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(54) **Multilayer film for microwave package**

(57) A multilayer film (10;20) comprising at least two layers (11,12,13;21,22,23) for a microwave package (1), which is suitable for the storage and preparation of food or the like. The layers (11,12,13;21,22,23) of the multilayer film (10,20) comprise an inner layer (11;21) suitable for contacting the food (50) and an outer layer (13;23), wherein a layer (12,13;22,23) of the film (10;20) is a vapor barrier. The multilayer film (10;20) comprises a vapor valve structure (14;24) with at least one channel (15;25) obtained between two layers (11,12;21,22) of the multilayer film (10;20) and further comprises an opening (16;26) formed at least in the inner layer (11;21), and the channel (15;25) is adjacent to the opening (16;26). Furthermore, a microwave package (1) can comprise the multilayer film (10;20), wherein the microwave package (1) is adapted to allow vapor to leave the package during the heating of the food (50). A production process for the multilayer film (10;20) is also disclosed.

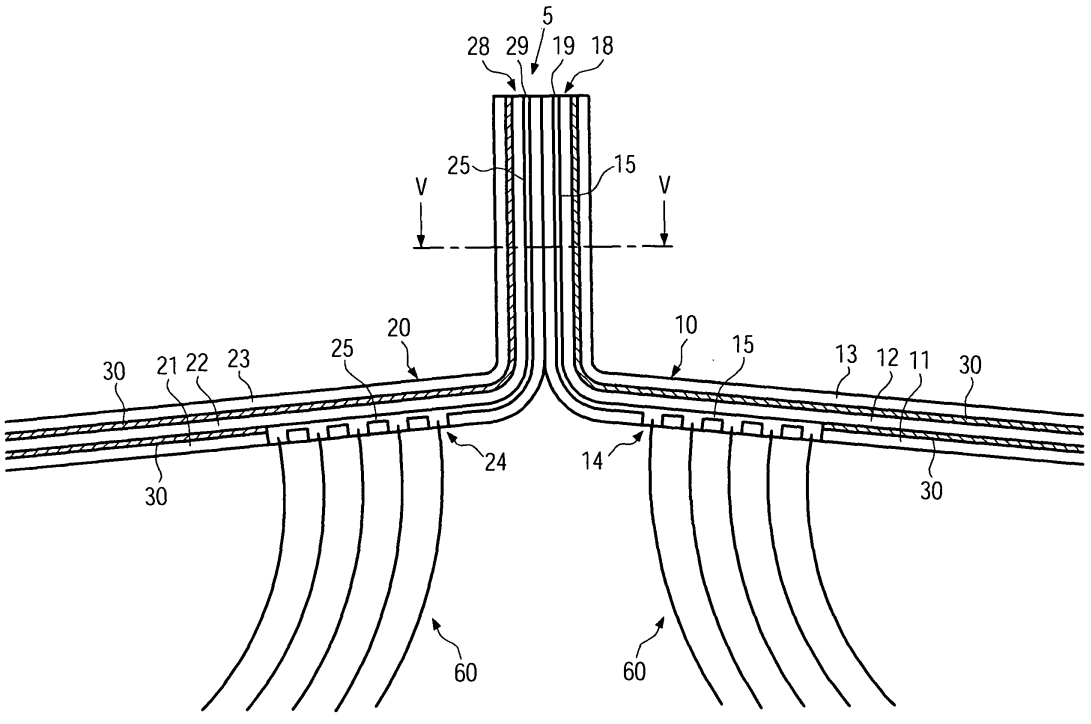

FIG. 4

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Description

[0001] The present invention relates to a multilayer film, a microwave package comprising said multilayer film, and a method for the production of said multilayer film according to the preamble of the independent claims. Such films and packages are generally known, as it is very comfortable for a consumer to prepare food or the like in a microwave without the necessity of filling the food in a different dish or unwrapping the food.

[0002] The Japanese patent application JP 11278557 A discloses a food packaging bag with a seal on its package edge, wherein the film section of the seal comprises an opening formed as a slit or a hole. The packaging bag is closed when the food is stored therein. The seal comprises a narrower section, wherein the sealed films can be detached from each other by force, as for example induced by the buildup of pressure due to the vaporization of liquid fractions within the food, such that the sealed films detach from each other and provide a direct connection from the inside of the bag to the outside through the opening in the film.

[0003] The inside of the bag needs to communicate to the outside, as otherwise the pressure due to the vapor inside the bag would lead to an explosion of the bag. Since this bag comprises a designated direct opening from the inside of the bag to the outside, the pressure inside the bag is immediately reduced when the sealed films no longer cover the direct opening. This allows that high pressure in the bag during the cooking process is avoided without the need for the customer to tear the bag open before the cooking process.

[0004] One disadvantage of the packaging bag is that, due to the opening process by tearing apart the sealed films, only a part of the designated opening can be opened. The vapor flow from the inside of the bag to the environment differs in respect to the size of the opening when all other cooking conditions are kept constant. Therefore, different cooking conditions regarding pressure and vapor content can arise in the inside of the bag, even if the bag is subjected to the same heating power. Thus, a varying result of the cooking process is possible, which is perceived as negative by a consumer, since generally a constant preparation outcome is desired.

[0005] Furthermore, it can be advantageous to build up a certain pressure in a package for the cooking of food while avoiding uncontrollable damaging of the film in the areas adjacent to the opening. Therefore, a packaging bag of this kind has to maintain the pressure under a certain level, as the opening induces high tensile forces in the film, especially in the area of the edges of the opening. This packaging bag comprises a relatively large, direct opening, such that only a low vapor pressure can be obtained in the inside of the bag. This results in longer preparation times, as according to the principle of a pressure cooker food can be prepared much faster if there is high pressure in the inside of the bag. Furthermore, a relatively large opening of the bag leads to a dehydration of the food in the inside if the food does not comprise a sufficient water portion or if there is no additional water added inside the bag.

