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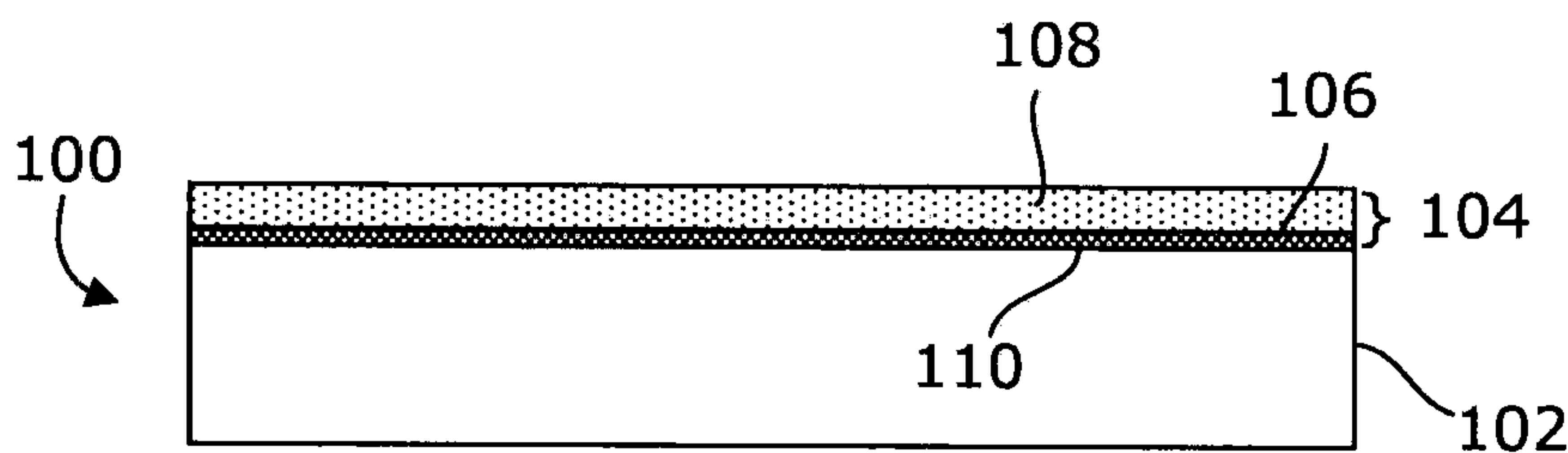


FIG. 1

(57) **Abrégé/Abstract:**

A packaging for a tea pouch, a method of making the packaging, and a tea pouch made from the packaging are disclosed. The packaging includes a paper substrate and a coextrusion including an ethylene vinyl alcohol layer. The ethylene vinyl alcohol layer is directly attached to the paper substrate. Packaging of this type exhibits excellent barrier properties, may be heat sealed under pressure to form a tea pouch without substantial amounts of squeeze out, and does not present the cost or disposal issues associated with some other types of packaging.

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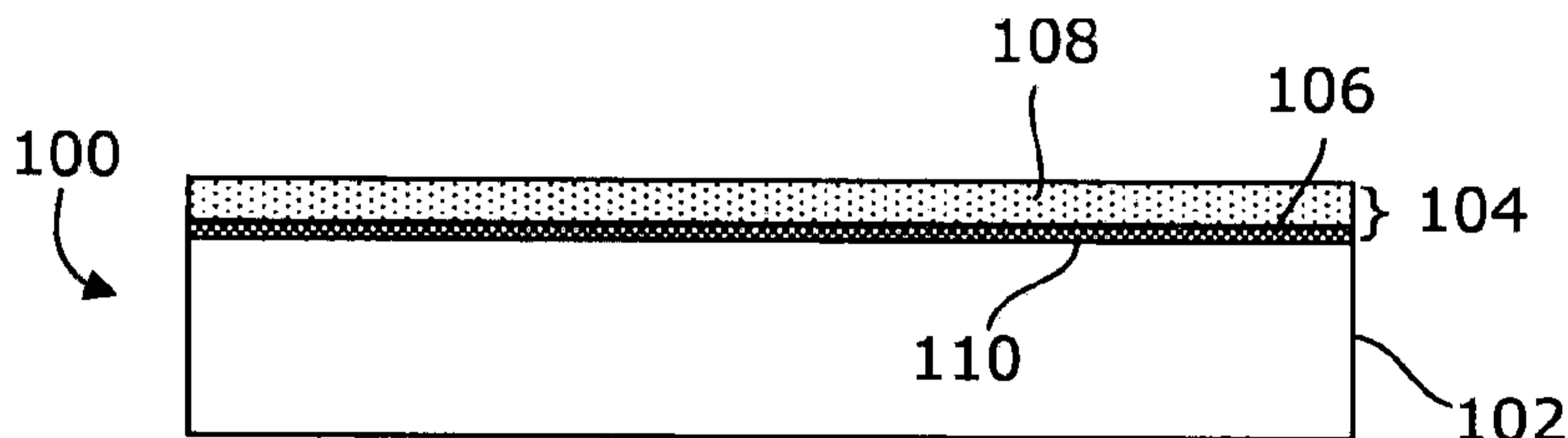


FIG. 1

(57) Abstract: A packaging for a tea pouch, a method of making the packaging, and a tea pouch made from the packaging are disclosed. The packaging includes a paper substrate and a coextrusion including an ethylene vinyl alcohol layer. The ethylene vinyl alcohol layer is directly attached to the paper substrate. Packaging of this type exhibits excellent barrier properties, may be heat sealed under pressure to form a tea pouch without substantial amounts of squeeze out, and does not present the cost or disposal issues associated with some other types of packaging.

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PACKAGING FOR A TEA POUCH

CROSS-REFERENCE TO RELATED APPLICATIONS

5 [0001] This patent application claims priority to U.S. provisional patent application serial number 61/296,321 titled "Packaging Materials" and filed on January 19, 2010. The full contents of that application is incorporated by reference as if set forth in its entirety herein.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

10 [0002] Not applicable.

TECHNICAL FIELD

[0003] This disclosure relates to packaging and, in particular, to packaging for use in a tea pouch.

BACKGROUND OF THE INVENTION

15 [0004] Packaging, particularly for perishable items such as tea, is subject to many demands. For example, the packaging for tea pouches must be capable of providing an oxygen and aroma barrier to prevent the tea contained within the pouch from spoiling and losing
20 flavor before the pouch is open. At the same time, however, the packaging should be workable in such a way that the packaging can be quickly placed around the tea bag using machinery.

[0005] The packaging must run well in packaging
25 machines, such as those made by Industria Macchine Automatiche (IMA), which run at line speeds of up to 400 bags/min. At these high line speeds, to form a heat seal, the temperature and pressure must be sufficiently high (typically in the range of 160°C to 180°C and 70
30 psi) to quickly form the seal in the brief amount of time that the packaging machine affords. Unfortunately, at these temperatures and pressures, the sealant resin on the inside of the tea pouch may squeeze out of the periphery of the pouch. The squeezed out resin builds up

on the heat seal jaws resulting in excessive waste of material and requiring periodic downtime to clean the machine.

5 [0006] Traditionally, aluminum foil or metallized films have been employed in tea pouch packaging. Aluminum foil gives the paper-based pouch structure excellent barrier properties as well as stiffness and deadfold properties which translate to good efficiencies on the high speed packaging machines. However, aluminum
10 foil has a very large carbon footprint and is expensive. Aluminum foil prices can swing up and down based on the energy costs associated with the production of thin aluminum foil and the sealant resin used on foil pouches is comparatively expensive when compared to other resins.

