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PROCESS OF PACKAGING BATTS OF FIBERS

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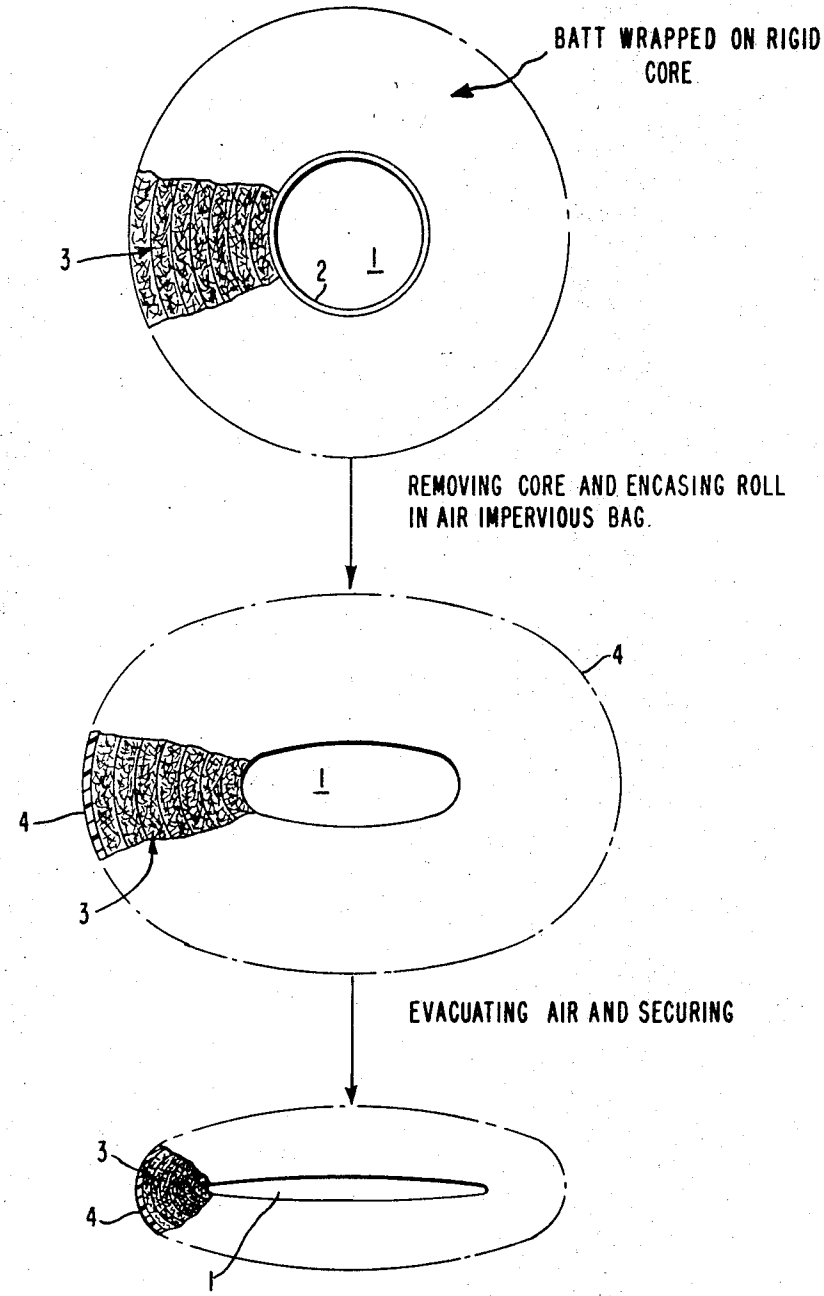

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PROCESS OF PACKAGING BATTS OF FIBERS

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ABSTRACT OF THE DISCLOSURE

The process of packaging initial batts of textile fibers at a density greater than the initial batt density and without significant increase in initial batt density upon unpackaging, which comprises:

(a) wrapping the initial batt onto a rigid core to form a cylindrical structure;
(b) encasing the structure with a bag of an air impervious material and removing the core;
(c) evacuating air from the bag to contract the structure and to increase the initial batt density; and then
(d) wrapping the contracted structure with a wrapper of sufficient tensile strength to maintain substantially the contracted state.

BACKGROUND OF THE INVENTION

Field of the invention

This invention is concerned with the handling of fiber batts. It is particularly concerned with packaging fiber batts for shipment and storage. It is more particularly concerned with the vacuum packaging of batts in such a way that higher density packages are formed without damage to the batts.