[0006] The Japanese patent publication JP 08-151084 discloses a container with a multilayer film for microwave oven cooking. Therein, it is disclosed that a film covers the opening area of the container, wherein the film comprises an inner and outer layer, which are not partially laminated. A conductive material inserted in between the layers is able to melt a part of the inner surface film to form a through hole by the generation of heat due to the radiation with microwaves. Consequently, the inside of the container is able to communicate with the environment. The disadvantage of this kind of packaging is that the selection of the material of the inner film layer has to consider that the melting process must not produce particles or toxic substances that contaminate the food, which is disposed directly under the possible opening. Furthermore, the material of the outer layer has to be chosen such that even when it is subjected to the heat of the conductive material it will not melt nor be destroyed. The connection from the inside of the container to the environment is not dependent on the pressure inside the container, as the opening is molten and its relatively large opening area is determined by the amount of material molten. Thus, a precise control of the vapor pressure in the inside of the container is not possible.

[0007] The Japanese patent publication JP 2006-044708 A discloses a film that comprises micropores in an inner and outer film layer. The throughput of pressure occurs in a section of the film layer where the micropores are disposed. Thus, a larger area of the package has to be provided with warning signs or similar measures such that a person handling the package with a recently prepared, hot food does not suffer burns by hot vapor. The probability of the throughput of a high amount of hot fluid is reduced by the micropores.

[0008] Nevertheless, there is a direct connection from the inside of the package to the environment, which can lead to a security risk for the consumer due to the throughput of hot liquid when the package is squeezed during handling.

[0009] The problem to be solved with the present invention is to provide a multilayer film, a microwave package comprising said multilayer film, and a method for the production of said multilayer film, wherein the microwave package provides convenient and safe preparation of food in a microwave at a high defined pressure. The microwave package shall be able to prepare a variety of dishes as no immoderate high fluid fraction of the food is required to allow a preparation without the dehydration of the food. Furthermore, a production process has to be provided that enables the economically efficient production of a multilayer film.

[0010] These problems are solved by a multilayer film according to claim 1, a microwave package according to claim 16, and a method for the production of a multilayer film according to claim 27.

[0011] The multilayer film comprises a vapor valve structure with openings formed at least in an inner layer of the film, and channels that are adjacent to said openings. The openings may lead from the designated inside of a package comprising the multilayer film up to a vapor barrier layer that is made of a gas-tight or vapor-tight material. Certain areas of the film comprise layers that are not connected to each other such that they form said channels. The channels may lead from the openings to an outer edge of the film, as well as to different openings of the package such as holes of different sizes, or microholes. The combination of suitable formed openings together with channels enables a vapor valve, allowing to control the pressure inside the package, vapor to leave the package while inhibiting throughout the liquid to leave the package.

[0012] The openings may be designed such that they only allow the throughput of vapor but not of a significant amount of liquid, even if liquid is directly adjacent to the openings. Thus, in combination with the channels only little or no liquid can exit the package by mistake. The channel may comprise an opening formed by non-connected layers at the outer edge of the multilayer film, to which it may extend, as then no additional openings have to be cut in the film layers.

[0013] The film combines different layers that are connected to each other by lamination, at least in the partial areas that do not form the channels. Furthermore, the layers of the film may be connected by any other method known in the prior art. The single layers of the film may be gas and/or vapor and/or liquid tight. The material of the film layers is heat resistant to allow a preparation in the microwave. Furthermore, it can be material that is designed to resist cold temperatures to allow the transport and storage of food in a frozen condition. The material of the single film layers can be for each layer at least one of the materials polypropylene, polyethylene, polyester, polyamide, metalized polyester, or metalized polyamide. The inner layer of the film, which is adjacent to the food when applied in a microwave package, may comprise a food safe material that is able to contact the food and prolong the duration of time food can be kept in the microwave package while still being attractive to the consumer. The outer layer of the film may be formed of a heat isolating material and/or a material that provides an ergonomically designed surface to the customer, such that the customer can easily grab the package while the package provides a convenient haptic impression. Furthermore, one of the layers of the film, especially an intermediate layer, may be a tear-proof layer that resists damaging of the package by sharp objects or pressure applied to the package. Intermediate layers can be disposed in between the inner and outer layer of the film.

[0014] In certain areas that form the channels of the film at least two adjacent film layers are not or detachably connected to each other. To not connect the layers to each other no lamination adhesive may be applied to this area during the lamination of the film. Apart from that, it is also possible to not apply pressure and/or not apply heat at certain areas of the film during the lamination process to form the channels. Furthermore, other means can be provided to locally obtain non-connected layers, such as the insertion of a distance piece like a flat metal part in between the layers, during the lamination process.

[0015] Furthermore, single spots of the film layers within the non-connected film layers can be laminated to each other such that the detachable connection can be fully opened when the channel is subjected to pressure. Generally it is possible that non-connecting film layers are detachably connected to each other, especially by a sealing agent. The sealing agent may be a cold sealing agent that is especially openable when subjected to pressure, or a thermosealing lacquer that is especially openable when subjected to heat. Furthermore, the detachable connection of the said layers may be obtained by a mutual peeling adhesion of the said layers such that the channel opens when it is subjected to pressure and/or vapor and/or heat. As well, sealing agents that are reactive with moisture can be applied, such that they open the connection when subjected to vapor.

[0016] Also the detachable connection in between the film layers can be obtained by any other way, as for example by a modified lamination process with reduced connection strength due to the variation of process parameters, such as lower pressure, lower heat, or by the usage of additional substances that reduce the connection strength of the lamination.

[0017] Non-connected film layers or detachably connected film layers may especially be applied in film sections close to the film edge, wherein the non-connected, respectively detachably connected layers can lead to the film edge, such that the channel can communicate to the environment at the film edge.

[0018] The single layers of the film can comprise openings, wherein openings are preferably only formed in the inner layer of the film, but it is also possible that openings are formed in the intermediate layers, e.g. to connect channels in between different layers. Each opening is able to communicate to the channel, wherein this communication is preferably openable and closeable by heat and/or pressure and/or vapor. This openable or closeable communication may comprise the detachable connection of two layers that can be obtained by the above-mentioned features. The openings can be formed by an optical process involving a laser or a mechanical process such as cutting or punching applied to designated layers of the film. Furthermore, it is possible that the openings are obtained by different processes, such as the melting or a chemical reaction of single layers of the film material during the production process.