15 [0007] Although polymeric substitutes for Al foil or metallized films have been considered, many polymers are more prone to the squeeze out described above and present other environmental and usability concerns. One alternative to foil based packaging, PVDC (polyvinylidene
20 chloride), has been considered as a barrier layer or as a coating on films. However, the use of PVDC is highly regulated and/or banned in many countries due to environmental concerns upon incineration. Additionally, many users complain that packaging made with oriented
25 films is difficult to tear open, even when notches are provided on the tea pouch to initiate a tear.

[0008] Hence, there is a continuing need for an improved packaging that maintains product freshness without presenting cost, processing, or post-use
30 concerns.

SUMMARY OF THE INVENTION

[0009] Packaging for a tea pouch, a method of making such packaging, and a tea pouch made from such packaging is disclosed. The packaging includes an ethylene vinyl

alcohol (EVOH) layer which is directly attached to a paper substrate. In some preferred forms, the EVOH layer can be formed as part of an asymmetrical coextrusion with a two resin capable coextruder, which makes the packaging inexpensive to produce.

5 [0010] As will be described in more detail below, EVOH has conventionally been considered unsuitable for this type of packaging because in order to prevent degradation of the EVOH, the EVOH needed to be sandwiched between 10 layers including moisture barriers such as LDPE (low density poly ethylene). Conventional EVOH coextrusion has been done using a symmetrical three resin, five layer design such as LDPE-Tie Resin-EVOH-Tie Resin-LDPE. The LDPE and Tie Resin materials are extruded separately and 15 directed into a feedblock device that splits them both into two separate layers on each side of the EVOH layer. When extrusion coated onto paper, the inner LDPE and Tie Resin layers would be disposed between the paper and EVOH. When formed into a tea pouch and heat sealed, heat 20 is applied to the paper side, thus the inner LDPE and Tie Resin layers must melt before the outer LDPE and Tie Resin layers. This premature melting of the inner polymeric layers makes the structure prone to excessive amounts of squeeze-out. This collected material would 25 need to be cleaned from the jaws and require frequent downtime.

[0011] A packaging for a tea pouch is disclosed. The packaging includes a paper substrate and a coextrusion including an ethylene vinyl alcohol layer. The ethylene 30 vinyl alcohol layer is directly attached to the paper substrate. Since the melting point of EVOH (178 degrees C) is greater than the commonly used set-point temperatures of the heat seal jaws (160 degrees C to 170 degrees C), the EVOH layer does not melt and does not

squeeze out. All of the heat put into the structure can go into melting just the sealant layer or layers.

[0012] In some forms, the ethylene vinyl alcohol layer may be directly attached to the paper substrate along a paper substrate - ethylene vinyl alcohol layer interface.

[0013] The coextrusion may include a tie resin and a sealant resin as a blend or as separate layers. In one form, the coextrusion further includes a tie sealant resin blend (TSRB) layer on the side of the ethylene vinyl alcohol layer not directly attached to the paper substrate. In another form, on a side of the ethylene vinyl alcohol layer not directly attached to the substrate, the coextrusion includes a tie resin layer and a sealant layer. In this form, the tie resin layer is disposed at least in part between the ethylene vinyl alcohol layer and the sealant layer.

[0014] The paper substrate may include cellulosic fibers and various types of paper may be suitable for use as the substrate. To provide an improved moisture barrier and to prevent the degradation of the ethylene vinyl alcohol layer, a polymeric barrier layer may be attached to a side of the paper substrate that is not directly attached to the coextrusion. Another paper layer may be attached to the polymeric barrier layer such that the polymeric barrier layer is sandwiched between the paper substrate and the other paper layer. In some forms, this polymeric barrier layer may be polyethylene or polypropylene.

[0015] The paper substrate and/or the polymeric barrier layer may have a treated surface. The treated surface can promote adhesion of the ethylene vinyl alcohol layer to the paper substrate and/or the polymeric barrier layer to the paper layers. Such treatments could

potentially include flame treatment, liquid priming, or corona treatment.

5 [0016] A coextrusion face of the packaging may be heat sealable to another coextrusion face of the packaging without substantial amounts of squeeze out at a rate of 400 units/minute or higher in a packaging machine, such as those made by Industria Macchine Automatiche (IMA). The ethylene vinyl alcohol layer may have a melting temperature (178 degrees C) in excess of a sealant layer 10 (90 to 100 degrees C) of the coextrusion containing a tie resin. By reducing the amount of squeeze out, the packaging can be run through packaging machines at higher speeds with less machine downtime being need to clean heat seal jaws or other tool parts.

15 [0017] The coextrusion may be formable using a two resin capable coextruder and may be asymmetrical. Notably, most EVOH extrusions are symmetrical and include moisture barrier layers on both sides of the EVOH, as the barrier properties of EVOH can degrade when exposed to 20 humidity levels above 85% RH. However, symmetric coextrusions of EVOH can require multiple coextruders or coextruders capable of extruding more than two resins. This has made conventional symmetrical coextrusions of EVOH very costly to produce.

25 [0018] To provide an effective barrier, the ethylene vinyl alcohol layer may include ethylene in a range of 24 to 48 mole percent, and preferably 35 mole percent ethylene.

30 [0019] A method of making packaging for a tea pouch is also disclosed which includes providing a paper substrate, extruding a coextrusion including a layer of ethylene vinyl alcohol, and attaching the coextrusion onto the paper substrate such that the layer of ethylene

vinyl alcohol is directly attached to the paper substrate.

[0020] The method may further include the step of treating a surface of the paper substrate to be attached to the layer of ethylene vinyl alcohol before attaching the coextrusion, thereby promoting adhesion between the paper substrate and the coextrusion. Again, the treatment may include flame treating, liquid priming, and/or corona treating the surface.

[0021] In one form, the coextrusion includes a layer of tie sealant resin blend (TSRB) coextruded with the layer of ethylene vinyl alcohol. If a blend is coextruded with the ethylene vinyl alcohol, then the extrusion step may be performed with a two resin capable extruder. In other forms, the coextrusion may include a layer of tie resin and a separate layer of sealant coextruded with the layer of ethylene vinyl alcohol. In either of these forms, the coextrusion may be asymmetrical.

[0022] The paper substrate may be further modified by attaching a polymeric layer and another paper layer to a side of the paper substrate not attached to the coextrusion such that the polymeric layer is sandwiched between the paper substrate and the other paper layer thereby forming an improved barrier to moisture that could degrade the ethylene vinyl alcohol.

[0023] A tea pouch may be made using a packaging of the type described herein. The tea pouch includes at least one ply of packaging comprising a paper substrate and a coextrusion with an ethylene vinyl alcohol layer in which the ethylene vinyl alcohol layer is directly attached to the paper substrate and the coextrusion further has a tie resin and a sealant. A seal is formed about at least a portion of the periphery of the tea

pouch to form an inner volume for storage of a tea product. This seal is formed by the application of heat and pressure to the at least one ply of packaging.

5 [0024] The packaging of this tea pouch may be further defined to have the features described above or disclosed hereafter.

10 [0025] The foregoing and still other advantages of the invention will appear from the following description. In that description reference is made to the accompanying drawings which form a part hereof and in which there is shown by way of illustration preferred embodiments of the invention. These embodiments do not represent the full scope of the invention. Rather, the claims should be
15 looked to in order to judge the full scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] FIGS. 1 through 4 are four exemplary embodiments of packaging for tea pouches;

20 [0027] FIG. 5 is a schematic illustrating a method of making packaging for tea pouches;

[0028] FIG. 6 is a plan view of an exemplary tea pouch; and

[0029] FIG. 7 is a cross-sectional view taken through line 6-6 of FIG. 6.

25 DETAILED DESCRIPTION OF THE INVENTION

[0030] Ethylene vinyl alcohol (EVOH) is an extrudable resin that has excellent oxygen, flavor, and aroma barrier properties. EVOH resins and packaging materials have been used for several decades as meat and cheese
30 film wrappers and its barrier properties with respect to oxygen, grease, oil, flavor additives, and aroma are well understood.

