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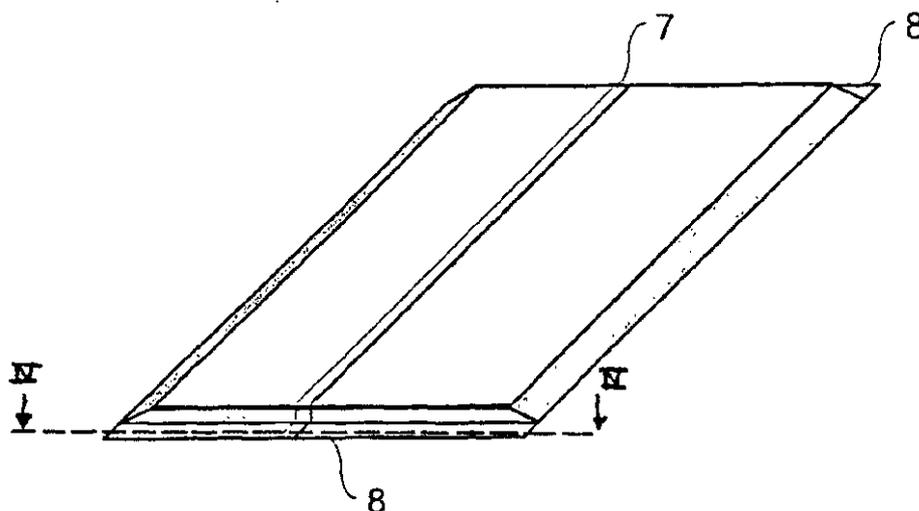
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(54) Title: EVACUATED JACKET FOR THERMAL INSULATION AND PROCESS FOR MANUFACTURING THE SAME



(57) Abstract: An evacuated jacket for thermal insulation comprises a discontinuous or porous, organic or inorganic filling material arranged inside an envelope made with at least one multi-layer barrier sheet (1) of substantially rectangular shape, which comprises at least one polymeric or inorganic central layer (2) having barrier properties towards atmospheric gases, an upper layer (4) and a lower layer (3), both of a polymeric material. The polymeric material which forms said upper layer (4) and the polymeric material which forms said lower layer (3) of the barrier sheet (1) are mutually heat-sealable and said barrier sheet (1) is folded up so as to superimpose two opposite sides (5, 6) thereof which are welded to each other by melting said upper layer (4) at one margin (6) and said lower layer (3) at the other margin (5). The present invention also relates to a process for manufacturing said evacuated jacket for thermal insulation.

“EVACUATED JACKET FOR THERMAL INSULATION AND PROCESS
FOR MANUFACTURING THE SAME”

The present invention relates to evacuated jackets for thermal insulation,
5 and in particular it relates to an evacuated jacket comprising an improved
envelope, as well as to a process for manufacturing the same.

Evacuated jackets are being increasingly used in a number of fields wherein
thermal insulation at temperatures lower than about 100°C is required. As
examples of application of these jackets, mention can be made of the walls of
10 domestic and industrial refrigerators, of the beverage dispenser machines or of the
containers for isotherm transportation, for example of drugs or cold or frozen
foods. Further, applications of these jackets in the building field or in the car
industry are being studied.

As it is known, an evacuated jacket is formed of an envelope inside which a
15 filling material is provided. The envelope has the purpose of preventing (or
reducing as much as possible) the entrance of atmospheric gases into the jacket, so
as to maintain a vacuum level compatible with the degree of thermal insulation
required by the application. The filling material has mainly the function of spacing
apart the two opposite sides of the envelope when the jacket is evacuated, and
20 must have a porous or discontinuous internal structure, so that its porosities or
interstices can be evacuated in order to perform the thermally insulating function.
This material can be inorganic, such as for example silica powder, glass fibers,
aerogels, diatomaceous earths, etc.; or organic, such as rigid polyurethane or
polystyrene foams, both in the form of boards and of powders.

25 The envelope is made with so-called “barrier” sheets, which are
characterized by their gas permeability being as low as possible and can be made
of a single component but more frequently are multi-layers of different
components. In the case of the multi-layers the “barrier” effect is conferred by one
of the component layers, or barrier layer, which can be formed of polymeric
30 materials, such as ethylene-vinyl alcohol copolymers (known in the literature with
the abbreviation EVOH); of polymeric layers on which a thin layer (generally less

than 0,5 μm) of aluminum or of an inorganic oxide is deposited; or of a metal sheet, mainly aluminum, having a thickness generally comprised between 4 and 10 μm . The multi-layer barrier sheet comprises at least one support layer of a polymeric material having good mechanical features, particularly plasticity; said
5 layer can be formed for example of polyacrylonitrile (PAN) or a polyolefine. On the opposite side with respect to said support layer, the barrier layer is covered with at least one protection layer, also polymeric. The polymeric protection layers are commonly made of polyesters (for example polyethylene terephthalate, normally abbreviated in PET) or polyamides (for example, Nylon[®]). Multi-layers
10 comprising five, six or even more superimposed layers are also common.

The envelope is generally formed of two barrier sheets having rectangular shape, reciprocally joined along the margins thereof by means of perimetrical weldings. The so joined margins of the barrier sheets form four flanges arranged at the sides of the resulting envelope. However, the main drawback of the
15 envelopes of this kind consists exactly in the presence of these flanges, which are very fragile and their possible fracturing can easily propagate beyond the perimetrical weldings, causing the permeation of atmospheric gases into the jacket and thus compromising the thermal insulating features thereof.

