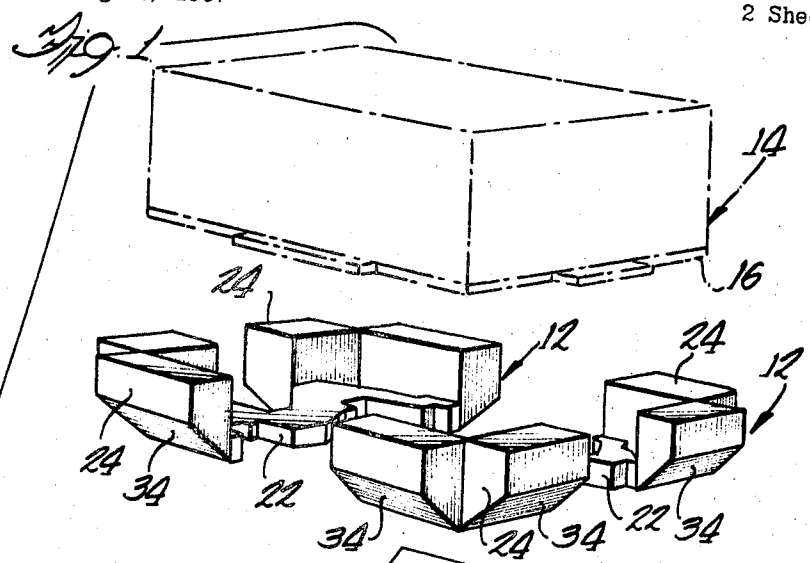
Oct. 8, 1968 J. M. CARMODY 3,404,826

CUSHIONING UNIT

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Fig. 1



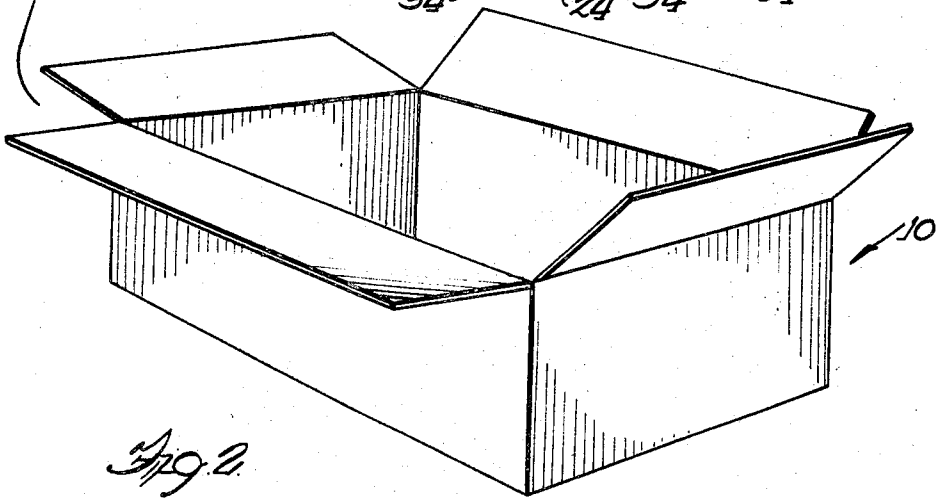
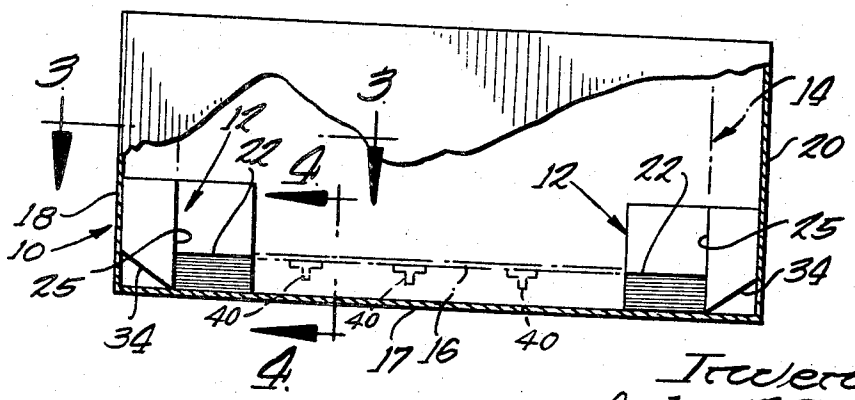