[0031] However, when exposed to humidity levels of 85% or higher, the barrier properties of EVOH degrade. To

avoid this, EVOH is typically extruded in a multi-layer coextrusion in which specialized tie resins are used to adhere the EVOH to outer polyolefin layers that protect the EVOH from humidity. For example, a five layer
5 coextrusion of EVOH may include LDPE-Tie Resin-EVOH-Tie Resin-LDPE. In this five layer structure, the LDPE layers protect the EVOH layer from exposure to moisture and, hence, degradation.

[0032] It should further be appreciated that EVOH
10 cannot be extruded as a separate thin film. When melted, EVOH becomes fluid very quickly. Thus, EVOH has traditionally required the above-described five layer structure not only to maintain barrier properties, but also to provide adjacent structural layers (such as
15 polyethylene) to support the coextrusion of the EVOH.

[0033] Although EVOH has excellent barrier properties, EVOH has heretofore been considered unsuitable as a barrier layer in some paper based applications. Production of EVOH has required extrusion machines
20 capable of coextruding more than two resins. Such machines are very expensive and not as common as those extruding only two resins. Further, given the dual tie resin and polyolefin layers deemed necessary to protect each side of the EVOH from humidity, a heat sealed paper
25 packaging product incorporating EVOH would have unacceptably high levels of "squeeze out" during packaging as a result of the melting of the various LDPE barrier layers and tie resins. As mentioned above, squeeze out results in the build up of polymeric material
30 on the packaging machine components which requires costly downtime to clean.

[0034] Disclosed below are structures for a paper-based substrate containing EVOH which avoid the problems of squeeze out and, in some structures, do not require

complex coextrusion machinery configurations capable of forming coatings having more than two layers. As used herein, a "-" is used to indicate layers that are coextruded with one another and a "/" is used to indicate layers that are separated attached to one another (for example, by lamination).

5 [0035] Now with reference to FIGS. 1 through 4, a number of the packaging structures that may be used for the tea pouch stock are disclosed including:

- 10
- (1) PAPER/EVOH-TSRB COEX
 - (2) PAPER/EVOH-TIE-SEALANT COEX
 - (3) PAPER/(PE or PP)/PAPER/EVOH-TSRB COEX
 - (4) PAPER/(PE or PP)/PAPER/EVOH-TIE-SEALANT COEX

15 As used herein, TSRB refers to a tie resin and sealant resin blend, whereas EVOH-TIE-SEALANT refers to three discrete separately formed layers of EVOH, tie resin (which is the resin designed to adhere the EVOH and the sealant layers together), and sealant. With respect to the figures, like reference numerals are used to describe like items in which the hundreds digit has been increased to correspond to the figure number (e.g., tie sealant resin blend layer 108 corresponds to tie sealant resin blend layer 308).

20 [0036] Looking first at FIG. 1, the layers of structure (1) listed above are illustrated. In FIG. 1, a packaging 100 includes a paper substrate 102 and a coextrusion 104 including an ethylene vinyl alcohol layer 106 and a tie sealant resin blend layer 108. The ethylene vinyl alcohol layer 106 of the coextrusion 104 is directly attached to the paper substrate 102 along a paper substrate - ethylene vinyl alcohol layer interface 110.

[0037] Turning now to FIG. 2, structure (2) is illustrated which is similar to structure (1), but in which the tie sealant resin blend layer has been replaced by separate tie resin and sealant layers. In FIG. 2, a packaging 200 again includes a paper substrate 202 with a coextrusion 204. However, in structure (2), the coextrusion 204 includes an ethylene vinyl alcohol layer 206, a tie resin layer 212, and a sealant layer 214. The ethylene vinyl alcohol layer 206 is directly attached to the paper substrate 202 along a paper substrate - ethylene vinyl alcohol layer interface 210. The other layers are arranged such that the tie resin layer 212 is sandwiched between the ethylene vinyl alcohol layer 206 and the sealant layer 214. Accordingly, the sealant layer 214 is disposed such that it is on an attachment face (i.e., a face that will be attached to another face of the packaging) when the packaging is heat sealed to form a tea pouch.

[0038] Now with reference to FIGS. 3 and 4, a packaging 300 and a packaging 400 are illustrated which correspond to structures (3) and (4) listed above. FIG. 3 is generally similar to FIG. 1 and FIG. 4 is generally similar to FIG. 2, except that in FIGS. 3 and 4 an additional polymeric barrier layer 316 or 416 and another paper layer 318 or 418 are attached to the other side of the paper substrate 302 or 402, respectively.

[0039] Looking at the structures above, it can be seen that the EVOH coextrusion is asymmetrical in all forms, unlike the LDPE-Tie Resin-EVOH-Tie Resin-LDPE structures which have been previously produced. As the EVOH is directly attached to a paper layer, the elimination of the tie resin-LDPE layers on the left side of the EVOH (of the listed structures) reduce the amount of squeeze out that is likely to occur during heat seal in an IMA

machine or the like. At least to some extent, the paper substrate may serve as a barrier to moisture to protect the EVOH layer.

[0040] To further prevent degradation of the EVOH layer, the thickness of the EVOH layer may be increased in comparison to the EVOH layer thickness in a standard symmetrical coextrusion. Additionally, as in FIGS. 3 and 4, an interpaper layer of a polymeric barrier layer such as polyethylene or polypropylene may be employed. The third and fourth structures have the best barrier properties for both water vapor transmission and oxygen transmission. However, using two thinner layers of paper is more expensive. The laminate resin layer would preferably be high density polyethylene (HDPE), polypropylene (PP), or another material with a high melting point polymeric material to prevent squeeze-out issues.

[0041] Notably, all other known EVOH paper structures to date have employed a layer of polyethylene resin between the paper and the EVOH resin. Because this polyethylene layer will melt and flow under the high seal pressure conditions, the known structures would have squeeze-out issues, or if the seal temperature and pressure are lowered to avoid squeeze out, then the packaged product would have weaker seal integrity. Additionally, as EVOH is typically processed to have tie resin and LDPE on either side as a moisture barrier, the extrusion equipment to produce a five layer coextrusion is typically more costly than that to produce a two layer coextrusion. At least the first and third structures described above can be produced with only a two resin capable coextruder.

[0042] It is also noted that EVOH melts at a much higher temperature than the TSRB (EVOH melts at around

178 degrees C, while the TSRB melts in the range of 90-100 degrees C depending on the blend). Accordingly, the EVOH itself also resists squeeze out when heat seal jaws of the packaging machines are set at 160 degrees C.

5 **[0043]** In one preferred form for the packaging of a tea pouch, the tea pouch packaging has a structure of 35#PAPER/4#EVOH-7#TSRB (#/ream based on 3,000 ft² ream size). The 35#/ream PAPER may be Kraft paper with a machine glaze type finish and bleached white color. The
10 paper may be flame treated for good adhesion of the 4#EVOH-7#TSRB coextrusion to the paper. The 4#EVOH-7#TSRB layers are coextruded from a single die. The EVOH may be 35 mol% ethylene EVOH (available as EVAL C109B) and the TSRB may be 50% POP (polyolefin plastomer,
15 available as DOW PT1450), 25% tie resin (such as ADMER AT1000A), and 25% LDPE (low-density polyethylene, available as CHEVRON 4517). The exact percentages of the constituent components may be varied depending on the temperatures, times, and pressures used to form the heat
20 seal and the quality of the seal desired.

[0044] In another exemplary form, the packaging for the tea pouch made according to structure (2) above may have a structure of 35#PAPER/4#EVOH-1.5#Tie Resin-5.5#Sealant.