In other technical fields, for example in food packaging, a general process
20 for the preparation of an envelope starting with a single rectangular sheet of plastic material is known, which enables the reduction of the number of the flanges from four to two to be obtained. According to this process, whose steps are briefly illustrated in figure 5a-5c, sheet S is rolled up on itself until two opposite margins M, M', which belong to the same side of the sheet, meet
25 together (fig. 5a). Said margins are reciprocally joined by a longitudinal welding, thus forming a welding flange F which is then folded over the external surface of the sheet (fig. 5b). Thus, an envelope is formed having two opened ends whose sealing, transversely to flange F, is carried out by inserting the edges thereof between welding bars. In the two areas wherein these weldings intersect the
30 flange, the envelope takes on the conformation shown in figure 5c (which has an enlarged scale with respect to figures 5a and 5b).

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However, this process cannot be applied to evacuated jackets. As a matter of fact, in the folded position of figure 5c, flange F causes a thickness which reduces the passage of heat from the welding bars to the underlying polymeric layers of the barrier sheet and therefore prevents a perfect reciprocal sealing. Further, because of its stiffness, along the folding lines the barrier sheet hardly forms sharp corners and can be only curved; a slot (indicated with L in figure 5c) remains in the intersection area between flange F and the seals transversal thereto, which enables the passage of atmospheric gases towards the inside of the jacket, although in a reduced quantity. The smallest gas infiltrations resulting from this imperfections, which would be acceptable in other technical fields, are not acceptable in the case of the envelopes for evacuated jackets.

Object of the present invention is therefore providing an evacuated jacket free from said drawbacks and a process for manufacturing the same. Said object is achieved by means of an evacuated jacket whose main features are specified in the first claim and other features are specified in the subsequent claims. The features of the process are specified in claim 7.

A first advantage of the evacuated jacket according to the present invention consists in that its envelope has a very good gas tightness also at the end seals, although it is made starting from a single barrier sheet. As a matter of fact, thanks to said support layer and said protecting layer being formed of mutually heat-sealable materials having a similar melting temperature, it is possible that the opposite layers which are joined together by means of said longitudinal welding belong to opposite sides of the sheet, so that the resulting envelope is flat in the welding area and does not comprise a longitudinal flange.

Consequently, when the edge of one end of the envelope is inserted between welding bars for the sealing thereof, the heat of said bars causes the melting of said support and protection layers, which become soft, thus allowing the welding bars to near each other so as to eliminate all the slots between the portions of said edges.

An advantage of the process for manufacturing the evacuated jacket according to the present invention consists in that, simultaneously to the sealing of

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the envelope ends, the thickness of the transversal flanges is made uniform by the welding bars. As a matter of fact, while said bars are nearing each other, the exceeding material is discharged from the sides because of the pressure of said bars and can be removed.

5 According to a particular aspect of the invention, said support layer and said protection layer are made of the same material.

Further advantages and features of the evacuated jacket according to the present invention will appear to those skilled in the art from the following detailed description of one embodiment thereof with reference to the accompanying
10 drawings, wherein:

- figure 1 shows an enlarged cross-sectional view of a barrier sheet that can be used for manufacturing an evacuated jacket according to said embodiment;
- figure 2 shows a step of the manufacturing of the evacuated jacket
15 according to said embodiment;
- figure 3 shows a complete evacuated jacket according to said embodiment;
- figure 4 shows an enlarged cross-sectional view of a lateral flange of the jacket of figure 3 taken along line IV-IV of the same figure; and
- 20 - figures 5a, 5b and 5c, the last being an enlarged partial sectional view, schematically show three steps of the manufacturing of a known jacket.

With reference to figure 1, there is shown that barrier sheet 1 which forms the envelope of the evacuated jacket according to the present embodiment of the invention is a multi-layer comprising a central layer 2 provided with barrier
25 properties towards atmospheric gases and consisting for example of a metal sheet, e.g. aluminum, having a thickness between 4 and 10 μm .

Further, said multi-layer comprises a lower layer 3 and an upper layer 4 suitable for providing support and protection for the central layer 2, and to enable the heat-sealing of the sheet. In addition to the good mechanical features,
30 particularly plasticity, it is required that the materials which form said layers are mutually heat-sealable. Said materials can be selected in the group consisting of

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polyacrylonitrile (PAN), polyolefines, such as polyethylene, and polyvinylchloride, as well as mixtures and copolymers thereof. The lower layer 3 and the upper layer 4 suitably have a thickness between 20 and 100 μm , preferably of about 50 μm .

5 According to a particular embodiment of the invention, the lower layer 3 and the upper layer 4 are made of the same material. Particularly suitable for this purpose is high density polyethylene (known as HDPE).

 With reference to figure 2, there is shown that the envelope of the evacuated jacket according to the present invention is made rolling up said barrier sheet 1 so
10 as to superimpose two opposite margins 5 and 6 thereof. The superimposition is carried out so as to contact the lower layer 3 at margin 5 with the upper layer 4 at the other margin 6.

 Now, with reference to figure 3, there is shown that, by virtue of the mutual heat-sealability of said lower layer 3 and upper layer 4, the longitudinal welding
15 of the two margins 5 and 6 has been carried out without having to fold the barrier sheet, therefore the obtained envelope does not have a longitudinal flange and is flat in the linear zone 7 of the longitudinal welding.

 Subsequently, the open ends along the edges orthogonal to margins 5 and 6 are sealed, by inserting said edges between welding bars. Once they have been
20 sealed on themselves, said edges form two lateral flanges 8.