[0019] The opening can especially be formed only of a plurality of microholes that are disposed in a layer of the film adjacent to the food, wherein the microholes can be applied in elliptic, rectangular, or differently shaped areas of varying size. Also, the shape and size of microholes can be varied or the amount of microholes in a

certain area can be varied with respect to the food, which is prepared in the microwave package. If a food with a high liquid fraction should be prepared in a microwave, a higher amount of microholes or bigger microholes have to be provided in the film layer, while for rather dry food, a smaller number of microholes with a smaller opening area is necessary. Thus, depending on the size, shape, and number of microholes, and the level of pressure, the flow of vapor through the vapor valve structure can be controlled and thus, the pressure during the preparation process can be adjusted to provide optimal preparation conditions for the food. The microholes each comprise a relatively small cross-sectional area, wherein the diameter of each microhole is less than 0.5 mm. Preferably, the microholes have a diameter in between 0.03 mm and 0.2 mm, depending on the type of food and number of active microholes. The size of the microholes can even be as small as micropores for rather dry dishes.

[0020] In the area of the openings the channel can be designed to be wider, such that a larger area of openings is possible, while the channel leading to the package edge can be designed to be more narrow. It may be especially advantageous that the film layer which is directly adjacent to the microholes is a vapor barrier to concentrate the vapor flow through the channel and to inhibit a direct communication of vapor through the film of the package. Of course, several other layers of the film, especially the inner or outer layer, may also be designed to be the vapor barrier. Thus, the channels in between the non- or detachably connected film layers and the openings form a vapor valve structure of the package to the outside.

[0021] The microwave package according to the invention comprises the multilayer film according to the invention. The microwave package may comprise a package edge, wherein film sections are connected parallel to each other. This package edge is preferably fluid tight. The microwave package may be designed in different shapes. It is possible that it is a pouch-type package, a pillow-type package, or a stand up bag-type package. The package encloses the therein contained food or the like, such that the only communication from the inside of the package to the environment is possible through the vapor valve structure. The package can comprise means that facilitate the process of opening for a consumer, such as perforations or a special shape, which enables the tearing in or dislocation of a certain part of the film, such that the consumer can access the food. Furthermore, it is advantageous when the openings are designed to be in the package in a location above the food such that components of the food are not able to plug the communication to the outside. This can be obtained by the package geometry and/or a film of a certain strength. It is also possible to provide a certain pressure inside the package that is present before the preparation of food or that is built up during the preparation of food, such that the opening is away from the food. Furthermore, it is possible that the package is a container that comprises the above-described film as a lid, wherein the film closes the container opening as it is attached to it by lamination, glue, or by any other means well known in the art. Within the lid that comprises the film the vapor valve structure communicates the inside of the container with the outside, wherein the opening of the channel of the vapor valve structure may be at the edge of the film.

[0022] The film may comprise a sealing that can be formed as a handling means when the film sections of the package are connected in an area at the edges of the film by a connection of the inner layers with each other. Furthermore, the sealing may be directed to the inside of the package by a connection of the outer layers with each other, or the sealing may be in the film extension plane by a connection of the inner layer of one film section with the outer layer of another film section. The handling means can facilitate the handling for the consumer, as it is possible to grab the package at the handling means to insert it into the microwave or take it out of the microwave. Furthermore, the handling means can comprise means for facilitating the opening of the package when the food is prepared.

[0023] In the package according to the invention, a various amount of different dishes can be prepared, wherein especially the preparation of dishes with different fluid fractions is possible due to an adaptation of the vapor valve structure to the differing fluid fractions. The package provides the preparation of pourable foods such as noodle dishes or vegetable dishes, as well as solid dishes such as hamburgers or meat pieces.

[0024] The method for the production of the multilayer film according to the present invention comprises the arranging of at least two layers on each other. An opening can be formed in at least one of the layers and finally a channel is formed by non-connecting adjacent layers of the film. The openings can be formed in a first layer before another layer is arranged on the first layer. It is important to emphasize that the opening can also be formed after the connecting of the adjacent layers to form the channel. Therefore, the method involves for example a selective laser operation when the layers are already connected to only form openings in one of the already connected layers. Furthermore, it is also possible that other means such as an insertion of a plate inside the channel enable the forming of openings in only one of the already connected layers.

[0025] In a preferred embodiment, microholes are applied in two already connected layers with a channel formed in between and then a further outer layer is arranged and connected to the designated intermediate layer. The method of forming the opening may comprise a laser operation, wherein the laser operation provides a fast production process and avoids that particles have to be cut away during the generation of the openings, which could later cause drawbacks regarding the production machines or food safety. A laser is especially suited for forming a plurality of microholes due to their amount while having only a small opening area. The con-

nection of the layers of the film may be obtained by lamination, but it is not relevant how this connection is obtained, while it provides a safe and stable connection of the layers in the areas not forming the channel.

[0026] Furthermore, a sealing agent as already defined above can be disposed in any of the channels before or after the connection of layers, wherein it is only necessary to dispose the sealing agent in a partial region of the channel, as the purpose of the sealing agent is to close the channel until a certain pressure or temperature is obtained, which allows to open the connection of the sealing agent such that the inside of the package can communicate with the outside. Thus, it is important during the storage and transport of the food that the channel is closed by the sealing agent to preserve the freshness of the contained food.

[0027] In the following a preferred embodiment of the microwave package according to the invention and comprising the multilayer film according to the invention is described.

Figure 1 shows a perspective view of the microwave package. The illustration with open side walls of the package on the front and back side is only chosen for the purpose of a better view of the relevant features. The open side walls are of course closed for a package that comprises food.

Figure 2 shows a lower perspective view on the microwave package, wherein the microholes are depicted.

Figure 3 shows a perspective view of a film section comprising the microholes and channel.

Figure 4 shows a cross section of two film sections with microholes and channels.

Figure 5 shows a cross section of figure 4 at V, wherein the layers of the two film sections that are sealed to each other are illustrated.

