will be freely transmitted to the bottoms of the recesses **14.1** as a result of which their walls will be pierced.

[0098] When the protective gas-waterproof housing **49** (FIGS. **12**, **18**) is used in the inventive package, the thermal module is driven similarly to that described above. Use of the mount **44** for the closed compartment **9** provides only the more reliable fixation of the closed compartment **9**.

[0099] As to operation of the activator shown in FIGS. **18** and **19**, then, when the external load acts to the rounded portions of the upper crossbars **62**, there is simultaneous rotation of each pair of the flexible **59** to increase the angle ϕ. At the same time, the piercing members **6** are still parallel to the plane of the ring **58** which is the main property of the parallelogram mechanism used in the present case. The flexible strips **63** provide reduction in the probability of random driving the thermal module in transportation of the package.

[0100] Principally, it is possible to use one flexible rod instead of the pair of flexible rods **59**. However, this simplification of the package can result in deterioration of engineering data and performance thereof.

INDUSTRIAL APPLICABILITY

[0101] The possibility to realize the offered invention using known materials and production processes widely employed in the food industry confirms the industrial applicability thereof

1-24. (canceled)

25. A package for changing a stored product temperature prior to the opening thereof, said package comprising:

a thermal module arranged in a heat insulating body, the thermal module comprising an activator that comprises a piercing member having a tip, and having arranged in a case of the thermal module

a stored product container hermetically connected to the thermal module case around an entire perimeter of an upper portion of the stored product container,

a solid reagent, and

a closed compartment formed of a pierceable material, the closed compartment containing a liquid reagent and installed in a position to interact with the tip of the piercing member of the activator of the thermal module when the activator is driven, wherein

a plurality of recesses are formed at equal angular distances relative to each other in a sidewall of the thermal module case at least oppositely to the closed compartment arranged therein;

an internal surface area of a bottom of one or more of said plurality of recesses is arranged at a minimum gap, or closely, to the closed compartment;

the heat insulating body is formed with a bottom, and with a sidewall flexed at application of a radially directed external load by a user;

the thermal module activator comprises a holder,

the holder having an annular shape, having the piercing member installed thereon, and the holder being installed coaxially with the thermal module case to sense the external load when the sidewall of the heat insulating body flexes, and to move the piercing member installed thereon under action of said load in a radial direction;

the tip of said piercing member being arranged in a respective one of said plurality of recesses formed in the sidewall of the thermal module case oppositely of the closed compartment;

and

a distance between the tip of the piercing member and the closed compartment containing the liquid reagent is smaller than a maximum flexure value of the sidewall of the heat insulating body.

26. A package according to claim **25**, wherein

the thermal module further comprises

a protective gas-watertight housing, hermetically connected around a perimeter of an upper portion of the protective gas-watertight housing to the thermal module case and the stored product container,

said protective gas-watertight housing being arranged between the thermal module case and the heat insulating body.

27. A package according to claim **26**, wherein the protective gas-watertight housing is arranged closely to an internal surface of the heat insulating body.

28. A package according to claim **26**, wherein the protective gas-watertight housing is arranged so as to have a gap formed between the protective gas-watertight housing and an internal surface of the heat insulating body.

29. A package according to claim **25**, wherein the holder of the thermal module activator is annularly shaped and comprises at least one resiliently deformable area having a weakened mechanical strength.

30. A package according to claim **26**, wherein the holder of the thermal module activator is annularly shaped and comprises at least one resiliently deformable area having a weakened mechanical strength.

31. A package according to claim **29**, wherein the holder is fastened at an internal surface of the sidewall of the heat insulating body.

32. A package according to claim **30**, wherein the holder is fastened at an internal surface of the sidewall of the heat insulating body.

33. A package according to claim **29**, wherein the holder is fastened at an internal surface of the protective gas-watertight housing.

34. A package according to claim **30**, wherein the holder is fastened at an internal surface of the protective gas-watertight housing.

35. A package according to claim **25**, wherein the holder of the thermal module activator is formed as an open ring and comprises two of said piercing members, said open ring being integrated with the two piercing members arranged oppositely to each other and having an elongated triangular shape.