Fig. 2



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Fig. 3

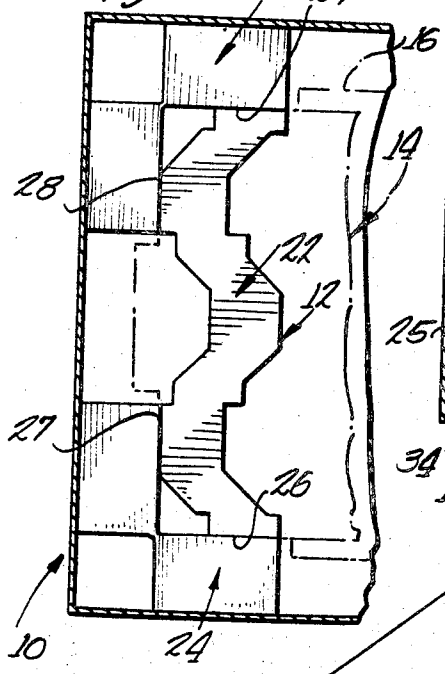


Fig. 4

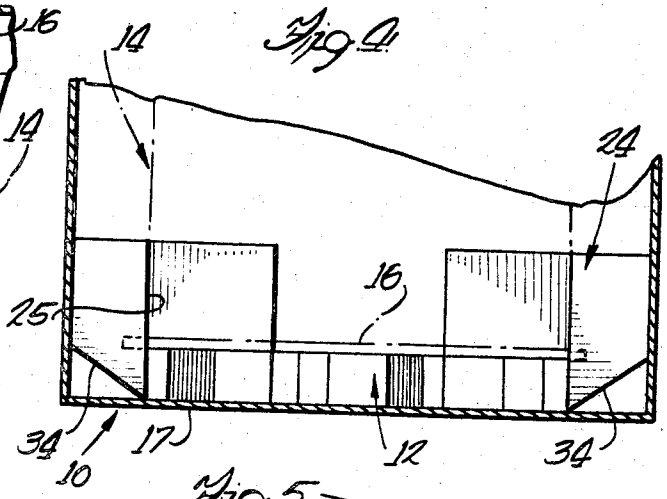


Fig. 5

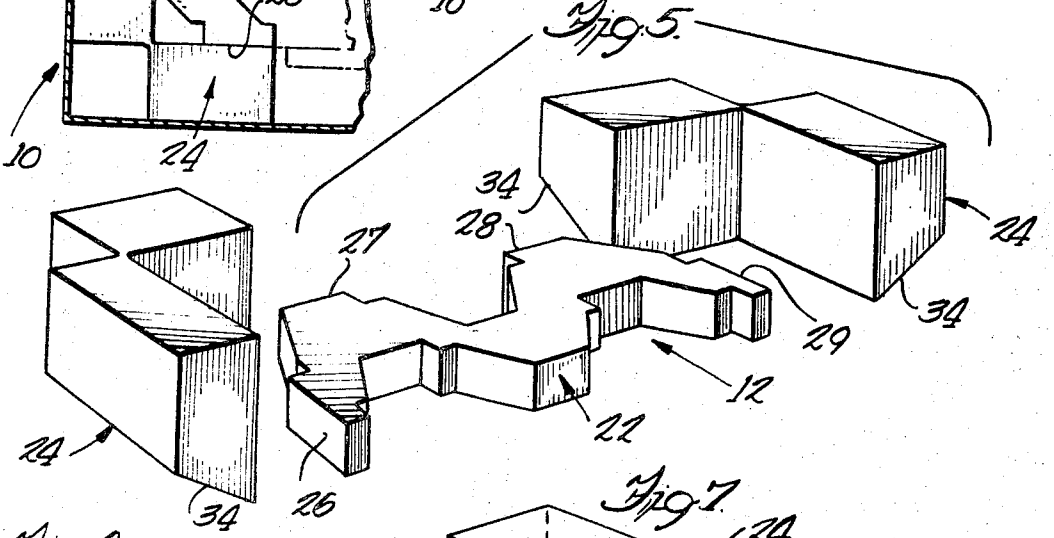


Fig. 6

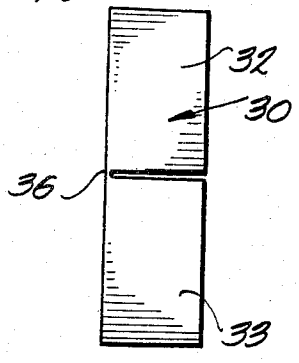
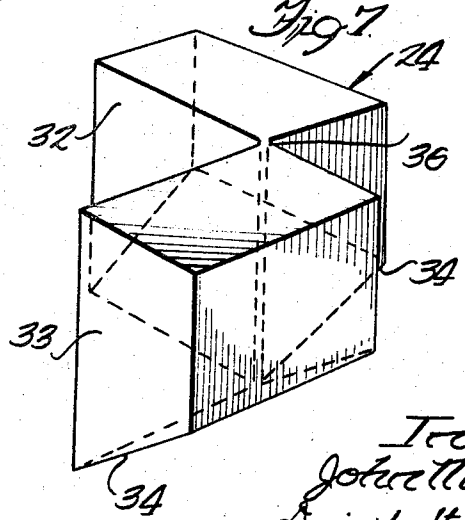


Fig. 7



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3,404,826

CUSHIONING UNIT

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7 Claims. (Cl. 229—14)

ABSTRACT OF THE DISCLOSURE

A cushioning unit which is formed of a resilient compressible material, such as polyethylene foam, and has an irregular-shaped or contoured bottom cushion which is affixed, by heat sealing, to two corner members of a like material. The corner members are L-shaped, and are formed from a generally rectangular-shaped piece of material which is cut to form two like pieces joined by a web. These like pieces are then folded L-shaped and affixed to the bottom cushion. The lower outside edges of the corner members are beveled, to prevent shearing the joints between them and the bottom cushion, on bottom or vertical impacts. The beveled edges on the corner members also permit the bottom cushion to function properly by eliminating the cushioning material which does not compress due to the fact that there is no "load" to compress it.

The present invention relates to the packaging of fragile articles, and has its most important application in the packaging of heavy fragile articles, such as electronic equipment housed in large, heavy cabinets and the like. The many techniques used heretofore for cushioning heavy fragile articles have met with varying degrees of success and there has been much room for improvement therein from the standpoint of the efficient and effective use of the cushioning materials, and the ease of assembly of the cushioning material within the boxes used to house the articles involved.

In U.S. Patent 3,173,535, there is disclosed a prefabricated cushioning unit insertable in the bottom of a box for cushioning heavy fragile articles against vertical and lateral thrusts. The cushioning unit comprises a body of resilient compressible material, such as polyethylene foam, forming an open centered, horizontally extending, rectangular, frame-like structure. The body of material has a horizontally extending, upwardly facing ledge located along the inner margins of the frame-like structure in a plane between the top and bottom thereof. The outer margins of the ledge are in alignment with inwardly facing, upwardly extending vertical surfaces adapted to surround the article involved, to cushion the same against lateral thrusts. The weight of the article to be supported by the cushioning unit is efficiently distributed over the body of resilient material by a relatively rigid layer of material covering the ledge and extending into the body of cushioning material to distribute the weight of the article involved over a greater area than the ledge.

