

PATENT SPECIFICATION (11)

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B8C 40A6 F12
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(54) AN IMPROVED EVACUATION DEVICE

(71) We, TEX INNOVATION AB, a company organized under the laws of Sweden, of Jullestigen 6, S-421 76 Västra Frölunda, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a method and apparatus for vacuum packaging.

The invention is concerned particularly with objects of a soft and voluminous material for instance garments, to be packed in e.g. bags of plastics materials.

Apparatus for this is already known and serves the purpose of minimising the volume of soft and voluminous products by evacuating the air therefrom in order to reduce the cost of transport and storage of the products. For instance, the U.S. Patent Specification No. 2,764,859 discloses a device of this kind wherein a special package is provided with a valve to which may be connected a vacuum pump. However, a valve of this kind makes the package unacceptably expensive and is unsuitable for the purpose of evacuating packages in a continuous sequence.

To make rational handling possible, the only other possibility hitherto open has been to enclose the package in a hermetically sealable container which is subject externally only to ambient atmospheric pressure whilst being connected to a source of vacuum. A common disadvantage inherent in this kind of air-evacuation method is that during the evacuation process the packages will be crumpled in a manner permitting air traps to form inside the package, which results in poor volume reduction.

SUMMARY OF THE INVENTION

The purpose of the present invention is to eliminate the above-mentioned drawbacks inherent in prior-art evacuation structures and provide a device by means of which it becomes possible to evacuate packages in a

rational and efficient manner at a rapid speed.

In accordance with the invention vacuum packaging apparatus comprises a first rigid member, a second flexible member disposed in or movable into facing relation with said first member so as to define therewith defining a chamber for receiving an article to be packaged, said second member being pressure-deformable, support means for suspending said second member such that, on such pressure deformation thereof, the middle section of said second member is free to be displaced, in use, towards said first member to a greater extent than other sections of said second member at least during initial pressure deformation of said second member, and means for creating suction pressure in said chamber for deformation of said second member and removal of air from said chamber.

Also in accordance with the invention a method of vacuum packaging a commodity in a package comprises the steps of placing a packaged commodity to be vacuum packaged in a chamber defined by a first rigid member and a flexible second member disposed in facing relationship with the first member, the second member being pressure-deformable throughout the entire extent thereof in such facing relationship with the first member and being spaced from said first member, creating a suction pressure in said chamber to deform the central portion of said second member so that the middle portion of said second member contacts the commodity prior to engagement of the other sections of the second member with the commodity.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described more in detail in the following with reference to the accompanying drawings, wherein;

Figure 1 is a perspective view of a presently preferred apparatus;

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Figure 2 illustrates the same from the side, and

Figure 3 is a sectional view along line III—III of Figure 2 on an enlarged scale.

5 The apparatus shown in the drawings is designed to dry garments and pack them into sacks or bags of plastics material. In a dryer tunnel 1 moisture contained in the garments is reduced to a level which is substantially below the normal moisture content of the atmospheric air, a method which is the subject of a separate application and therefore shall not be described herein in detail. The garments 3, suspended from an overhead conveyor rail 2, are thereafter displaced to a packaging station 4 wherein the garments are enclosed in a package of an airtight material, preferably a plastics bag 5. The garments 3, enclosed in their separate bags 5, are then forwarded to the air-evacuation device in accordance with the invention.

This device comprises a first rigid member or wall 6 and a second member or wall 7 which walls are displaceable towards and away from one another and, in the illustrated apparatus, one wall 7 is arranged to be swung about a hinge connection 9 (see Figure 2) at the lower short side of the walls by means of two hydraulic piston-and-cylinder walls 8, one at either side, whereas the opposite wall 6 is stationary. The stationary wall 6 consists of a flat slab having a strip seal 10 extending along its marginal portions. When the walls 6 and 7 are moved together, this strip seal 10 creates an airtight-sealed chamber between the walls. Via an opening 12 at the upper part of the slab and below the seal 10 this chamber communicates with an air-evacuating means, such as a pump 13, via a connection conduit 14 and a vacuum indicator 15. In the opening 12 in the slab is furthermore disposed a welding rail 16 and behind it piston-and-cylinder units 17 for displacement of the welding rail between an operative and an inoperative position, and on the rear face of the wall 6 a welding impulse generator 18 is arranged. The second member or wall 7 consists of a cloth 20 of plastics or rubber material whose marginal edges are secured to a peripheral frame 19 so that the cloth 20 is suspended by the frame 19 and is pressure deformable throughout its entire extent. It will be noted that the cloth 20 and the frame 19 form a tray-like structure of which the cloth 20 forms the base and the frame forms the side walls, the arrangement being such that, in the absence of suction pressure, the cloth 20 is spaced from the wall 6 by the frame 19.