36. A package according to claim **26**, wherein the holder of the thermal module activator is formed as an open ring and comprises two of said piercing members, said open ring being integrated with the two piercing members arranged oppositely to each other and having an elongated triangular shape.

37. A package according to claim **35**, wherein the holder is fastened at an internal surface of the sidewall of the heat insulating body.

38. A package according to claim **36**, wherein the holder is fastened at an internal surface of the sidewall of the heat insulating body.

39. A package according to claim **35**, wherein the holder is fastened at an internal surface of the protective gas-watertight housing.

40. A package according to claim **36**, wherein the holder is fastened at an internal surface of the protective gas-watertight housing.

41. A package according to claim **25**, wherein

the thermal module case is formed with a cylindrical lower portion having said recesses arranged in the sidewall of the lower portion,

the holder of the thermal module activator is formed as an open ring of a resiliently deformable material

with two identical arched pushers fastened as cantilevers and arranged at an external cylindrical surface of the open ring,

and with identical protrusions arranged uniformly around a circumference of an internal cylindrical surface of the open ring, a number of said protrusions being equal to a number of recesses in the lower cylindrical portion of the thermal module case,

the holder has two through openings positioned radially and coaxially to one another, and each of said through openings passing via a respective protrusion of a pair of protrusions arranged oppositely to one other,

the holder comprises two of the piercing members, and each of said two piercing members is formed as a thin metal rod pointed from one side and is located to perform a sliding longitudinal displacement in one of the two through openings corresponding to the piercing member and formed in the holder,

the tips of the piercing members are arranged oppositely to each other on two sides of the thermal module case and closely to a bottom of a respective recess,

a length of the piercing members is greater than a length of said through openings in the holder at least by a value of a distance between their tips and the closed compartment, while free ends of the arched pushers are arranged to interact with non-pointed faces of the piercing members protruding beyond the open ring when said free ends flex towards the open ring,

the open ring is arranged outwardly of the lower portion of the thermal module case,

and wherein

the protrusions at the internal surface of said ring are arranged in respective recesses in the sidewall of the lower portion of the thermal module case and are pressed to their bottom surfaces by forces of the resilient strain of the open ring.

42. A package according to claim **26**, wherein

the thermal module case is formed with a cylindrical lower portion having said recesses arranged in the sidewall of the lower portion,

the holder of the thermal module activator is formed as an open ring of a resiliently deformable material

with two identical arched pushers fastened as cantilevers and arranged at an external cylindrical surface of the open ring,

and with identical protrusions arranged uniformly around a circumference of an internal cylindrical surface of the open ring, a number of said protrusions being equal to a number of recesses in the lower cylindrical portion of the thermal module case,

the holder has two through openings positioned radially and coaxially to one another, and each of said through openings passing via a respective protrusion of a pair of protrusions arranged oppositely to one other,

the holder comprises two of the piercing members, and each of said two piercing members is formed as a thin metal rod pointed from one side and is located to perform a sliding longitudinal displacement in one of the two through openings corresponding to the piercing member and formed in the holder,

the tips of the piercing members are arranged oppositely to each other on two sides of the thermal module case and closely to a bottom of a respective recess,

a length of the piercing members is greater than a length of said through openings in the holder at least by a value of a distance between their tips and the closed compartment, while free ends of the arched pushers are arranged to interact with non-pointed faces of the piercing members protruding beyond the open ring when said free ends flex towards the open ring,

the open ring is arranged outwardly of the lower portion of the thermal module case,

and wherein

the protrusions at the internal surface of said ring are arranged in respective recesses in the sidewall of the lower portion of the thermal module case and are pressed to their bottom surfaces by forces of the resilient strain of the open ring.

43. A package according to claim **41**, wherein

the thermal module further comprises a casing head in the form of a cylindrical cup spring-loaded from a bottom side of said cup relative to the bottom of the heat insulating body, and tightly encompassing the lower portion of the thermal module case, and arranged to be axially moveable relative to said lower portion of the thermal module case,

a radial through opening is formed near a bottom of the lower portion of the thermal module case, wherein

a corrugation open only from below is arranged on a sidewall of the casing head oppositely to said radial through opening, and said corrugation forms a channel with an external surface of the sidewall of the thermal module case, and a cavity of the casing head communicates with a cavity of the thermal module via said channel and said radial opening,

and wherein at least one pair of openings are formed in sidewalls of the casing head and the lower portion of the thermal module case, said openings being arranged to provide coincidence with each other at a lowermost position of axial movement of the casing head relative to said lower portion of the thermal module case.