 Before the last sealing a porous or discontinuous, organic or inorganic filling material of any known kind, and optionally a getter material or device are inserted inside the envelope. A number of getter materials or devices, suitable for
25 chemically sorbing moisture or other atmospheric gases, are known in the field and therefore do not need a detailed description.

 Figure 4 shows an enlarged partial view in cross-section of one of said lateral flanges 8. In particular, it shows the portion of said flange which comprises the linear zone 7 of the longitudinal welding. With reference to said drawing, there is shown that the thickness of each lateral flange 8 is uniform all over its
30 length, in spite of the threefold superimposition of the barrier sheet 1, in the linear zone 7 of the longitudinal welding. This can be explained considering that in said

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linear zone 7 the lower layer 3 and upper layer 4 of the barrier sheet have become thinner. As a matter of fact, during the step of sealing the envelope ends, the heat of the welding bars causes said layers to be melted and to become soft, so that some of the polymeric material of which they are formed is discharged from the sides because of the pressure of said bars and can be removed. As it appears from the drawing, the edges of the envelope ends are perfectly sealed on themselves and no slot is present. On the contrary, by the process according to the state of the art which was previously described with reference to figure 5c, the seals in this area are not perfect, so that the entrance of air inside the jacket is allowed which compromises the thermal insulation properties thereof.

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CLAIMS

1. An evacuated jacket for thermal insulation, comprising a discontinuous or porous, organic or inorganic filling material arranged inside an envelope made with at least one multi-layer barrier sheet (1) of substantially rectangular shape, which comprises at least one polymeric or inorganic central layer (2) having barrier properties towards atmospheric gases, an upper layer (4) and a lower layer (3), characterized in that said upper layer (4) and said lower layer (3) of the barrier sheet (1) are formed of mutually heat-sealable polymeric materials.
2. An evacuated jacket according to the preceding claim, characterized in that both the polymeric material which forms said upper layer (4) and the polymeric material which forms said lower layer (3) of the barrier sheet (1) are selected in the group consisting of: polyolefines, polyacrylonitrile, polyvinylchloride and mixtures or copolymers thereof.
3. An evacuated jacket according to the preceding claim, characterized in that both the upper layer (4) and the lower layer (3) of the barrier sheet are made of high density polyethylene or a copolymer thereof.
4. An evacuated jacket according to any of the preceding claims, characterized in that said upper layer (4) and said lower layer (3) of the barrier sheet (1) have a thickness between 20 and 100 μm .
5. An evacuated jacket according to the preceding claim, characterized in that said upper layer (4) and said lower layer (3) have a thickness of about 50 μm .
6. An evacuated jacket according to any of the preceding claims, characterized in that it contains a getter material or device.
7. A process for manufacturing an evacuated jacket according to one of the preceding claims, characterized in that it comprises the following steps:
 - preparing one multi-layer barrier sheet having a substantially rectangular shape comprising at least one polymeric or inorganic central layer (2) having barrier properties towards atmospheric gases, an upper layer (4) and a lower layer (3) formed of mutually heat-sealable polymeric materials;
 - folding up said barrier layer (1) so as to superimpose two opposite margins thereof (5, 6) and welding together said margins by melting said upper layer (4)

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- at one margin (6) and said lower margin (3) at the other margin (5), obtaining an envelope with two open ends;
- sealing one open end of said envelope by welding on itself an edge of the barrier sheet which is orthogonal to said margins (5, 6);
 - inserting into the envelope a discontinuous or porous, inorganic or organic filling material;
 - evacuating the interior of the envelope; and
 - sealing the other open end of the envelope by welding on itself the other edge of the barrier sheet which is orthogonal to said margins (5, 6).
8. A process according to claim 7 characterized in that, before the last sealing, a getter material is inserted inside the envelope.