25 **[0045]** In still another exemplary alternative form, the packaging for the tea pouch made according to structures (3) and (4) in which two papers are laminated together may have a total paper basis weight of 30#/ream (3,000 ft²) and a lamination polymer basis weight of
30 6#/ream. In this form, the two paper layers may each have a separate basis weight of 15#/ream, although they might be uneven or differently distributed. By having 30#/ream in the paper layers and 6#/ream of the lamination polymer, the total weight basis and thickness

of the structures are substantially the same. It is contemplated that as the intermediate lamination polymer is a polymeric barrier layer to moisture, then the EVOH basis weight may be reduced to 3#/ream since there is additional protection to humidity on the paper side.

5 [0046] Although a preferred tea pouch structure is described above, this structure should not be construed as limiting. Some examples of variations to the structure are provided below which, again, are for purpose of example only and should not be construed as limiting.

10 [0047] It is contemplated that the paper may be a type having a machine glazed (MG) or a machine finished (MF) type finish, may be of a white or a natural color, and may be of a Kraft, ground wood, recycled, or sulfite furnish. Clay coated paper may also be used. The paper may include laminations of one or more layers of paper or include a PET, Nylon, OPP, or PLA film laminated to the paper. The basis weight of the paper substrate can range from 10#/ream to 60#/ream.

15 [0048] Although EVOH with 35% ethylene content is believed to provide the best barrier results, EVOH is available in 24% ethylene to 48% ethylene content. It is contemplated that any amount of ethylene content might be used or selected based on the desired properties of the barrier or for appropriate economy. Generally speaking, the lower the ethylene content, the better the aroma and oxygen barrier. It is contemplated that the basis weight of the EVOH layer may be in the range of .1#/3,000ft² to 10.0#/3,000 ft².

25 [0049] The TSRB may have a tie resin content from 10wt% to 80wt% and a polyethylene content from 20wt% to 90wt%. The tie resin may be an anhydride modified LDPE based adhesive resin concentrates such as ADMER AT1000A

or DUPONT BYNEL 41E170. The polyethylene sealant resin may be LDPE, MDPE, HDPE, LLDPE, POP, mLLDPE and blends thereof, and copolymers of PE such as, for example: EVA, IONOMER, EAA, EMAA, EMAC, EnBA, and the like. TSRB can be further modified with slip, antiblock, or color concentrates depending upon customer needs.

[0050] The particular tie sealant resin blend selected may be tweaked to minimize the amount of squeeze out that occurs during heat sealing at high temperatures and pressures, while simultaneously maximizing the quality of the seal. The basis weight of the TSRB layer may be in the range of 1.0#/3,000ft² to 20.0#/3,000 ft² and modified to provide enough TSRB material to form a robust seal without including so much material so as to induce squeeze out.

[0051] In order to achieve a thin and stable coating layer, EVOH is not extruded as its own single layer, but needs to be coextruded with the TSRB. Another suitable alternative is to extrude an asymmetric three layer coextrusion, such as in the second and fourth structures, in which the tie and sealant resins are not blended. Of course, a benefit of using the TSRB instead of the three layer coextrusion is that a three resin capable coextruder is not required.

[0052] Now with reference to FIG. 5, a line 500 for making the packaging is disclosed. The line 500 illustrated is suitable for making any of the structures (1)-(4) listed above. One of ordinary skill in the art will readily appreciate, however, that segments of the line 500 may be eliminated or not used based on the desired structure of the final product.

[0053] The line 500 includes two sections. The first section provides the paper substrate layer or forms a laminate including the paper layers with the polymeric

barrier layer disposed there between. The second section then applies the EVOH coextrusion to the substrate.

[0054] In the form shown, the first section of the line 500 is shown for the preparation of structures shown in FIGS. 3 and 4, which include a paper / polymeric barrier layer / paper lamination. In this form, paper is separately unrolled from a main substrate roll 502 and an auxillary substrate roll 504 and fed toward an extrusion laminator 506 which inserts the polymeric barrier layer between the two paper layers. On the way to the extrusion laminator 506, the paper from the main substrate roll 502 is fed past a treater 508 such as a flame treater or a corona treater that treats the surface of the paper from the main substrate roll 502 such that the polymeric barrier layer created at the extrusion laminator 506 will adhere well to the paper layer. Likewise, the paper from the auxillary substrate roll 504 is fed past a treater 509 such as a flame treater or a corona treater that treats the surface of the paper from the auxillary substrate roll 504 such that the polymeric barrier layer created at the extrusion laminator 506 will also adhere well to this paper layer.

[0055] At the extrusion laminator 506, the paper layers meet at a nip point at which point the polymeric barrier layer is inserted between the paper layers. The nip point occurs between a rubber nip roll 510 and a chill roll 512. The paper layers approach the nip point from different angles and in the space between where the paper layers meet and at a location above the nip point, a die 514 supplies a molten resin A (which may be, for example, polyethylene or polypropylene) as a melt curtain between the paper layers. This molten resin A is pressed between the paper layers at the nip point, is cooled to form a paper / polymeric barrier layer / paper structure

found in FIGS. 3 and 4, and exits the extrusion laminator 506.

5 [0056] It should be appreciated that while the line 500 is shown including the extrusion laminator 506 for the formation of the paper / polymeric barrier layer / paper structure of structures (3) or (4), that if the structures (1) or (2) are being formed then the extrusion laminator 506 may be eliminated and the first section of the line 500 could simply be a main substrate roll that
10 unrolls to provide the paper substrate.

[0057] Regardless of whether the substrate is a single paper layer or a paper / polymeric barrier layer / paper laminate structure, the substrate may then be optionally fed past a treater 516 that treats the surface of the
15 paper substrate for better adhesion to the coextrusion further down the line 500. Again, the treater 516 may incorporate a flame treatment, liquid priming, or a corona treatment to prepare the surface of the paper substrate.

20 [0058] In the second portion of the line 500, a coextrusion coater 518 applies or coats the paper substrate with the EVOH coextrusion to form the packaging. In the coextrusion coater 518, the paper substrate is fed between a rubber nip roll 520 and a
25 chill roll 522. A feedblock 524 of the coextruder 526 receives molten EVOH and at least one other molten resin B and/or C. If an EVOH-TSRB coextrusion is being formed, then the molten TSRB is also fed into the feedblock 524 (as B, with no C resin being fed) and a two layer
30 coextrusion of EVOH-TSRB is extruded by the die 528 proximate the nip point such that the EVOH layer side contacts the paper substrate. In this form, the coextruder 526 may be only a two resin capable coextruder. If an EVOH-Tie-Sealant coextrusion is being

formed, then in addition to the molten EVOH the feedblock 524 receives both a molten tie resin (as B) and a molten sealant (as C) and the die 528 extrudes an EVOH-Tie-Sealant coextrusion such that the EVOH layer is applied to the paper substrate. After exiting the coextrusion coater 518, the packaging is wound up on a product wind-up roll 530.

[0059] Now with reference to FIGS. 6 and 7, an exemplary tea pouch 600 is illustrated that has been made by heat sealing a ply of the paper/EVOH-TSRB packaging 100. The tea pouch 600 is formed by folding a single ply of the packaging in half at a fold line 602 such that the TSRB layer 108 on either side of the fold line 602 face one another and a tea bag 604 is disposed between the two halves. A U-shaped seal 606 is then formed around a portion of the periphery 608 of the tea pouch 600 by use of heat and pressure from a packaging machine such as the IMA machine above to seal the two TSRB layers 106 together. The seal 606 and the fold line 602 completely surround the tea bag 604 such that the tea bag 604 is entirely contained with an inner volume 610 of the tea pouch 600.