[0028] Figure 1 shows a preferred embodiment of a microwave package 1 according to the invention. The microwave package comprises the film section 10 and film section 20, which are made of a multilayer film according to the invention. In this preferred embodiment, one piece of film comprises the two film sections 10, 20. Also, it is possible that the film sections of other embodiments of the invention are comprised in different film pieces. The film of the package 1 encloses the inside 40 of the package 1. The film sections 10, 20 are connected to each other on the upper part 4 of the package 1 by a sealing 5. The microwave package 1 comprises a package base 2 on its lower side, wherein the package 1 can be positioned in the microwave on that base 2. Starting from the package base 2, the package 1 comprises two side walls 3, which are basically perpendicular to the base 2 and which may obtain the depicted position during the preparation process due to the pressure in the package 1 or may be designed to be in this position, even before the food 50 is prepared. Starting from the side walls 4, the package 1 comprises an upper portion 4 extending basically horizontally. The upper portion 4 of the package 1 is closed with the sealing 5. Food 50 is disposed in the inside 40 of the package 1, such that the food 50 can be prepared in the package 1 when it is inserted into a microwave oven. The open front and back side of the package 1 can be either closed by an additional sealing, additional film sections, or the whole illustration of figure 1 can be understood as a partial cross section of a package 1, which is closed in adjacent, not depicted sections of the package 1. It has to be emphasized that the closed package 1 only communicates through vapor valve structures 14, 24 (see Fig. 3 and 4) with the environment. The layers of the package are formed of different materials, such as polypropylene, polyethylene, polyester, polyamide, metallized polyester, or metallized polyamide. The material of the inner layer has to be gas tight, such that it preserves the freshness of the food. The intermediate layer is gas and vapor tight, such that it provides the vapor barrier. The outer layer is formed of a material providing mechanical durability.

[0029] Figure 2 depicts the same package 1 from a lower viewpoint, wherein here the area with the vapor valve structure 14, 24 is illustrated starting from openings 16, 26, which consist of microholes. Channels 15, 25 lead to the sealing 5 and the film edge 18, 28. The channels 15, 25 and microholes 16, 26 are disposed symmetrically to the sealing 5, wherein in other embodiments of the invention it is also possible that channels 15, 25 and microholes 16, 26 are disposed on only one side of the sealing 5, or in differing places with respect to the sealing 5.

[0030] Figure 3 shows an enlarged view of the film section 10 of the present embodiment, wherein the vapor valve structure 14 is explained in more detail in the following. The channel 15 leads from the microholes 16 to the channel opening 19 at the film edge 18. Furthermore, the microholes 16 are disposed in a rectangular area in the inner layer 11 of the film 10. The channel 15 leads further to the inside of the film 1 than the microholes 16. The microholes 16 are disposed in an area wider than the channel 15. The channel 15 has a constant width from microholes 16 up until the film edge 18. The layers 11, 12 may not be connected in the partial area over the microholes 16, but it is also possible that the film layers are laminated in a partial area over the microholes 16. Thus, only one tool for microhole cutting has to be provided, while the actual effective size of the opening to the channel 15 is determined by the size of the channel 15 over the microholes 16. Thus, with the same layer 11 comprising microholes 16 a lot of different packages 1 for a lot of different types of food with different fluid fractions can be provided.

[0031] Figure 4 shows a side view of a cross section

through the sealing 5, wherein here the layers of the film 10, 20 are depicted, especially the inner layer 11, 21, the middle layer 12, 22, and the outer layer 13, 23. The single layers of the film are connected by a lamination adhesive 30 in those areas where they do not form the channel 15, 25. The inner layers 11, 21 of both film sections 10, 20 are connected to each other to form the sealing 5. The inner layer 11, 21 comprises microholes 16, 26 that lead at least partially into a non-connected area in between the layers 11, 12, 21, 22, which form the channels 15, 25. The channel 15, 25 then leads up to the channel opening 19, 29 at the film edge 18, 28. Vapor 60 can escape through the microholes 16, 26, the channel 15, 25, and the channel opening 19, 29 at the film edge 18, 28 from the package inside 40 to the environment. The shape and number of microholes 16, 26, which are adjacent to the channel, determines the intensity of vapor flow of a certain food 50 at certain preparation conditions. A sealing agent is provided in between the layers that form the channel 15, 25 or in the area of the microholes 16, 26, such that the microwave package 1 is closed until the actual preparation provides a certain pressure and/or vapor content and/or heat in the package 1, such that the detachable connection of the sealing agent is detached. The sealing agent can be applied only in certain areas of the channel or throughout the whole channel.

[0032] Figure 5 shows a cross section of the sealing 5 as indicated by V in figure 4. Therein, the connected layers 11, 21 are depicted, which are connected to each other to form a fluid and vapor tight sealing 5. The connection in between the inner layer 11, 21 and intermediate layer 12, 22 is only partially carried out such that a channel 15, 25 is obtained in between the inner and intermediate layers, wherein the channel 15, 25 is designed to enable the communication of vapor 60 from the inside 40 of the package 1 to the environment. The intermediate layer 12, 22 is laminated to the outer layer 13, 23. The connection of the layers is obtained by lamination, wherein any other possible technique known in the art can also be applied. The intermediate layer 12, 22 and/or the outer layer 13, 23 may be a vapor barrier, that is a layer which inhibits the throughput of vapor, such that vapor 60 is only led to the outside through the channels 15, 25 and not through the film 10, 20.

[0033] Of course, several channels can be disposed between several different layers, wherein those channels can also be connected to each other, to the openings of the inside of the package, and to the outside.

[0034] Either the channels and/or the openings can be closed during the storage of the food in the package and the channels and/or microholes and are then only opened during preparation when a certain pressure and/or a certain heat is obtained and/or the channels and/or microholes are subjected to vapor. The closed package enables a hygienic and food safe storage of the food before preparation. Single layers of the film can be transparent or opaque, as well as translucent. Prints can be applied to several layers or several layers can be designed in differing colors.

[0035] The inner and outer layer can especially be designed to comprise a certain mechanical durability, such that they can inhibit damaging of the film by sharp objects, tension, pressure, or any similar mechanical load.

[0036] The openings to the outside can comprise additional closing means, which can be removed by the consumer, as for example tape strips, that are applied over the channel opening to the environment. Also, the microholes can comprise additional closing means that can be removed by the consumer before the preparation of food.

[0037] Single microholes may not be closed by the detachable connection of the layers, such that vapor and heat developed during the preparation process more easily reaches the detachable connection of the layers, and therefore provides a more secure and faster opening of the detachable connection when it is closed with heat and/or vapor-reactive sealing agents.