Fig. 1

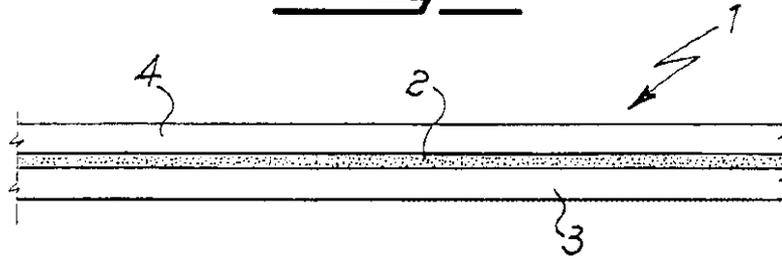


Fig. 2

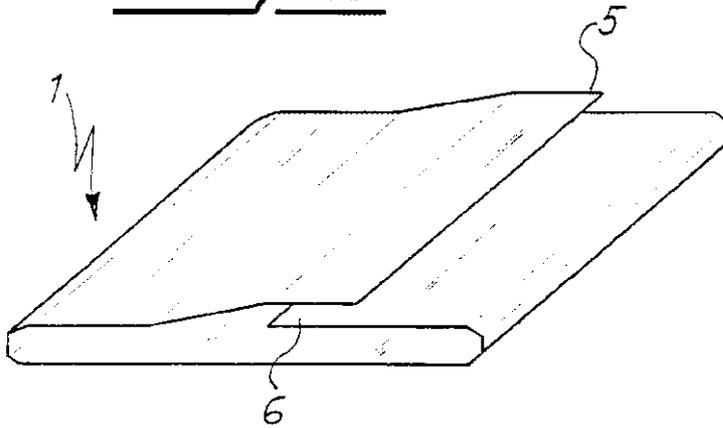


Fig. 3

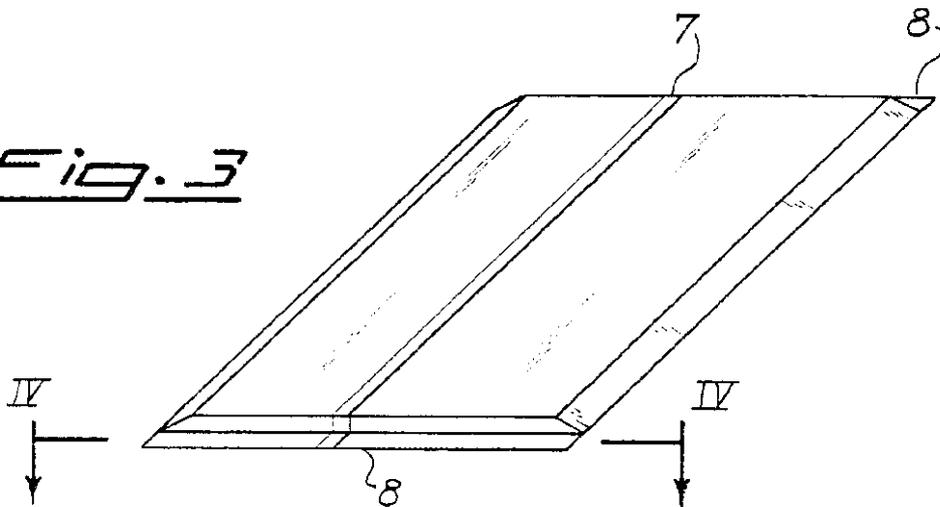
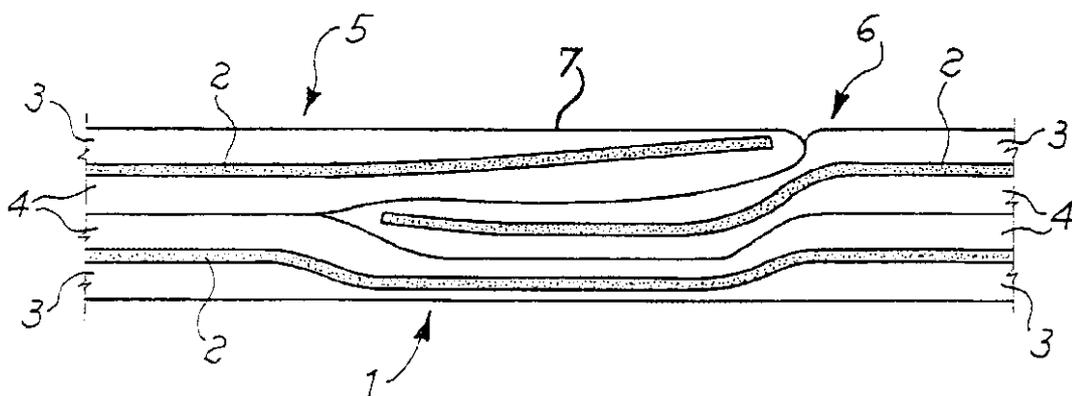
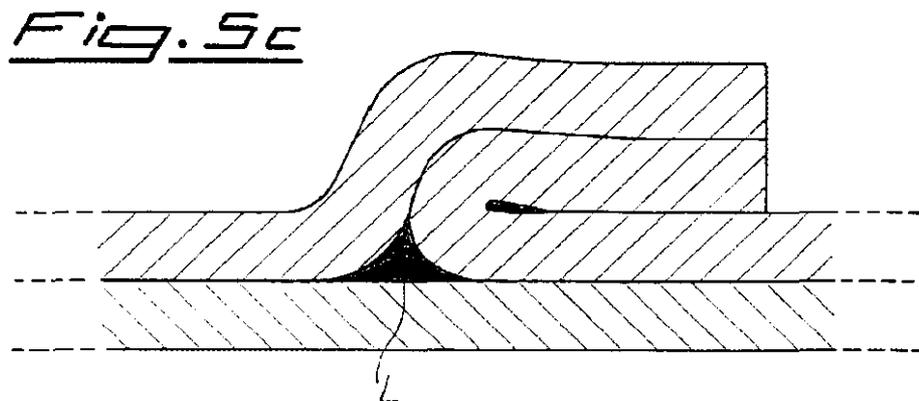
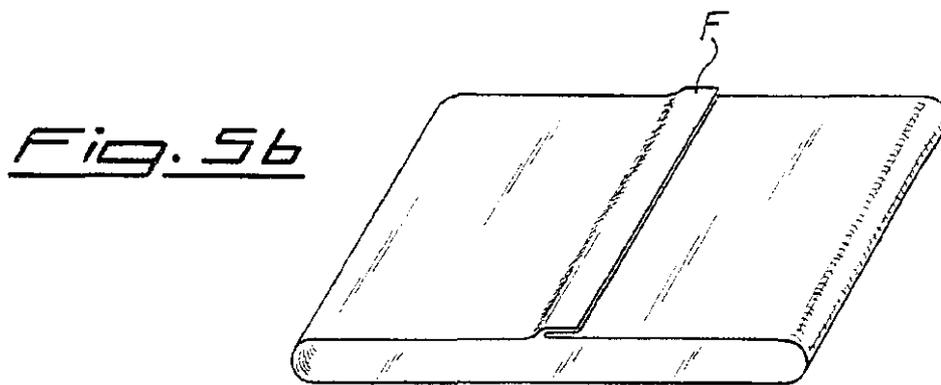
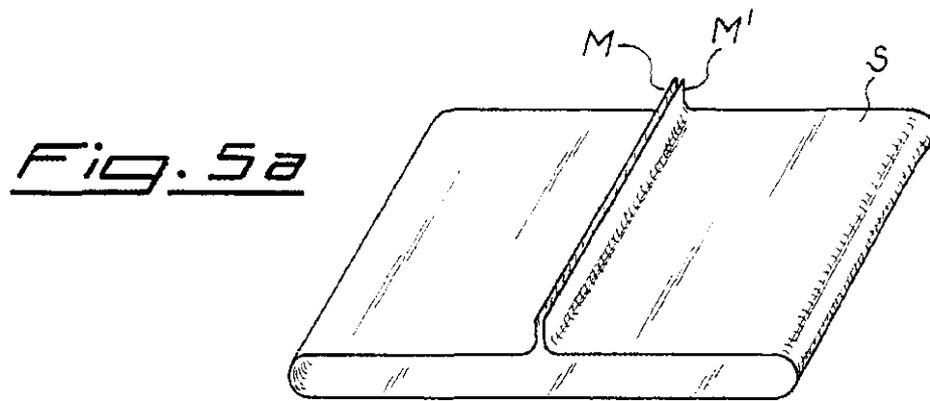