Each side of the body of cushioning material is most advantageously made of an elongated extruded piece of plastic foam material, the ends of the pieces being adhesively or otherwise secured together to form a rectangular frame-like structure. Inwardly facing horizontal recesses are formed in the vertical inwardly facing surfaces of the frame-like structure to accommodate the peripheral portions of the layer of rigid material extending into the cushioning unit.

The cushioning unit is most advantageously used in conjunction with a box bottom having cleats extending around the margins of the upper surface thereof. The bottom of the cushioning unit rests on the box bottom and the outer margins thereof are undercut to form a marginal

recess which conforms to the shape of the cleats. The cushioning unit thus hugs the top and inner side surfaces of the cleats. The cleats are preferably positioned outwardly of the bottom of the cushioned article involved and the upper surface of the cleats are above the bottom of the article, so that the cushioned lateral thrusts of the article are taken, at least in part, by the cleats rather than entirely by the side walls of the box.

The cushioning unit of the subject patent is extremely effective in packaging heavy fragile articles. However, after having used it for an extended period of time, it has been found that it can be substantially improved, both from the standpoint of its manufacturing cost and its ability to more effectively cushion the articles.

It is therefore an object of the present invention to provide an improved prefabricated cushioning unit which is insertable in the bottom of a box for cushioning heavy fragile articles against vertical and lateral thrusts.

A further object is to provide improved cushioning units of the above type which require a minimum amount of cushioning material to satisfy a given cushioning job.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The above objections are accomplished with a cushioning unit which is formed of a resilient compressible material, such as polyethylene foam, and has an irregular-shaped or contoured bottom cushion which is affixed, by heat sealing, to two corner members of a like material. The corner members are L-shaped, and are formed from a generally rectangular-shaped piece of material which is cut to form two like pieces joined by a web. These like pieces are then folded L-shaped and affixed to the bottom cushion. The lower outside edges of the corner members are beveled, to prevent shearing the joints between them and the bottom cushion, on bottom or vertical impacts. The beveled edges on the corner members also permit the bottom cushion to function properly by eliminating the cushioning material which does not compress due to the fact that there is no "load" to compress it.

The invention accordingly comprises an article of manufacture processing the features, properties, and the relation of elements which will be exemplified in the article hereinafter described, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings in which:

FIG. 1 is an exploded perspective view, illustrating a carton, two cushioning units exemplary of the invention and an object affixed to the pallet, and further generally illustrating the manner in which they are assembled within the carton to package the object for shipment and/or storage;

FIG. 2 is a side plan view of the arrangement of FIG. 1 assembled, partially broken away to illustrate the interior of the carton and the cushioning units as they are retained therein;

FIG. 3 is a sectional view, taken along lines 3—3 of FIG. 2;

FIG. 4 is a sectional view, taken along lines 4—4 of FIG. 2;

FIG. 5 is an exploded perspective view of one of the cushioning units before it is affixed together in an assembled integral fashion;

FIG. 6 is a top plan view of one of the corner members affixed to the bottom cushion after it has been cut but prior to its being folded and affixed to the bottom cushion; and

FIG. 7 is a perspective view of the corner cushion, illustrating how it is folded to affix it to the bottom cushion.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

Referring now to the drawings, in FIG. 1 there is illustrated a closable carton **10**, a pair of cushioning units **12** each of which is of identical construction having a bottom cushion **22** and two corner members **24** and an object **14** which may be, for example, a fragile electronic instrument, affixed to a pallet **16**. The object **14** is packaged within the carton **10** for shipping and/or storage, by first placing the cushioning units **12** within the carton **10** so that they are seated on the bottom wall **17** thereof and in abutting relationship with its opposite side walls **18** and **20** (FIG. 2). Thereafter, the pallet **16** with the object **14** affixed to it in any suitable fashion is placed within the carton **10**, atop the bottom cushions **22** of the cushioning units **12**. The corner members **24** of the cushioning units **12** preferably abut the object **14**, as well as the edges of the pallet **16**. In this fashion, the pallet and the object are positionally retained in a substantially centrally-disposed, fixed position within the carton **10**. As explained more fully below, the bottom cushions **22** cushion the object **14** against vertical thrusts and the corner members **24** cushion the object against lateral thrusts so that the cushioning units **12** fully protect the object from damage due to either vertical and lateral, or a combination of both, thrusts.