Claims

1. Multilayer film (10;20) comprising at least two layers (11,12,13;21,22,23) for a microwave package (1) suitable for the storage and preparation of food (50) or the like, wherein the layers (11,12,13;21,22,23) of the film (10;20) comprise
an inner layer (11;21) suitable for contacting said food (50) or the like, and
an outer layer (13;23);
wherein a layer (12,13;22,23) of the film (10;20) is a vapor barrier; and
wherein the film (10;20) comprises a vapor valve structure (14;24) comprising at least a channel (15; 25) obtained between two layers (11,12;21,22) of the multilayer film (10;20),
characterised in that
said vapor valve structure (14;24) further comprises an opening (16;26) formed at least in said inner layer (11;21), and wherein said channel (15;25) is adjacent to said opening (16;26).

2. Multilayer film according to claim 1, wherein the channel (15;25) extends to an outer edge (18;28) of said multilayer film (10;20).

3. Multilayer film according to claim 1 or 2, wherein said channel (15;25) is formed by adjacent layers (11,12; 21,22) of the film (10;20) which are at certain areas not connected to each other, thus enabling communication of vapor through said opening (16;26) and said channel (15;25).

4. Multilayer film according to claim 1 or 2, wherein said channel (15;25) is formed by adjacent layers (11,21; 12,22) of said film (10;20) which are at least in partial areas connected by a detachable connection, such

that no communication of vapor through said opening (16;26) and channel (15;25) is possible, the detachable connection being such that the detachment of said layers (11,12;21,22) can occur due to heat and/or pressure and/or vapor, such that communication of vapor through said opening (16;26) and said channel (15;25) is possible.

5. Multilayer film according to claim 4, further comprising a sealing agent for said detachable connection of said layers (11,12;21,22).

6. Multilayer film according to claim 5, wherein said sealing agent is a cold sealing agent.

7. Multilayer film according to claim 5, wherein said sealing agent is a thermosealing lacquer.

8. Multilayer film according to claim 4, wherein the detachable connection of said layers (11,12;21,22) is obtained by mutual peeling adhesion of said layers (11,12;21,22).

9. Multilayer film according to any one of the previous claims, comprising an intermediate layer (12;22), being in particular the vapor barrier.

10. Multilayer film according to claim 9, wherein said channel (15;25) is obtained in between said inner layer (11;21) and said intermediate layer (12;22), said inner layer (11;21) comprising said opening (16;26).

11. Multilayer film according to claim 9, wherein said channel (15;25) is obtained in between said outer layer (13;23) and said intermediate layer (12;22), said inner layer (11;21) and said intermediate layer (12;22) comprising said opening (16;26), said outer layer (13;23) being a vapor barrier.

12. Multilayer film according to claim 9, wherein said channel (15;25) is obtained in between said inner layer (11;21) and said intermediate layer (12;22), said inner layer (11;21) and intermediate layer (12;22) comprising said opening (16;26).

13. Multilayer film according to any of the preceding claims, wherein said opening (16;26) comprises a plurality of microholes (16;26).

14. Multilayer film according to any of the preceding claims, wherein each of the layers (11,12,13;21,22,23) of the film (10;20) is made of at least one material of the following group:

- polypropylene;
- polyethylene;
- polyester;
- polyamide;
- metalized polyester; and
- metalized polyamide.

15. Multilayer film according to any of the preceding claims, wherein said layers (11,12,13;21,22,23) are at least partially laminated to each other by lamination adhesive (30).

16. A microwave package (1) suitable for the storage and preparation of food (50) or the like,
characterised in that
it comprises the multilayer film (10;20) of any one of the preceding claims, which forms at least partly the wall (2,3,4) of said package (1), and
said at least one vapor valve structure (14;24) being arranged such that it allows vapor to leave the package (1) during heating of the food (50) or the like.

17. Microwave package according to claim 16, wherein film sections (10;20) are connected parallel to each other to form a package edge (5), which is preferably fluid tight.

18. Microwave package according to claim 17, wherein said package (1) is a pouch type package.

19. Microwave package according to claim 17, wherein said package (1) is a pillow type package.

20. Microwave package according to claim 17, wherein said package (1) is a stand up bag type package.

21. Microwave package according to any one of the claims 16 to 20, wherein the film sections (10;20) are connected in an area at their edges (18;28) by a connection of the inner layers (11;21) or a connection of the outer layers (13;23) of each film section (10;20) respectively.

22. Microwave package according to any one of the claims 16 to 20, wherein the film sections (10;20) are connected in an area at their edges (18;28) by a connection of the inner layer (11;21) with the outer layer (13;23) of each film section (10;20) respectively.

23. Microwave package according to claim 21 wherein said openings (16;26) and said channels (15;25) of at least two vapor valve structures (14;24) are symmetrically arranged with respect to the connection plane of said package edge (5).

24. Microwave package according to any of the claims 16 to 23, wherein said channel (15;25) is oriented perpendicular to the package edge direction (Y).

25. Microwave package according to claim 16, wherein said package (1) is a container having said multilayer

film (10;20), comprising said vapor valve structure (14;24), as a lid.

26. Microwave package according to any of the claims 16 to 25, wherein said vapor valve structure (14;24) is arranged at the upper part of said package (1) and away from the food (50).

27. A method for the production of a multilayer film (10; 20), the method being **characterised by** the following steps:

i) arranging at least two layers (11,12,13; 21,22,23) on each other;
ii) forming an opening (16;26) in at least one layer (11,12;21,22); and
iii) connecting adjacent layers (11,12,13; 21,22,23) while obtaining a channel (15;25) between said at least two layers (11,12;21,22) by not connecting of said at least two layers (11,12; 21,22) at certain adjacent areas of the film (10; 20);

wherein a vapor valve structure (14;24) comprises said opening (16;26) and said channel (15;25), and wherein the channel (15;25) is adjacent to said opening (16;26).

28. The method according to claim 27, further comprising the following steps:

a) arranging a further outer layer (13;23) on an intermediate layer (12;22); and
b) connecting said outer layer (13;23) with said intermediate layer (12;22).

29. The method according to claim 27 or 28, wherein the forming of said opening (16;26) involves a laser operation.

30. The method according to any one of the claims 27 to 29, wherein said opening (16;26) comprises a plurality of microholes.

31. The method according to any one of the claims 27 to 30, wherein the connecting of the layers (11,12,13; 21,22,23) is obtained by lamination.

32. The method according to any one of the claims 27 to 31, further comprising the step of disposing a sealing agent in said channel (15;25).

33. The method according to claim 28, wherein said opening (16;26) is formed according to step ii) in inner and intermediate layers (11,12;21,22).