Fig. 4





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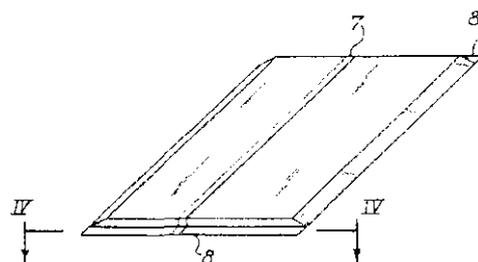
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权利要求书2页 说明书5页 附图3页

[54] 发明名称 用于隔热的真空外套以及用于制造
这种真空外套的方法

[57] 摘要

一种用于隔热的真空外套，包括有设置在一个外壳内部的不连续或者多孔有机或者无机填充材料，所述外壳由至少一块基本上呈长方形的多层隔离板(1)构成，并且该多层隔离板(1)包括有至少一个聚合的或者无机的中间层(2)、一个上部层(4)和一个下部层(3)，所述中间层(2)对大气中的气体具有阻隔性能，而所述上部层(4)和下部层(3)均由聚合材料制成。用于形成隔离板(1)上的所述上部层(4)的聚合材料和用于形成该隔离板(1)上的所述下部层(3)的聚合材料均能够被相互热封接起来，并且隔离板(1)被向上折叠起来，以便将其上的两个相对侧边(5, 6)叠合起来，这两个相对侧边(5, 6)通过熔化一个边缘(6)处的所述上部层(4)和另外一个边缘(5)处的所述下部层(3)而被相互焊接起来。本发明还涉及一种用于制造所述隔热用真空外套的工艺。



1. 一种用于隔热的真空外套，包括有一种被设置在一个外壳内部的不连续或者多孔有机或者无机填充材料，该外壳由至少一块基本上呈长方形的多层结构隔离板（1）制成，该多层结构隔离板（1）包括有至少一个聚合或者无机中间层（2），一个上部层（4）和一个下部层（3），所述中间层（2）对大气中的气体具有阻隔性能，其特征在于：隔离板（1）上的所述上部层（4）和所述下部层（3）均由相互可热封接的聚合材料制成。

2. 根据权利要求1所述的真空外套，其特征在于：用于形成隔离板（1）的所述上部层（4）的聚合材料，和用于形成该隔离板（1）的所述下部层（3）的聚合材料可以是聚烯烃、聚丙烯腈、聚氯乙烯、以及它们的混合物或者共聚物。

3. 根据权利要求2所述的真空外套，其特征在于：所述隔离板的上部层（4）和下部层（3）均由高密度聚乙烯或者其共聚物制成。

4. 根据前述权利要求中任何一个所述的真空外套，其特征在于：所述隔离板（1）的上部层（4）和下部层（3）均具有20至100微米的厚度。

5. 根据权利要求4所述的真空外套，其特征在于：所述上部层（4）和所述下部层（3）均具有50微米左右的厚度。

6. 根据前述权利要求中任何一个所述的真空外套，其特征在于：其包含有一种吸气材料或者装置。

7. 一种用于制造根据前述权利要求中任何一个的真空外套的方法，其特征在于包括有下述步骤：

制备一块基本上呈长方形的多层结构隔离板（1），该隔离板（1）包括有至少一个聚合或者无机中间层（2），一个上部层（4）和一个下部层（3），所述中间层（2）对大气中的气体具有阻隔性能，所述上部层（4）和下部层（3）均由可相互热封接的聚合材料制成；

将所述隔离板（1）折合起来，以便将其两个相对边缘（5，6）叠合起来，并且通过使得一个边缘（6）处的所述上部层（4）和另外一个边

缘(5)处的所述下部层(3)发生熔化而被焊接在一起, 获得一个带有两个开口端部的外壳;

通过将该隔离板上与所述边缘(5, 6)垂直的边缘焊接到其自身上, 来对所述外壳的一个开口端部进行封接;

将一种不连续或者多孔的无机或者有机填充材料插入到所述外壳内;