More specifically, the cushioning units **12** are formed from a resilient compressible material preferably expanded polyethylene foam having a density within a range of 1.8 to 2.6 pounds per cubic foot, and each includes a bottom cushion **22** having corner members **24** affixed to the opposite end edges thereof as to form an integral unit. The contour of the bottom cushions **22**, as can be best seen in FIGS. 3 and 5, is irregular-shaped, generally resembling a sinusoidal curve having rectilinear, as opposed to curvilinear, surfaces or edges. Other shapes of curvature can be used, however, the illustrated generally sinusoidal configuration is preferred for several reasons. For example, a large area of coverage is provided, and hence cushioning with a minimum amount of material; the bottom cushions can be progressively die cut from a long length of material, with no waste, and the bottom cushions will dovetail together for shipping and/or storage; clearance is provided for fastening means such as wing head bolts projecting from the pallet bottom; and it allows the cushioning units to adjust themselves to fit a carton and/or pallet without direct expansion or compression of the material, if proper dimensions are not attained due to faulty heat sealing.

The bottom cushions **22** also have a predetermined thickness which is dependent, to some degree, upon the density of the expanded polyethylene foam and the weight of the object to be supported, to provide the most satisfactory cushioning against vertical thrusts. Flat sealing surfaces **26–29** are provided along the side and top edges of the bottom cushions **22** so that the corner members **24** can be integrally affixed to them, in the manner described below. The flat sealing surfaces **26** and **29** are in parallel spaced relation and are in planes perpendicular to the plane in which the two flat sealing surfaces **27** and **28** lie.

The corner members **24** likewise are formed from a resilient compressible material preferably expanded polyethylene foam having a density of 1.8–2.6 pounds per cubic foot. The corner members **24** are formed from a rectangular-shaped body of material, generally represented by the reference numeral **30** in FIG. 6, of predetermined dimensions so as to provide the most satisfactory cushioning against lateral thrusts. The rectangular-shaped body of material is cut using any suitable means such as a blade or a heated wire to provide two substantial identical smaller rectangular-shaped pieces **32** and **34**, which are integrally affixed together along one edge thereof by a flexible web **36**. The rectangular-shaped body of material **30** is folded L-shape, at the web **36**, to form a corner member **24**, and affixed by heat sealing it to the bottom cushion **22** at the two surfaces of contact with the flat sealing surfaces **26** and **27**, or **28** and **29**. An identical corner member is affixed to the two surfaces of contact with the other two of the flat sealing surfaces **26** and **27**, or **28** and **29** of the bottom cushion. The lower edges of the corner members are aligned with the bottom wall of the bottom cushion so that a flat surface is provided on the underside of the cushioning units **12**. The corner members **24** are of a height such that the upper edges thereof extend a substantial distance above the top surface of the bottom cushion **22**, so as to provide an upstanding support surface **25**. The support surface **25** is engageable by the object **14**, or the pallet **16** to which the object **14** is affixed, to cushion it against lateral thrusts or impacts.

It may be noted that beveled edges **34** also are cut on the lower outer edges of the corner members **24**. The success of the cushioning units **12** is, to a great degree, dependent upon these beveled edges. Without them, it is found that some of the material of the corner members **24** is not compressed when a vertical thrust or impact is exerted on the cushioning units, and that this material retards the cushioning effect of the bottom cushions. As a result, the cushioning units **12** fail to function properly. In addition, it is found that the cushioning units themselves, in many cases, are damaged when a vertical thrust or impact is erected on them, as a result of the heat sealed joints between the bottom cushion **22** and corner members **24** being severed. The beveled edges **34** permit the bottom cushions **22** to function properly to cushion an object, by eliminating the material of the corner members **24** which does not compress due to the fact that there is no "load" to compress it. The beveled edges **34** also completely eliminate the previous problem of the heat sealed joints being severed. Accordingly, it is apparent that without the beveled edges **34** on the corner members **24**, the cushioning units **12** generally are unsatisfactory for their intended purpose.