[0060] While a tea pouch is shown formed from a single ply of packaging which has been folded and a portion of the periphery has been heat sealed, it should be appreciated that two separate plies of packaging could be sealed around their entire periphery to establish the inner volume for receiving the tea bag such that no fold is required. Additionally, while a tea pouch formed from the paper/EVOH-TSRB structure has been illustrated in FIGS. 6 and 7, it will be appreciated that any structures (1)-(4) could be sealed (either at the TSRB surface or sealant surface) under heat and pressure to make the tea pouch.

[0061] While specific embodiments of the present invention has been shown, various modifications falling within the breadth and scope of the invention will be apparent to one skilled in the art. Thus, the following
5 claims should be looked to in order to understand the full scope of the invention.

CLAIMS

What is claimed is:

1. A packaging for a tea pouch, the packaging comprising:

5 a paper substrate; and
a coextrusion including an ethylene vinyl alcohol layer;

wherein the ethylene vinyl alcohol layer is directly attached to the paper substrate.

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2. The packaging of claim 1, wherein the ethylene vinyl alcohol layer is directly attached to the paper substrate along a paper substrate - ethylene vinyl alcohol layer interface.

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3. The packaging of claim 1, wherein the paper substrate comprises cellulosic fibers.

4. The packaging of claim 1, wherein the coextrusion further comprises a tie sealant resin blend layer on the side of the ethylene vinyl alcohol layer not directly attached to the paper substrate.

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5. The packaging of claim 1, wherein the coextrusion further comprises, on a side of the ethylene vinyl alcohol layer not directly attached to the substrate, a tie resin layer and a sealant layer, the tie resin layer being disposed at least in part between the ethylene vinyl alcohol layer and the sealant layer.

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6. The packaging of claim 1, wherein the coextrusion is asymmetrical.

7. The packaging of claim 1, further comprising a polymeric barrier layer attached to a side of the paper substrate that is not directly attached to the coextrusion and further comprising another paper layer attached to the polymeric barrier layer such that the polymeric barrier layer is sandwiched between the paper substrate and the other paper layer.

8. The packaging of claim 7, wherein the polymeric barrier layer is selected from a group consisting of polyethylene and polypropylene.

9. The packaging of claim 1, wherein a coextrusion face of the packaging is heat sealable to another coextrusion face of the packaging without substantial amounts of squeeze out at a rate of 400 units/minute.

10. The packaging of claim 1, wherein the coextrusion is formable using a two resin capable coextruder.

11. The packaging of claim 1, wherein the ethylene vinyl alcohol layer has a melting temperature in excess of a layer of the coextrusion containing a tie resin.

12. The packaging of claim 1, wherein the paper substrate further comprises a treated surface attached to the coextrusion, the treated surface promoting adhesion of the ethylene vinyl alcohol layer to the paper substrate.

13. The packaging of claim 1, wherein the ethylene vinyl alcohol layer includes ethylene in a range of 24 to 48 mole percent.

14. The packaging of claim 13, wherein the ethylene vinyl alcohol layer includes 35 mole percent ethylene.

5

15. A method of making packaging for a tea pouch,
the method comprising:

providing a paper substrate;

extruding a coextrusion including a layer of
5 ethylene vinyl alcohol; and

attaching the coextrusion onto the paper substrate
such that the layer of ethylene vinyl alcohol is directly
attached to the paper substrate.

10 16. The method of claim 15, further comprising the
step of treating a surface of the paper substrate to be
attached to the layer of ethylene vinyl alcohol before
attaching the coextrusion thereby promoting adhesion
between the paper substrate and the coextrusion.

15 17. The method of claim 16, wherein the step of
treating the surface includes flame treating.

20 18. The method of claim 16, wherein the step of
treating the surface includes corona treating.

19. The method of claim 16, wherein the step of
treating the surface includes liquid priming.

25 20. The method of claim 15, wherein the coextrusion
includes a layer of tie sealant resin blend coextruded
with the layer of ethylene vinyl alcohol.

30 21. The method of claim 20, wherein the extrusion
step is performed with a two resin capable extruder.

22. The method of claim 15, wherein the coextrusion
includes a layer of tie resin and a layer of sealant
coextruded with the layer of ethylene vinyl alcohol.

23. The method of claim 15, further comprising the step of attaching a polymeric layer and another paper layer to a side of the paper substrate not attached to the coextrusion such that the polymeric layer is sandwiched between the paper substrate and the other paper layer thereby forming an improved barrier.

24. The method of claim 15, wherein the coextrusion is asymmetrical.

25. A tea pouch comprising:

at least one ply of packaging comprising a paper substrate and a coextrusion including an ethylene vinyl alcohol layer in which the ethylene vinyl alcohol layer is directly attached to the paper substrate, the
5 coextrusion further comprising a tie resin and a sealant;

a seal formed about at least a portion of the periphery of the tea pouch to form an inner volume for storage of a tea product;

10 wherein the seal is a heat seal formed by the application of heat and pressure to the at least one ply of packaging.

26. The tea pouch of claim 25, wherein the ethylene vinyl alcohol layer is directly attached to the paper substrate along a paper substrate - ethylene vinyl alcohol layer interface.
15

27. The tea pouch of claim 25, wherein the paper substrate comprises cellulosic fibers.
20

28. The tea pouch of claim 25, wherein the coextrusion further comprises a tie sealant resin blend layer on the side of the ethylene vinyl alcohol layer not directly attached to the paper substrate.
25

29. The tea pouch of claim 25, wherein the coextrusion further comprises, on a side of the ethylene vinyl alcohol layer not directly attached to the substrate, a tie resin layer and a sealant layer, the tie resin layer being disposed at least in part between the ethylene vinyl alcohol layer and the sealant layer.
30

30. The tea pouch of claim 25, wherein the coextrusion is asymmetrical.

5 31. The tea pouch of claim 25, further comprising a polymeric barrier layer attached to a side of the paper substrate that is not directly attached to the coextrusion and further comprising another paper layer attached to the polymeric barrier layer such that the polymeric barrier layer is sandwiched between the paper
10 substrate and the other paper layer.

15 32. The tea pouch of claim 31, wherein the polymeric barrier layer is selected from a group consisting of polyethylene and polypropylene.

20 33. The tea pouch of claim 25, wherein a coextrusion face of the packaging is heat sealable to another coextrusion face of the packaging without substantial amounts of squeeze out at a rate of 400 units/minute.

25 34. The tea pouch of claim 25, wherein the coextrusion is formable using a two resin capable coextruder.

30 35. The tea pouch of claim 25, wherein the ethylene vinyl alcohol layer has a melting temperature in excess of a layer of the coextrusion containing a tie resin.

36. The tea pouch of claim 25, wherein the paper substrate further comprises a treated surface attached to the coextrusion, the treated surface promoting adhesion of the ethylene vinyl alcohol layer to the paper substrate.

37. The tea pouch of claim 25, wherein the ethylene vinyl alcohol layer includes ethylene in a range of 24 to 48 mole percent.