对所述外壳内部抽真空; 并且

通过将该隔离板上与所述边缘(5, 6)垂直的另一边缘焊接到其自身上, 来对所述外壳的另外一个开口端部进行封接。

8. 根据权利要求7所述的方法, 其特征在于: 在进行最后的封接操作之前, 将一种吸气材料插入到所述外壳内部。

用于隔热的真空外套以及用于制造这种真空外套的方法

本发明的技术领域

本发明涉及用于隔热的真空外套，尤其是涉及一种包括有一个改良外壳的真空外套，本发明还涉及一种用于制造这种真空外套的方法。

对相关现有技术的描述

真空外套被越来越多地应用在许多需要在低于100℃左右的温度下进行隔热的领域中。作为这些外套的应用示例，可以想到家庭用和工业用冰箱的壁，自动饮料售货机的壁，或者用于比如对药品、低温或者冷冻食品进行恒温运输的容器的壁。另外，也还对将这些外套应用于建筑领域或者汽车工业进行了研究。

众所周知，一个真空外套是由一个其内部设置有填充材料的外壳制成的。外壳的功能是防止（或者尽可能地减少）大气中的气体进入到该外套中，以便保持一个与应用领域所需隔热度相适应的真空水平。填充材料的主要功能是在对该外套进行抽真空操作时将外壳的两个相对侧壁隔离开，并且这些填充材料必须具有多孔的或者不连续的内部结构，以便可以抽取其多孔结构或者间隙中的气体，来实现隔热功能。这种材料可以是无机的，比如石英粉、玻璃纤维、气凝胶、硅藻土等；或者是有机，比如刚性聚氨酯或者聚苯乙烯泡沫，它们均呈板状或者粉末状。

所述外壳由所谓的“隔离”板制成，这些“隔离”板的特征在于它们的透气性尽可能地低，并且可以由一个整体式组件制成，但是更多的是由不同组件形成的多层结构。在多层结构情况下，“隔离”效果由所述组件层中的一层来提供，或者由隔离层来提供，该隔离层可以由聚合材料制成，比如乙烯乙烯醇共聚物（在文献中被缩写为EVOH）；或者由在其上淀积有一个薄的铝层或者薄的无机氧化物层（通常小于0.5微米）的聚合层制成；或者由一个金属薄板制成，主要是薄铝板，通常具有4至

10微米的厚度。所述多层结构的隔离板包括有至少一个支撑层，该支撑层由一种具有良好机械特性，尤其是可塑性的聚合材料制成；所述支撑层比如可以由聚丙烯腈（PAN）或者一种聚烯烃制成。在与所述支撑层相对的侧面上，在所述隔离层上覆盖有至少一个防护层，这些防护层也由聚合材料制成。聚合性防护层通常由聚酯（比如通常被缩写为PET的聚对苯二甲酸乙酯）或者聚酰胺（比如尼龙®）制成。多层结构通常包括有五个、六个或者更多的叠合层。

所述外壳通常由两个呈长方形的隔离板制成，这两个长方形隔离板借助于周边焊接工艺（perimetrical welding）沿其边缘被相互结合起来。如此结合起来的隔离板边缘在最终外壳的侧边处形成了四个凸缘。但是，这种类型外壳的主要缺点在于这些凸缘，因为这些凸缘非常脆弱并且可能存在的裂缝易于传播到周边焊接部分之外，导致大气中的气体渗透到外壳中，从而损害其隔热性能。

在其它技术领域中，比如在食品包装领域中，用于制备外壳的一般工艺通常由一个长方形整体式塑料薄板开始进行，该塑料薄板能够使得所获得的凸缘的数目从四个减少到两个。在附图5a至5c中简要地示出了这种工艺的步骤，根据该工艺，薄板S被卷绕在其本身上，直至该薄板相同侧面上的两个相对边缘M，M'会合在一起（附图5a）。利用纵向焊接工艺将所述边缘相互结合起来，从而形成一个焊接凸缘F，该焊接凸缘F随后被折叠到薄板的外表面上（附图5b）。从而，形成了一个具有两个开口端部的外壳，通过将这两个开口端部的边缘插入到两个焊接杆之间，来横切凸缘F对这两个开口端部进行封接。在这些焊接部分与所述凸缘相交的两个区域中，外壳具有附图5c中所示出的构造（该附图5c相对于附图5a和5b具有较大的比例关系）。

但是，该工艺无法被应用于真空外套。因为，在附图5c中的折叠状态下，由凸缘F所产生的厚度会减少从焊接杆传向隔离板上的底部聚合层的热量，从而阻碍了形成理想的相互封接部分。另外，由于其硬度，该薄板几乎无法沿折叠线形成尖锐的拐角，仅可能形成弯曲的拐角。在凸缘F与横切该凸缘F的封接部分之间相交的区域中遗留下一条狭缝（在附

图5c中由L指示出来)，该狭缝能够形成一个通往外套内部的大气气体流动通道，尽管通过该通道流动的气体量很小。由于该缺陷所导致的微量气体渗透，也许在其它技术领域中可以容许的，但是对用于真空外套的外壳来说是无法接受的。

对本发明的概述

因此，本发明的目的在于提供一种没有所述缺点的真空外套，和一种用于制造这种真空外套的方法。所述目的借助于这样一种真空外套得以实现，该真空外套的主要技术特征在第一权利要求中进行表述，而其它技术特征在后续的权利要求中进行表述。所述方法的技术特征在权利要求7中进行表述。

根据本发明的真空外套的第一优点在于，尽管其外壳由一个整体式隔离板开始制取，但是具有非常好的气密性，并且在端部封接处也是如此。由于所述支撑层和所述防护层均由熔融温度相同或接近的相互可热封接材料制成，所以借助于所述纵向焊接部分而结合在一起的相对两层属于该薄板的相对侧面，从而最终的外壳在焊接区域中较为平整，并且不会包括有纵向凸缘。