While a garment 3 is being packed in its individual bag 5 in the packaging station 4, the walls 6 and 7 are moved apart to the position illustrated in Figure 1 with the aid of the piston-and-cylinder units 8. The gar-

ment, enclosed in the package, is advanced while suspended from the overhead conveyor 2 to a position between the two walls 6, 7, whereafter the wall 7 is pulled into contact with the strip seal 10. The evacuation process is initiated immediately. This process is effected in such a way that the central area of cloth 20 of the movable wall 7 is first sucked inwards against the wall 6, and thereafter the surrounding area of the cloth is sucked against wall 6. In this way, no air pockets or air traps are formed in the garment 3 but the latter is flattened to a maximum degree against the wall 6. When the cloth 20 is tightened inwards against the wall 6 a channel 21 will remain, extending circumferentially around the chamber 11 (see Figure 3), whereby is ensured that the air-evacuation is effected to the desired degree. The vacuum indicator 15 issues an impulse to the welding impulse generator 18 which in turn starts the sealing process. This takes place in the following manner. The piston-and-cylinder units 17 displace the welding rail 16 into abutment against the package for a brief moment whereby in the conventional manner a seam 22 is formed closing the bag 5 in an airtight manner. The welding rail 16 is retracted, the vacuum in the chamber 11 is eliminated and the wall 7 swung away. The package that leaves the chamber is very compact and has a considerably reduced volume.

The invention is not limited to the embodiment as illustrated and described but may be modified in a variety of ways within the scope of the appended claims. For example the stationary wall 6 may extend in a horizontal plane and the movable wall 7 may form a lid portion which is vertically displaceable. In this case the packages may be advanced while supported horizontally on a conveyor to a position between the two portions 6 and 7.

The device is equally suitable for reducing the volume of packages containing objects other than garments. For instance, other voluminous goods such as baby napkins, sanitary napkins, insulating slabs of plastics foam or mineral wool, pillows, mattresses, and so on. During preliminary attempts to evacuate packages containing for instance mineral wool slabs the volume has been reduced as low as a fourth or a fifth of the normal volume, which means that the space necessary to store packages of this kind is reduced correspondingly.

WHAT WE CLAIM IS:—

1. Vacuum packaging apparatus comprising a first rigid member, a flexible second member disposed in or movable into facing relation with said first member so as to define therewith a chamber for receiving an article, said second member being pres-



Figure 2 illustrates the same from the side, and

Figure 3 is a sectional view along line III—III of Figure 2 on an enlarged scale.

5 The apparatus shown in the drawings is designed to dry garments and pack them into sacks or bags of plastics material. In a dryer tunnel 1 moisture contained in the garments is reduced to a level which is substantially below the normal moisture content of the atmospheric air, a method which is the subject of a separate application and therefore shall not be described herein in detail. The garments 3, suspended from an overhead conveyor rail 2, are thereafter displaced to a packaging station 4 wherein the garments are enclosed in a package of an airtight material, preferably a plastics bag 5. The garments 3, enclosed in their separate bags 5, are then forwarded to the air-evacuation device in accordance with the invention.

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WHAT WE CLAIM IS:—

1. Vacuum packaging apparatus comprising a first rigid member, a flexible second member disposed in or movable into facing relation with said first member so as to define therewith a chamber for receiving an article, said second member being pres-

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sure-deformable, support means for suspending said second member such that, on such pressure deformation thereof, the middle section of said second member is free to be displaced, in use, towards said first member to a greater extent than other sections of said second member at least during initial pressure deformation of said second member, and means for creating suction pressure in said chamber for deformation of said second member and removal of air from said chamber.

2. An apparatus as defined in Claim 1, wherein said second member comprises a sheet of plastics or rubber material.

3. Apparatus as defined in Claim 1 wherein the second member is pressure-deformable throughout its entire extent.

4. Apparatus as defined in Claim 1, wherein there is also included sealing means for sealing the article when it is in the form of a thermoplastic package.

5. Apparatus as defined in Claim 1, wherein said apparatus includes means for bringing at least one of said first and second members into operative relationship with the other of the members.

6. Apparatus as claimed in any one of Claims 1-5 in which said support means comprises a rigid peripheral frame to which the marginal edges of said second member are secured.

7. Apparatus as claimed in Claim 6 in which the peripheral frame and said second member form a tray-like structure of which the second member forms the base and the peripheral frame forms the side walls, the arrangement being such that, in the absence of suction pressure, the second member is spaced apart from the first member by said peripheral frame.

8. A method of vacuum packaging a commodity in a package comprising the

steps of placing a packaged commodity to be vacuum packaged in a chamber defined by a first rigid member and a second flexible member disposed in facing relationship with the first member, the second member being pressure-deformable throughout the entire extent thereof in such facing relationship with the first member and being spaced from said first member, creating a suction pressure in said chamber to deform the central portion of said second member so that the middle portion of said second member contacts the packaged commodity prior to engagement of the other sections of the second member with the packaged commodity.

9. A method as defined in Claim 8 which includes the further step of sealing the vacuum packaged commodity after the majority of the air is removed from said package.

10. A method as defined in Claim 8 or 9, wherein the step of creating a suction pressure in the chamber is continued until such time as the pressure-deformable second member contacts completely the packaged commodity and substantially all of the air is removed from said packaged commodity, whereafter said packaged commodity is sealed.

11. Vacuum packaging apparatus substantially as described with reference to, and as shown in, the accompanying drawings.

12. A method of vacuum packaging substantially as described with reference to the accompanying drawings.

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