Description of the prior art

Fiber batts are assemblies of fibers such that they form resilient masses suitable for use in pillows, mattresses, clothing insulation, furniture upholstery, and similar applications. In order that the batts serve these uses, it is essential that they have a large proportion of open spaces and, hence, low densities. Due to this low density, it is uneconomical to ship such batts. In the past such batts have been compressed, as disclosed in Barnett et al. U.S Pat. 3,117,513 dated Jan. 14, 1964, to increase density, but this causes a permanent loss of some of the bulk and leaves creases and other distortions in the batts. Vacuum packaging of fibers is disclosed in British Pat. 1,017,164 (complete specification published Jan. 19, 1966). However, the process of this patent does not apply to batts of fibers and does not solve the problem of packaging batts in the minimum space.

SUMMARY OF THE INVENTION

In the present invention fiber batts are rolled up into cylindrical masses with a hollow center and these rolls are placed in plastic bags. Air is evacuated from the bag and the roll assumes an oval cross-section. The bag is then sealed so that air cannot re-enter and the batt package maintains the oval cross-section shape due to outside air pressure on the surface of the plastic bag. The batting is not appreciably creased and will expand to substantially its original bulk when the bag is opened for use of the batting.

The invention is the process of packaging initial batts of textile fibers at a density of 2 to 4 times the initial batt density without substantial damage to the batt and without substantial increase in initial batt density upon unpackaging, which comprises in its narrower scope:

(a) wrapping the initial batt onto a rigid core to form a cylindrical structure having a diameter within the range of about 20 to about 60 inches, said core having a diameter within the range of about 10% to 35% of the cylindrical structure diameter;
(b) encasing the structure with a bag of an air impervious material and removing the core;
(c) evacuating air from the bag to contact the structure to a density of about 2 to 4 times the initial batt density; and then
(d) wrapping the contracted structure with a wrapper of sufficient tensile strength to maintain substantially the contracted state.

DESCRIPTION OF THE DRAWING

The drawing is a pictorial flow chart illustrating the process of this invention. In the drawing, **1** represents the open space within the interior of the batting. The rigid core is represented by **2**, **3** depicts the fibers forming the batt, and **4** is the air impervious bag encasing the roll of batting.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Fiber battings are of maximum value on a weight basis when they have maximum bulk-minimum density. However, since shipment of highly bulky materials is expensive, it is desirable to increase the density of fiber batts for shipment. The high bulk should be easily restored after shipment if the batts are to possess maximum usefulness. The present invention achieves these results in a unique manner by winding the batts onto a cylindrical core, removing the core, placing the roll of batting in a plastic bag and then evacuating the bag. When the core is removed the roll assumes an oval cross-section. As the air is removed, the atmospheric pressure on the outside of the bag causes a compression or contraction of the roll of batting to a greater density than the original batting. The evacuated bag is sealed so that air cannot re-enter. When the bag is opened, after shipment, the batting returns to near its original volume and original bulk.

In a preferred manner of operating according to the present invention, a batting of 0.5 to 6 inches (1.3 to 15.2 cm.) thickness, 15 to 85 inches (.38 to 2.16 meters) width and 10 to 30 yards (9.15 to 27.4 meters) long consisting of resin-treated polyester fibers is wound around a rigid tube having an outside diameter of 2 to 12 inches (5 to 30 cm.). The tube core is removed from the roll and the roll placed in a polyethylene or other plastic bag. The bag is evacuated to a pressure of about 2 to 12 inches (5 to 30 cm.) of mercury. The bag is then sealed airtight, preferably wrapped with paper, and packed with other similar bags in shipping cartons. The paper wrapping maintains the compressed shape even if air leaks into the plastic bag.

The density of the original batting is about 0.8 lb. per cubic foot (12.8 kilograms per stere) while the final packaged batting has a density of about 2.4 lbs. per cubic foot (38.4 kilograms per stere). When the battings are removed from the bags they recover nearly all the bulk lost by packaging. The actual loss of bulk is usually less than 10% which is largely "false bulk" which would be lost during use of the battings even without the vacuum packaging.

From the above density figures, it will be seen that the density can be increased to three times or more its initial value for shipping. The reduction in volume makes it possible to increase truck loads from 2,500 lbs. (1133 kg.) to as high as 9,000 lbs. (4081 kg.). Greater densities can be obtained, but going beyond a density of 3 lbs. per cubic foot (48 kg./stere) results in some permanent loss

of bulk. The greater density of the package not only aids shipping but also makes storage more economical.