因此，当这种外壳的一个端部的边缘被插入到用于对其进行封接的焊接杆之间时，所述焊接杆的热量会使得所述支撑层和防护层发生熔化，变得柔软，从而允许焊接杆相互靠近，以消除在所述边缘部分之间形成的所有狭缝。

用于制造根据本发明的真空外套的方法其优点在于，在对外壳端部进行封接的同时，在所述焊接杆的作用下，横切凸缘的厚度会变得均匀一致。从而，在所述焊接杆相互靠近的同时，在所述焊接杆的压力作用下将多余的材料从侧边排出，并且可以被去除掉。

根据本发明的一个特殊方面，所述支撑层和所述防护层由相同材料制成。

对附图的简述

通过下面参照附图对本发明一实施例进行的详细描述，本技术领域那些熟练技术人员将会明白根据本发明的真空外套的其它优点和技术特征，其中：

附图1示出了一块隔离板的放大横剖视图，该隔离板可以用于制造一个根据所述实施例的真空外套；

附图2示出了根据所述实施例的真空外套的制造步骤；

附图3示出了一个根据所述实施例的完整真空外套；

附图4沿附图3中线IV-IV示出了附图3所示外套中的横向凸缘的放大横剖视图；而

附图5a、5b和5c示意性地示出了一种现有外套的制造步骤，其中附图5c是一个放大的局部剖视图。

对优选实施例的详细描述

参照附图1，在此示出了一块隔离板1，该隔离板1用于形成根据本发明该实施例的真空外套中的外壳，并且是一个包括有一个中间层2的多层结构，该中间层2对大气中的气体具有阻隔性能，并且比如由一块厚度为4至10微米的金属薄板制成，比如薄铝板。

另外，所述多层结构还包括有一个下部层3和一个上部层4，它们适合于为中间层2提供支撑和保护作用，并且能够对该薄板进行热封接。除了良好的机械特性，尤其是可塑性之外，还需要用于形成所述层的材料可以被相互热封接起来。所述材料可以是聚丙烯腈（PAN）、诸如聚乙烯这样的聚烯烃、聚氯乙烯、以及它们的混合物或者共聚物。下部层3和上部层4均适合于具有20至100微米的厚度，最好是具有50微米左右的厚度。

根据本发明的一个特定实施例，下部层3和上部层4均由相同材料制成。为此目的，尤其适合的是高密度聚乙烯（公知的HDPE）。

参照附图2，在此示出了根据本发明的真空外套中的外壳，该外壳通过对所述隔离板1进行卷绕以便将两个相对边缘5和6叠合起来而制成。进

行叠合操作的目的在于,使得边缘5处的下部层3与另一边缘6处的上部层4发生接触。

下面,参照附图3,在此示出了依靠所述下部层3和上部层4的可相互热封接性能,已经在无需对隔离板进行折叠的条件下将两个边缘5和6纵向焊接起来,从而,所获得的外壳不带有纵向凸缘,并且在纵向焊接线性区域7处较为平整。

接着,通过将垂直于边缘5和6的边缘插入到焊接杆之间,来沿着该边缘对开口端部进行封接。一旦它们已经被封接到它们自身上,那么所述边缘将形成两个横向凸缘8。

在进行最后封接操作之前,将任何一种公知类型的多孔或者不连续有机或者无机填充材料,以及任选的吸气材料或者装置插入到外壳内部。在本技术领域,公知有许多种适合于利用化学方式吸收水分或者其它大气气体的吸气材料或装置,因此无需对其进行详细描述。

附图4示出了一个所述横向凸缘8横剖面的放大局部视图。尤其是,其示出了所述凸缘上包括有纵向焊接线性区域7的部分。参照所述附图,在此示出了尽管对隔离板1进行了三重叠合操作,但是在纵向焊接线性区域7中,沿各个横向凸缘8的整个长度方向其厚度均匀一致。其原因在于,在所述线性区域7中,隔离板的下部层3和上部层4已经变得较薄。因此,在对外壳端部进行封接的过程中,焊接杆的热量会使得所述层发生熔化并且变得柔软,从而在所述焊接杆的压力作用下,使得形成所述层的某些聚合物材料从侧边排出,并且可以被去除掉。正如在附图中所显示的那样,外壳端部的边缘最好被封接在其本身上,并且不存在狭缝。相反,利用根据现有状态中的工艺,在该区域处的封接部分并不理想,从而会形成进入到外套内部的气体入口,损害其隔热性能,其中,根据现有状态中的工艺已经在前面结合附图5c进行了描述。