5

38. The tea pouch of claim 37, wherein the ethylene vinyl alcohol layer includes 35 mole percent ethylene.

1 / 3

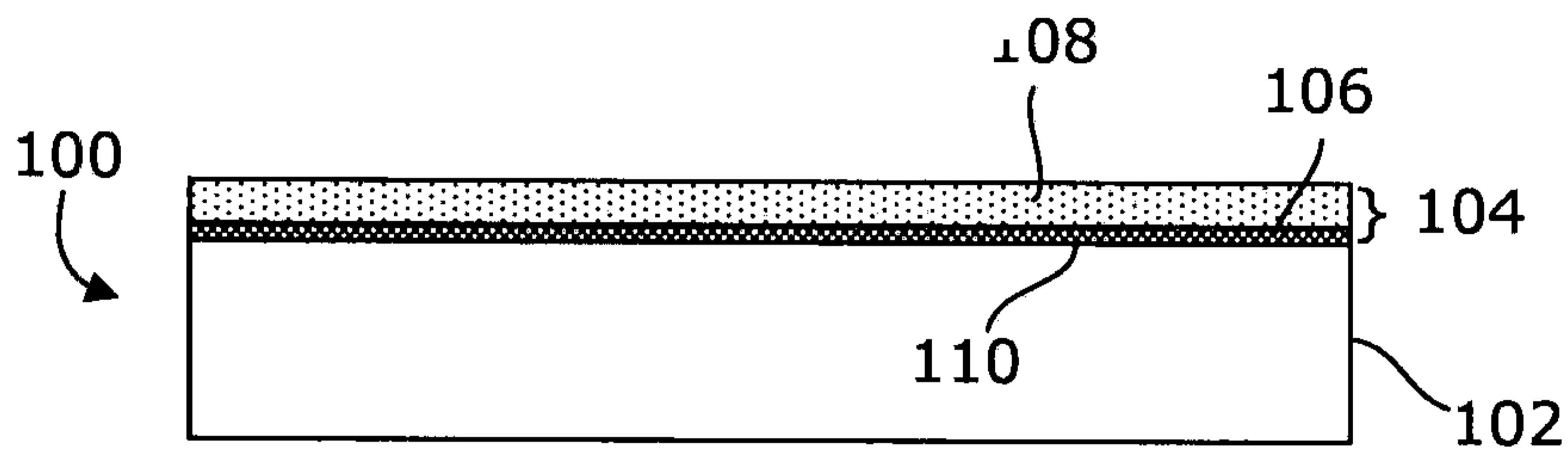


FIG. 1