34. The method according to any one of the claims 27 to 33, wherein said step ii) of forming an opening (16;26) is provided by a laser selectively operation after the step iii) of connecting said adjacent layers (11,12,13;21,22,23).

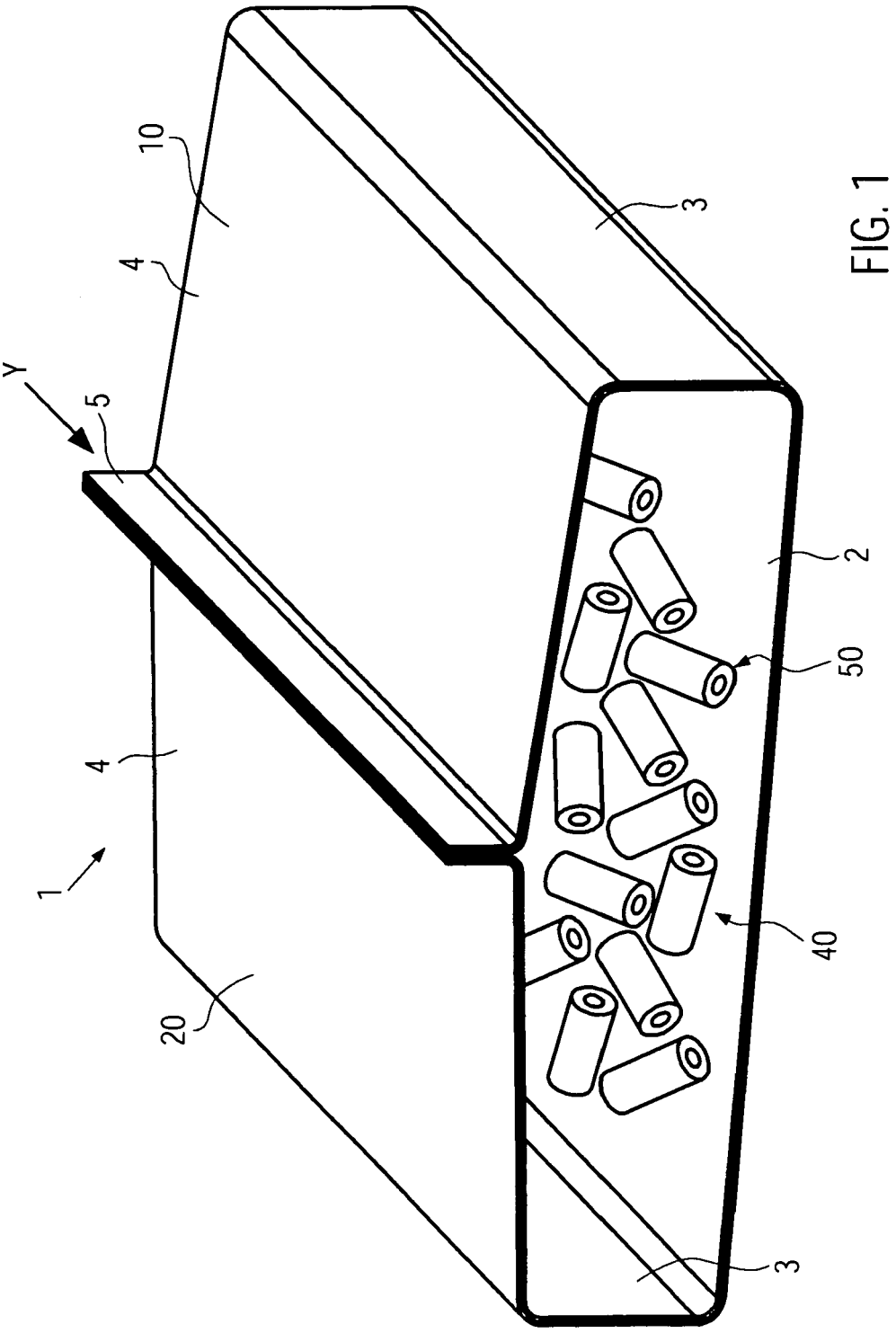