图 1

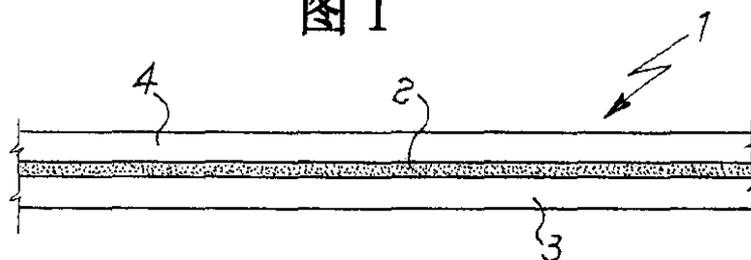


图 2

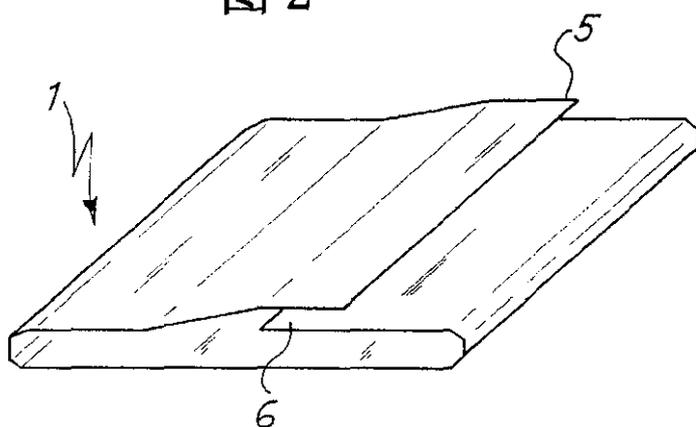


图 3

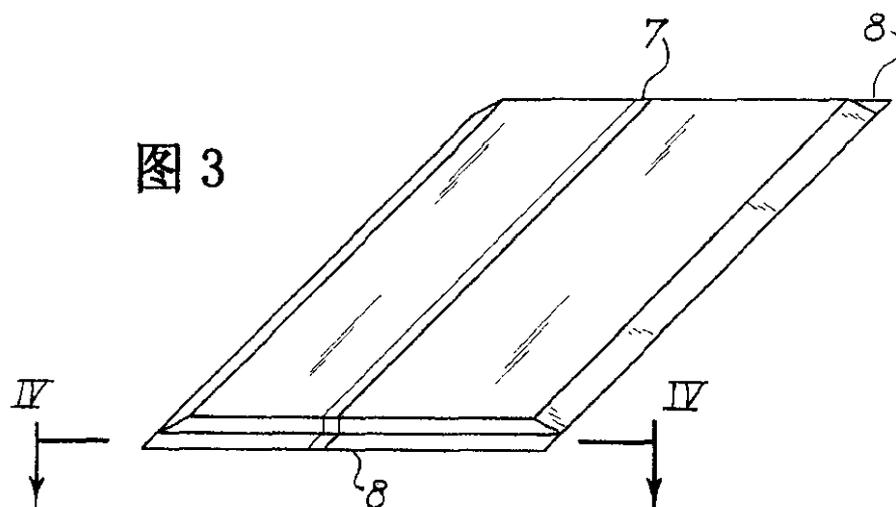


图 4

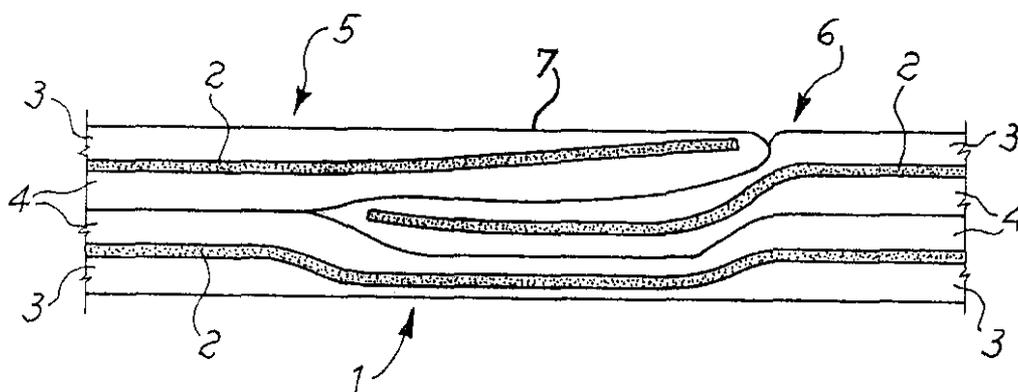


图 5a

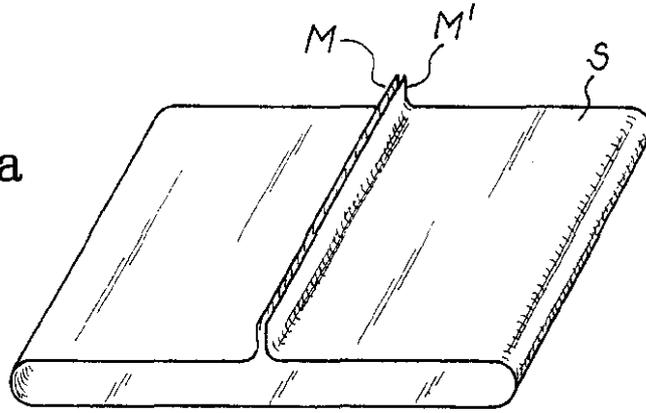


图 5b

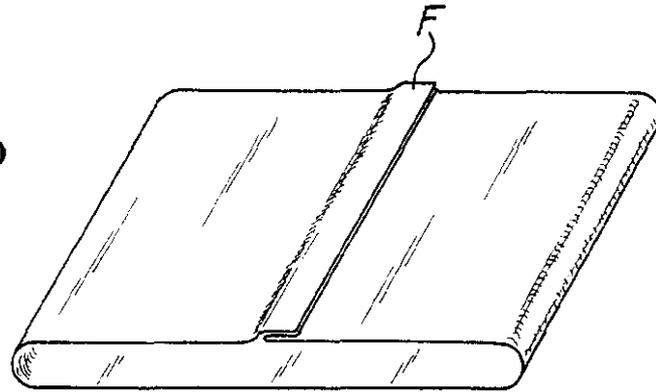


图 5c