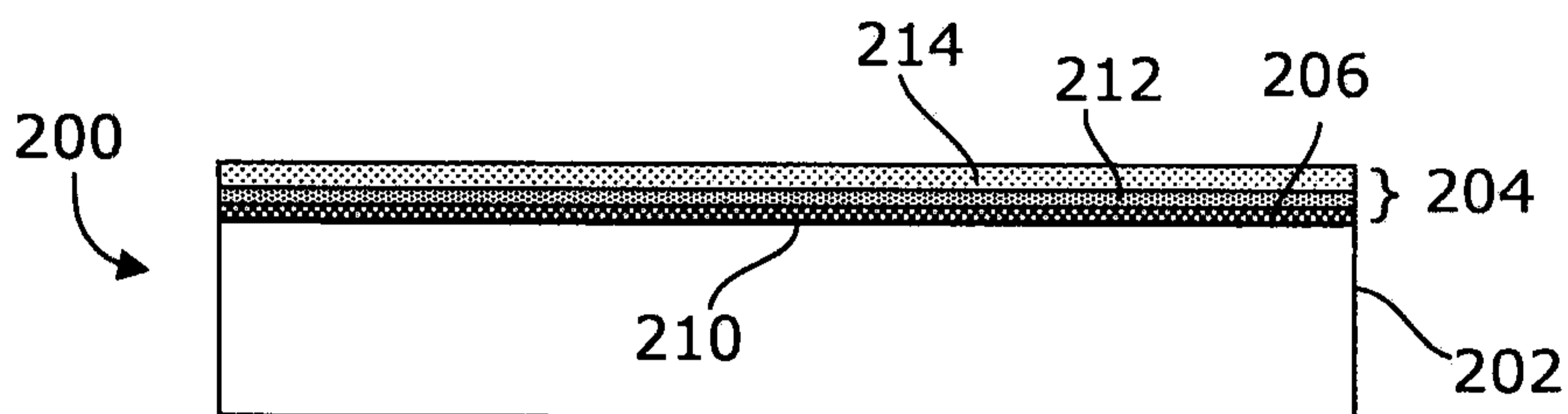


FIG. 2

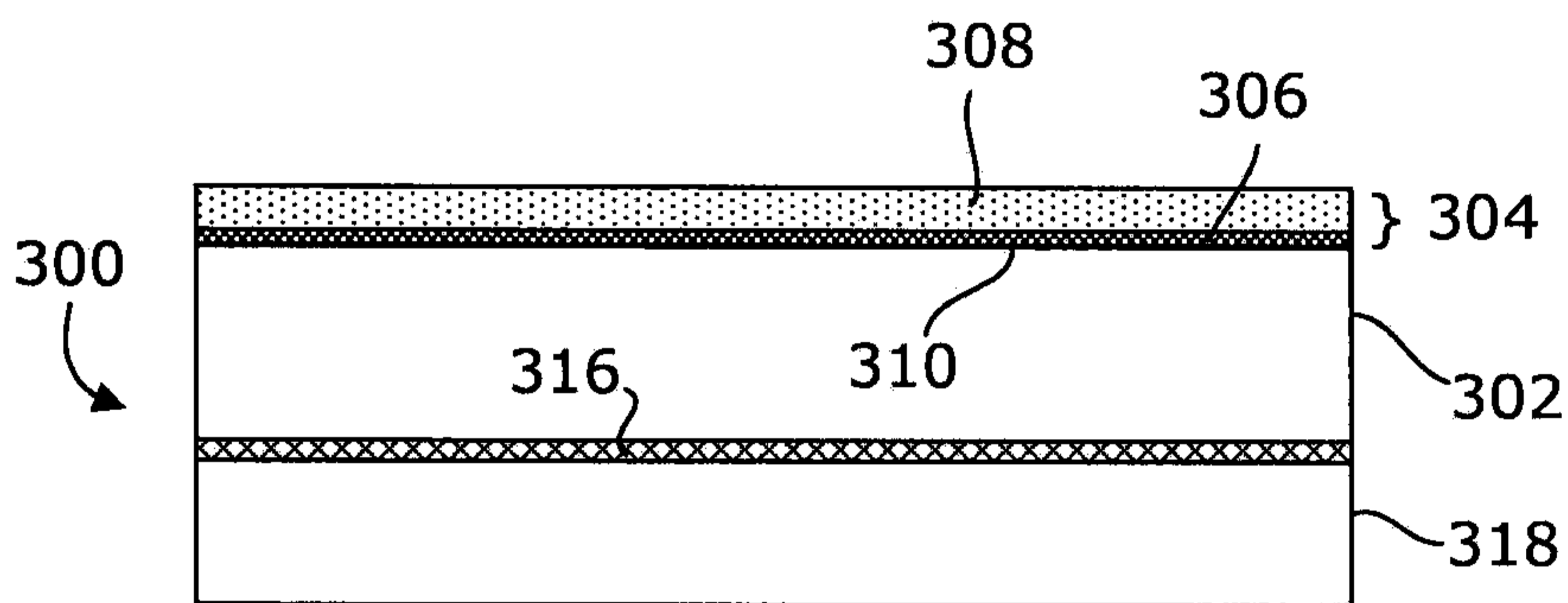


FIG. 3

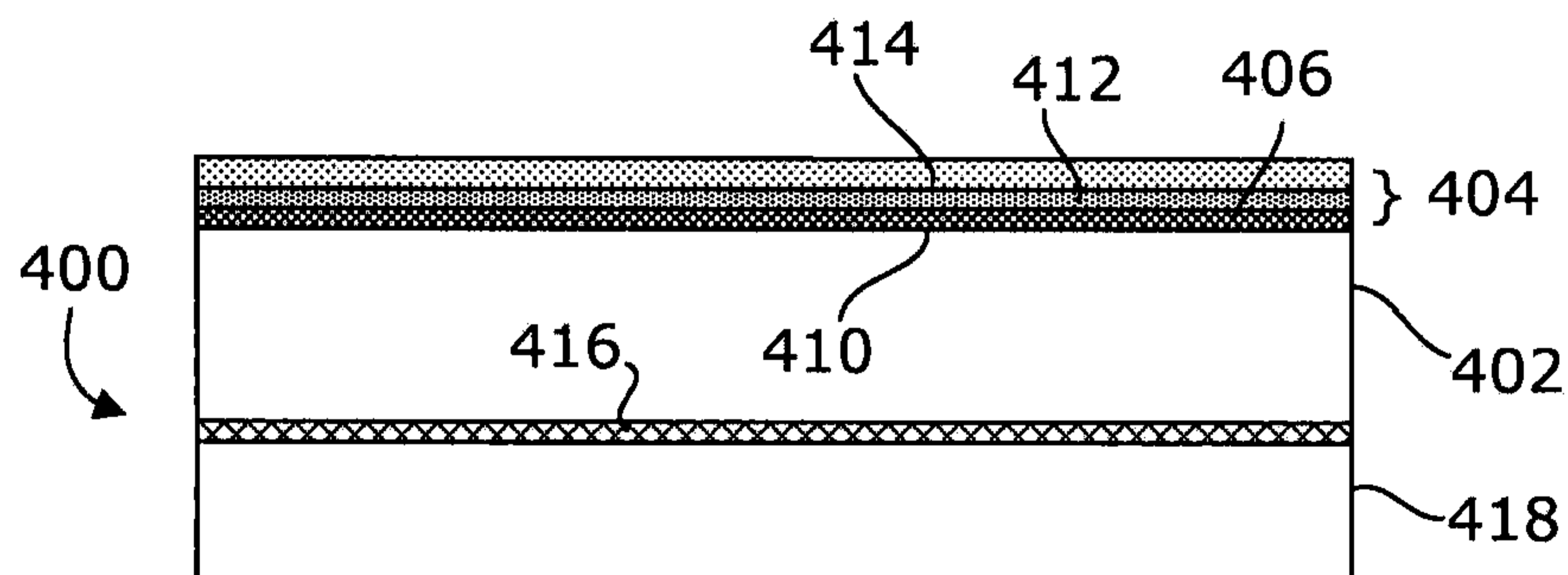


FIG. 4

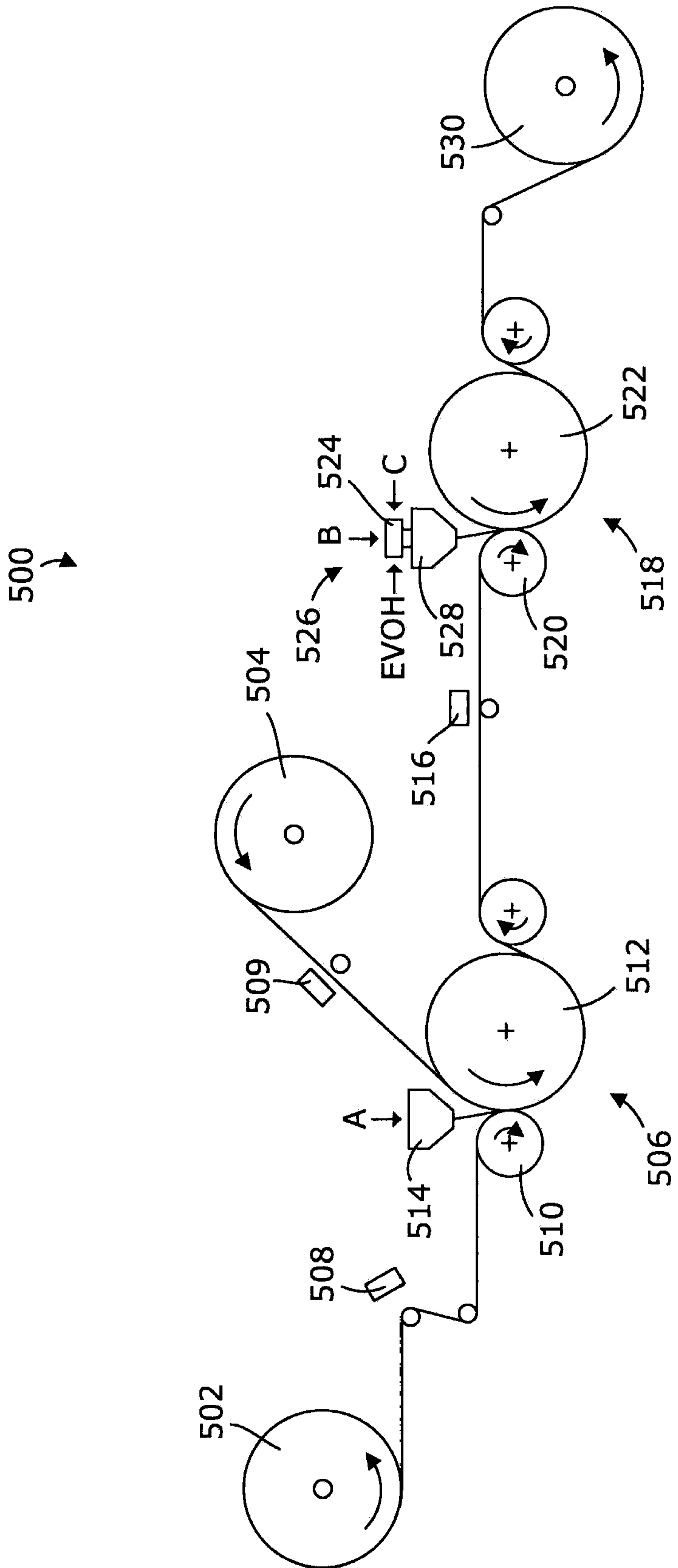