The size of the roll of batting may vary over rather wide limits, but best results are obtained when the diameter of the batting rolls is 20 to 60 inches, preferably 30 to 40 inches. When the core is removed, the rolls become somewhat flattened and oval-shaped with a vertical thickness of about two-thirds the horizontal thickness. In the preferred range of operation, these dimensions would be about 22 inches (56 cm.) for the vertical thickness and 35 inches (89 cm.) for the horizontal thickness. After evacuating, the vertical thickness is about 6 to 10 inches (15 to 25 cm.) and the horizontal thickness is 25 to 30 inches (63 to 89 cm.).

No appreciable creasing or crushing of the batts occurs under the optimum conditions for operating under this invention. Mechanical compression by the usual methods to give the same density would seriously damage the batts.

Any natural or man-made battings of fibers can be packaged by the method of the present invention. Most battings go into uses where high resilience is desirable, and for this reason, resilient fibers such as the polyester fibers give optimum results. Even greater resilience is obtained when packaging resin-treated batts according to the present invention.

Fiber deniers are not critical for this process and may vary from 1.5 denier to over 40 denier with values of 4 to 40 denier preferred.

EXAMPLE I

Polyethylene terephthalate fibers of 4.25 denier and 2 inch (5.08 cm.) length having a spiral crimp are processed through a garnett machine to open the mass of fibers and form a web and then cross-lapped into a batt structure. The surface of the batt is sprayed with a 23% emulsion of a resin to bond the fibers within the batt to one another at cross-over points and to give increased resiliency to the batt.

The resin is of the following composition:

	Percent
Ethyl acrylate	46.3
Methyl methacrylate	48.0
N-methylolmethacrylamide	4.7
Methacrylic acid	1.0

After spraying the surface another layer of fibers is cross-lapped onto the first layer, the surface is again sprayed and then the batting is turned over and the opposite side is sprayed with the above resin. The final single batting is 1.1 inches (2.8 cm.) thick. The resin-treated batt is passed through an oven at 138° C. to dry it and cure the resin. The batting contains about 15% resin on a dry weight basis.

This batting is next wrapped around a rigid tube type core having an outside diameter of 10 inches (25.4 cm.) until the diameter of the roll is 40 inches. The core is then removed and the roll of batting partly collapses to an oval cross-section.

The roll is placed in a polyethylene bag having a wall thickness of 1.5 mil (0.0038 cm.). A 2 inch (5.08 cm.) inside diameter suction pipe is inserted into the roll at the open end of the bag and the bag is tightly folded around this pipe to form an air tight seal. The air in the bag is removed by applying a vacuum of 8 inches (20 cm.) of mercury to the pipe. The low pressure causes the bag and roll to collapse. The roll contracts to a flattened oval shape having a height of about 8 inches (20.3 cm.) and a width of about 28 inches (71 cm.) in cross section. At the same time the density changes from 0.8 pound per cubic foot (12.8 kilograms per stere) to 2.4 pounds per cubic foot (38.4 kilograms per stere).

The suction pipe is removed from the bag, the end of the bag is twisted to form an air tight seal and the tightly twisted end is tucked into the roll to maintain the vacuum. The package is next wrapped in 60 basis weight paper (60 pounds per 3,000 square feet or 0.097 kilogram per square meter) to protect the batt and to maintain the batt in its contracted form in the event of air leakage.

This package can be shipped and stored much more cheaply than the original batting. It occupies only one-third of the space occupied by the original batting. When the wrapping is removed and the bag opened for use, the batting immediately expands to approximately its original volume and is ready to be converted into upholstery padding, cushions or the like. The batting is substantially free of wrinkles or distortion. A batting mechanically pressed to the same small volume is badly creased and distorted and does not fully recover when the pressure is released.

Since many different embodiments of the invention may be made without departing from the spirit and scope thereof, it is to be understood that the invention is not limited by the specific illustrations except to the extent defined in the following claims.

What is claimed is:

1. In the process of preparing a packaged resilient batt from crimped polyethylene terephthalate fibers wherein the fibers in the form of webs are assembled into a batt having a plurality of cross-lapped fiber layer and bonded to one another at cross-over points by applying a bonding a resin to form a low density batt suitable for use as padding in upholstery and cushions, and the batt is then packaged for shipment; the improvement for packaging the batt at an elevated density in a manner that will allow the batt to resume a low density after being removed from the package and be substantially free of wrinkles and distortion, wherein the improvement comprises wrapping the batt around a rigid core to form a roll, removing the core and collapsing the roll to an oval cross-section, placing the roll in a bag of an air-impervious material, evacuating the bag by applying a vacuum to contract the roll, twisting the open end of the bag and tucking it into the collapsed roll to seal it, and wrapping the evacuated bag and roll with paper to enclose and protect the rolled batt whereby the batt is maintained at a density 2 to 4 times that of the original batt.

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53—21, 22, 27, 37, 370; 29—91.1