FIG. 1

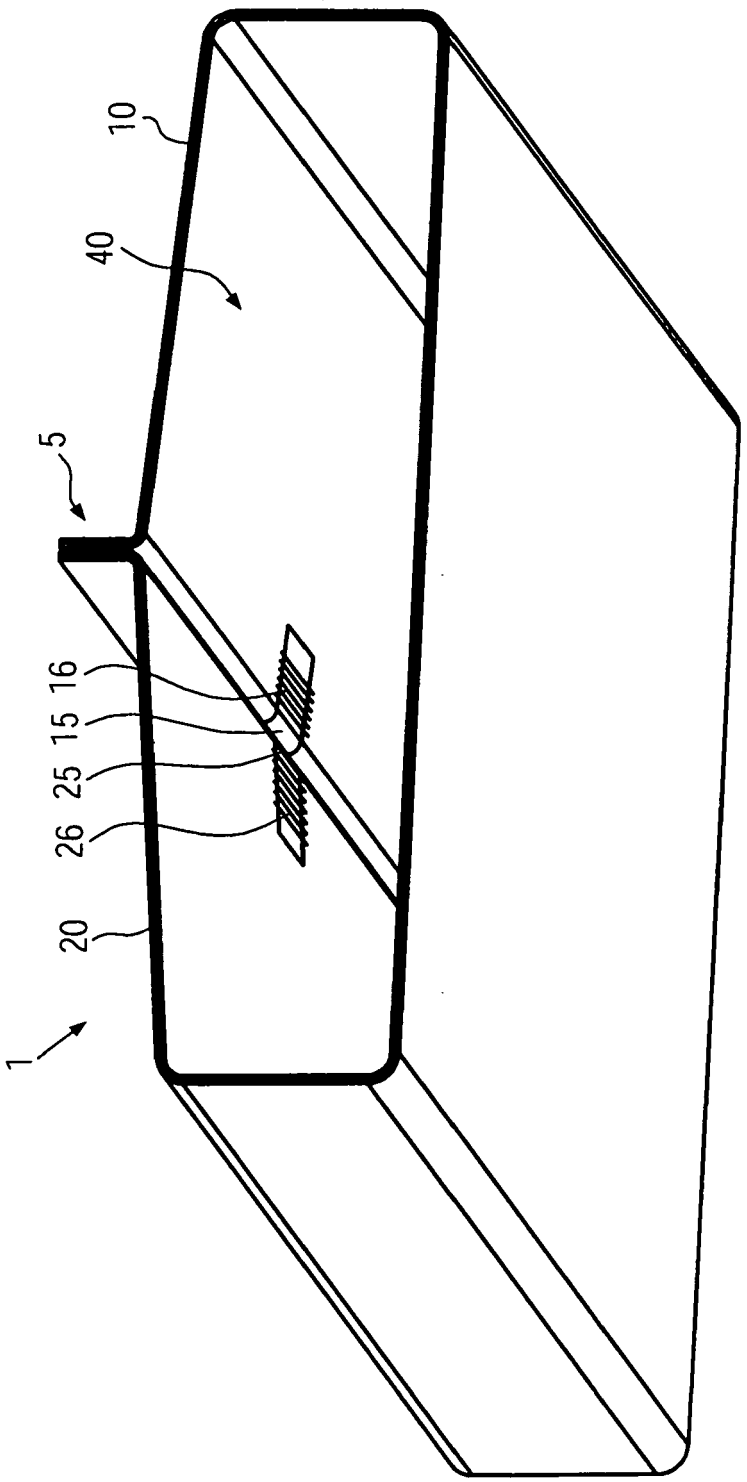

FIG. 2

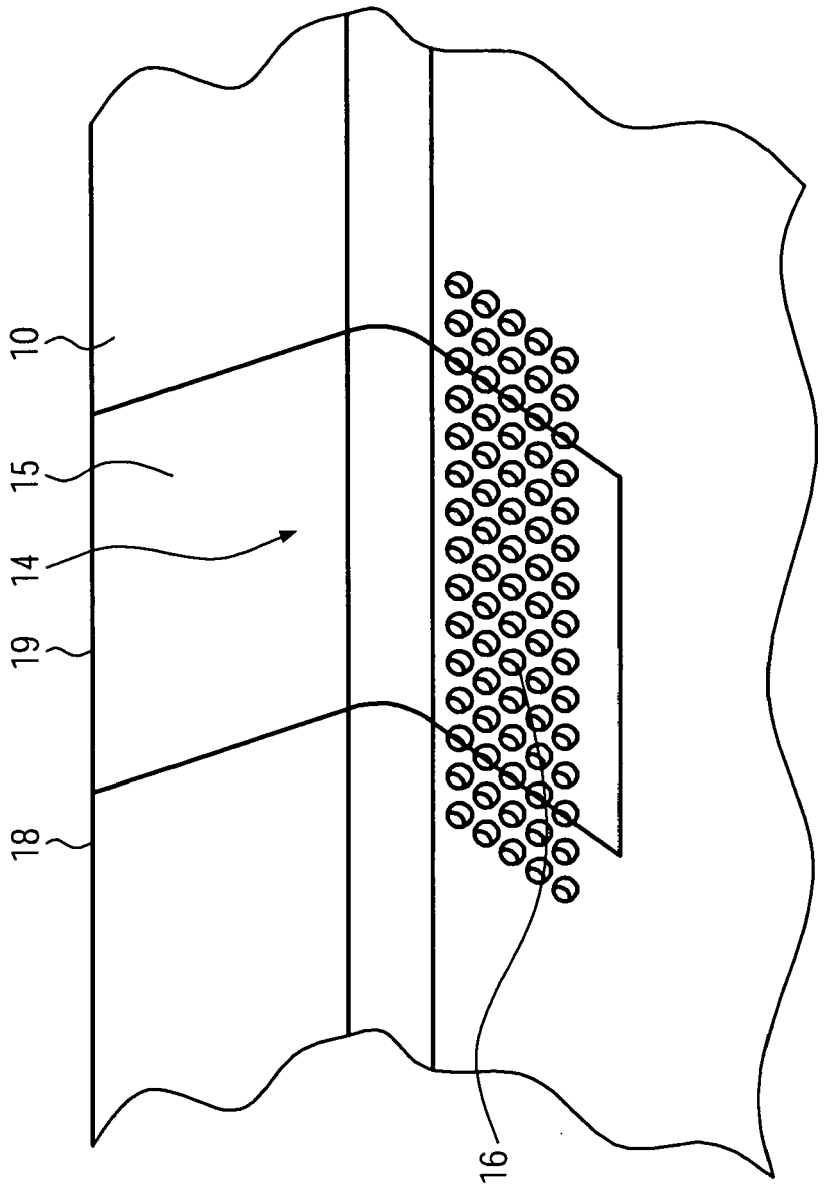

FIG. 3

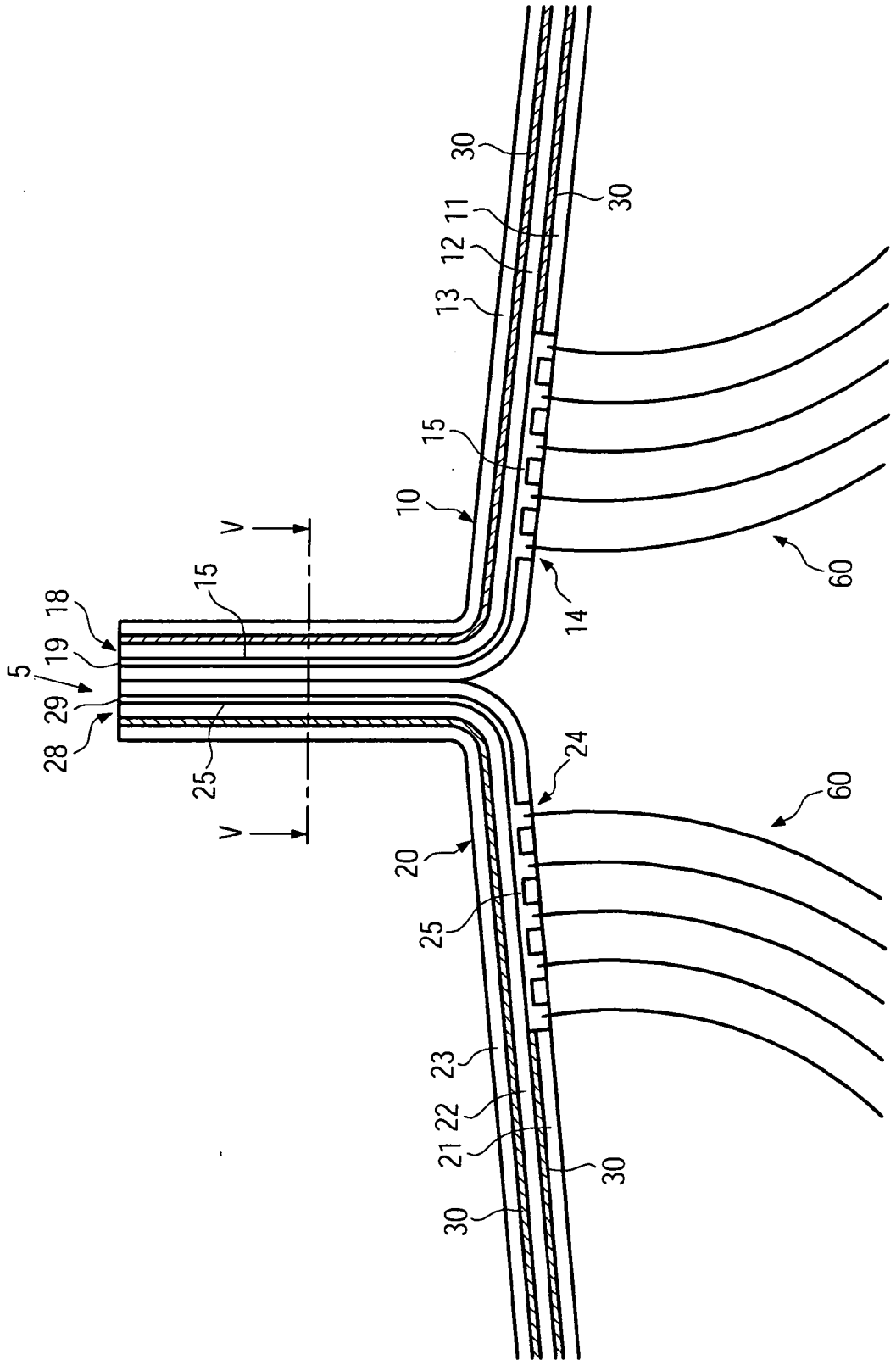

FIG. 4

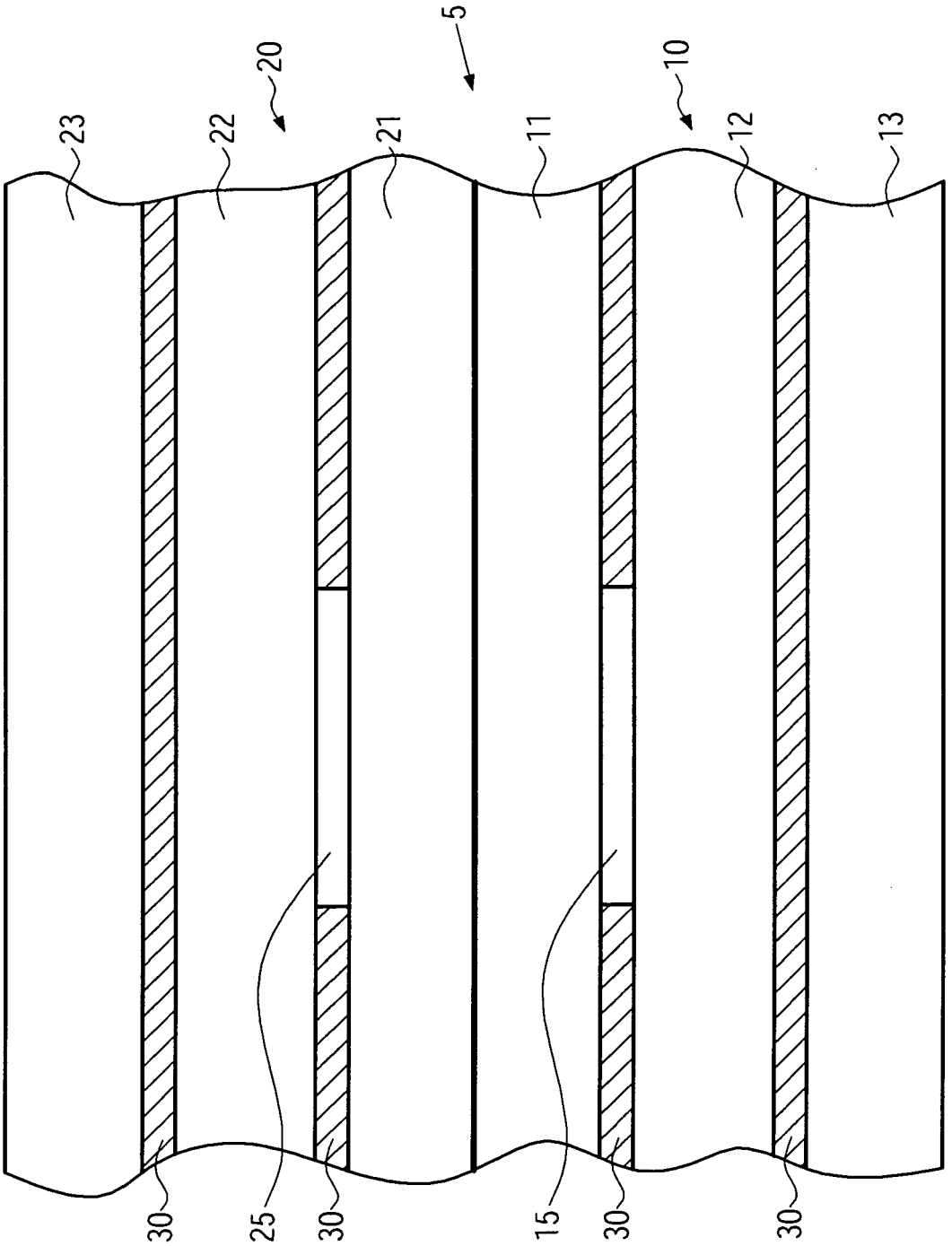

FIG. 5

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EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 May 2008	Gino, Christophe

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Place of search	Date of completion of the search	Examiner
The Hague	16 May 2008	Gino, Christophe

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