44. A package according to claim **42**, wherein

the thermal module further comprises a casing head in the form of a cylindrical cup spring-loaded from a bottom side of said cup relative to the bottom of the heat insulating body, and tightly encompassing the lower portion of the thermal module case, and arranged to be axially moveable relative to said lower portion of the thermal module case,

a radial through opening is formed near a bottom of the lower portion of the thermal module case, wherein

a corrugation open only from below is arranged on a sidewall of the casing head oppositely to said radial through opening, and said corrugation forms a channel with an external surface of the sidewall of the thermal module case, and a cavity of the casing head communicates with a cavity of the thermal module via said channel and said radial opening,

and wherein at least one pair of openings are formed in sidewalls of the casing head and the lower portion of the thermal module case, said openings being arranged to provide coincidence with each other at a lowermost position of axial movement of the casing head relative to said lower portion of the thermal module case.

45. A package according to claim **25**, wherein the recesses in the sidewall of the thermal module case are formed as grooves arranged along a generatrix of said sidewall.

46. A package according to claim **45**, wherein the recesses in the form of grooves are shaped as a conical surface area having a vertex facing upwardly.

47. A package according to claim **45**, wherein a bottom of at least one of said recesses has a through opening formed therein and covered by a plate of a porous material from an external side of the thermal module case.

48. A package according to claim **46**, wherein a bottom of at least one of said recesses has a through opening formed therein and covered by a plate of a porous material from an external side of the thermal module case.

49. A package according to claim **25**, wherein the recesses in the sidewall of the thermal module case are formed as holes.

50. A package according to claim **49**, wherein the recesses formed as holes have a shape of a surface of revolution of a second-order curve arc.

51. A package according to claim **25**, wherein an upper portion of the thermal module case has at least one through opening formed therein and covered by a plate of a porous material from an external side of the thermal module case.

52. A package according to claim **25**, wherein the thermal module further comprises a mount fastened from an external side of the stored product container, and the closed compartment is placed in the mount.

53. A package according to claim **25**, wherein

the holder of the thermal module activator is formed as a ring with two posts arranged oppositely to each other in a diametric plane of the package, and comprises two piercing members,

said plane being a symmetry plane of two of said recesses arranged oppositely to each other in the sidewall of the thermal module case,

wherein each post comprises two flexible rods parallel to each other and tilted away from an axis of the package, lower ends of said rods being fastened on the ring, and upper ends of the rods being connected to each other by a crosspiece parallel to a plane of the ring, the crosspiece having one of the piercing members fixedly fastened to said crosspiece.

54. A package according to claim **26**, wherein

the holder of the thermal module activator is formed as a ring with two posts arranged oppositely to each other in a diametric plane of the package, and comprises two piercing members,

said plane being a symmetry plane of two of said recesses arranged oppositely to each other in the sidewall of the thermal module case,

wherein each post comprises two flexible rods parallel to each other and tilted away from an axis of the package, lower ends of said rods being fastened on the ring, and upper ends of the rods being connected to each other by a crosspiece parallel to a plane of the ring, the crosspiece having one of the piercing members fixedly fastened to said crosspiece.

55. A package according to claim **26**, wherein the heat insulating body is provided with an opening in a bottom of said heat insulating body.

56. A package according to claim **25**, wherein the stored product container has a top comprising a discoverable closure of a sheet material having an external surface area with a thermal paint applied thereto and having an irreversible color variation in heating up to a respective temperature.

57. A package according to claim **25**, wherein containers of gas-water-permeable material are placed between the heat insulating body and the thermal module case and filled with a substance that sorbs steam and gases evolved when the reagents react with each other.

58. A package according to claim **26**, wherein containers of gas-water-permeable material are placed between the protective gas-watertight housing and the thermal module case and filled with a substance that sorbs steam and gases evolved when the reagents react with each other.

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