FIG. 5

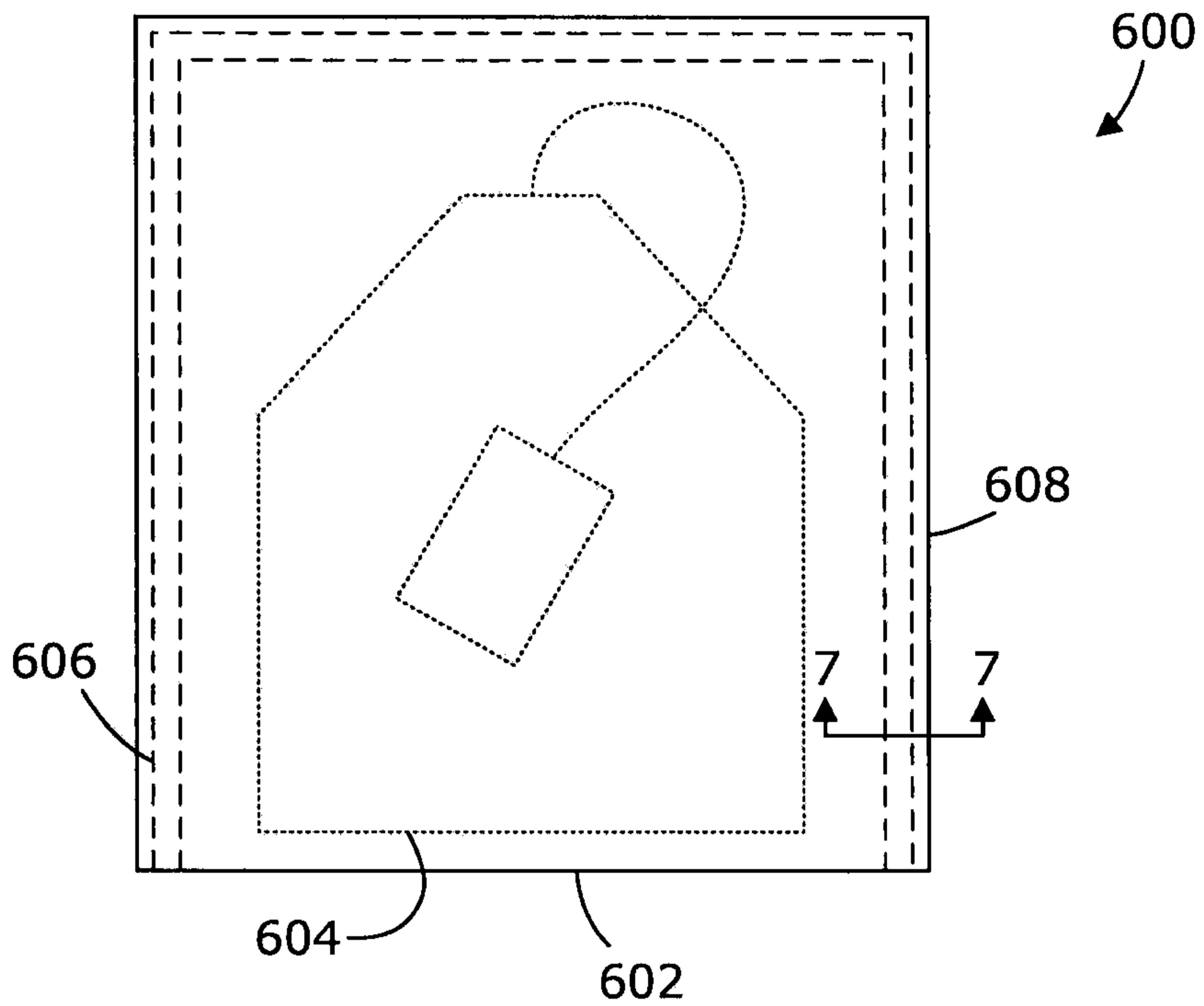


FIG. 6

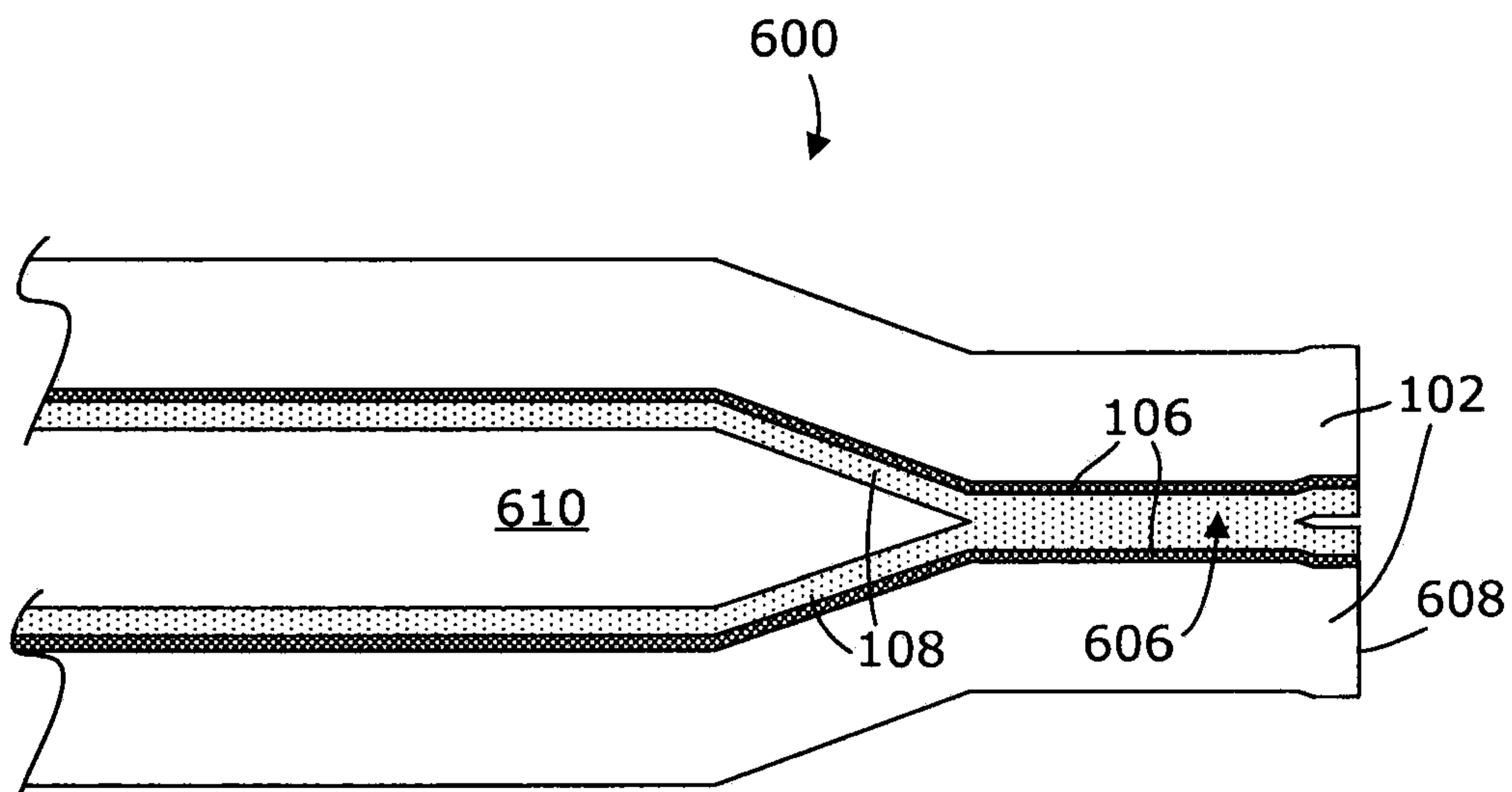


FIG. 7

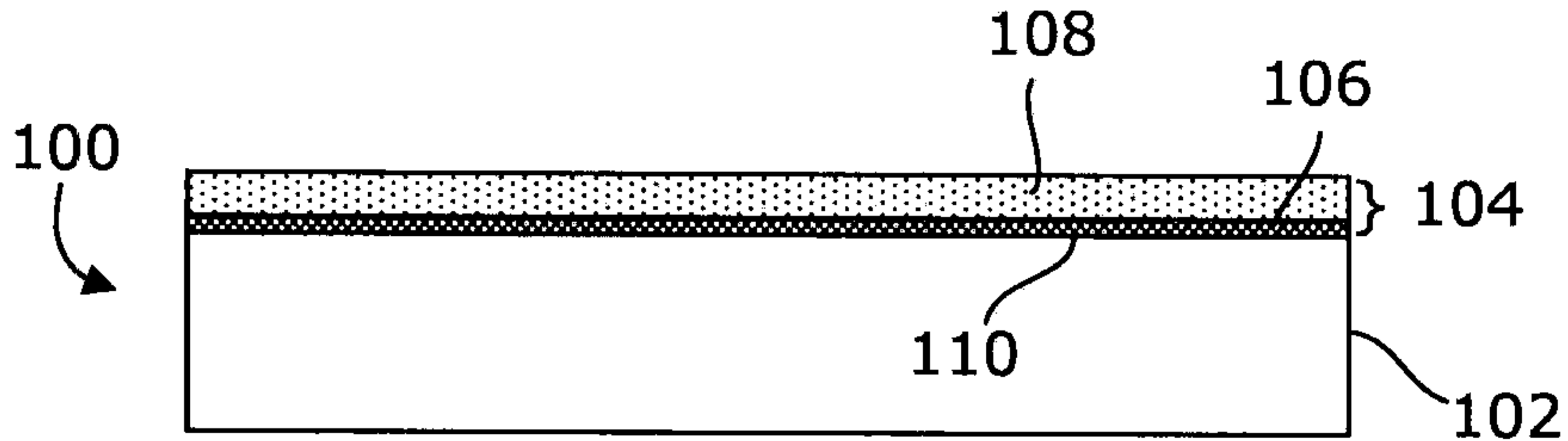


FIG. 1