The object **14** preferably is affixed to the pallet **16**, however, it can be placed directly onto the cushioning units **12**, if desired. The pallet, however, will function as an agent to distribute the weight of the load more evenly over the cushioning units **12** and therefore is preferably used. Fastening of the object **14** to the pallet can be accomplished by extending wing nut bolts **40** (FIG. 2) or the like through appropriately positioned apertures (not shown) in the pallet and affixing them to fastening means on the object which are adapted to receive them. As indicated above, the irregular shape of the bottom cushions **22** provides clearance for the wing nut bolts, when the pallet and the object are placed with the carton atop the cushioning units.

In particular application, a composer machine weighing approximately 51 pounds is packaged within a carton **10**, atop two cushioning units **12**, for shipping the same to a distinct location. Prior to packaging the composer machine, it is affixed to a ¼ inch chipboard pallet **16** approximately 23 inches long by 17⅞ inches wide and contoured, as generally illustrated in FIG. 1, so as to seat atop the cushioning units **12**. In this particular application, a corrugated tube also is placed about the machine. The tube rests on top of the pallet and extends to the top of the carton. The tube provides additional protection to the machine against objects severing the side walls of the carton, but it does not protect the machine from damage due to vertical or lateral thrusts. The cushioning units **12** are of expanded polyethylene foam having a density within the range of 1.8–2.6 pounds per cubic foot. The bottom cushion **22** has a generally sinusoidal configuration, as disclosed, and is 16½ inches in length and 4^{15}⁄$_{16}$ inches in width overall, with a thickness of 2 inches. The transverse dimension of the sinusoidal-shaped body of the bottom cushion is approximately 2⅝ inches, so that it provides an area coverage of approximately 4⅞ inches. The slight re-

duction in size is a result of heat sealing the corner members **24** to it. The corner members **24** also are of expanded polyethylene foam and are formed from a rectangular-shaped body of material **30** which is 10 inches in length, 6 inches in height and 3 inches in thickness. The material **30** is cut so as to provide a web ⅛ inch in thickness, and is folded to provide two identical smaller rectangular-shaped pieces, each 5 inches in length, 6 inches in height and 3 inches in thickness. The beveled edge **34** extends angularly from the inside lower edge of the corner members to a point two inches up from the bottom of the opposite or the outside lower edge thereof. After the corner members **24** are heat sealed to the bottom cushion **22**, the latter has an overall length of approximately 16⅜ inches and an overall width of approximately 4⅞ inches. When packaged within a carton **10** atop cushioning units **12** of the above-described dimensions, the composer machine is substantially fully protected against vertical and lateral thrusts imparted to it.

Other fragile articles can be similarly packaged, for shipping and/or storage, simply by proportionately scaling the cushioning units to provide the necessary support.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above article without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention, which, as a matter of language, might be said to fall therebetween.

Now that the invention has been described, what is claimed as new and desired to be secured by Letters Patent is:

1. A cushioning unit insertable between a fragile article and the bottom of a carton comprising a bottom cushion having a predetermined thickness and a generally sinusoidal shape formed of a resilient compressible foam-like cushioning material, said bottom cushion cushioning said fragile article against vertical thrusts, and corner members each having a pair of arms extending at right angles

to one another affixed to said bottom cushion at, at least two opposite ends thereof so as to form two corners thereon, said corner members being fixedly secured to said bottom cushion throughout its thickness and having a height substantially longer than its thickness so as to provide an upwardly extending surface against which said fragile article can abut to cushion said fragile article against lateral thrusts, said corner members having the lower outer corner edges of the arms thereof angularly cut away so as to provide beveled edges on them and a void between said arms and the bottom and side walls of said carton when said cushioning units are inserted within said carton in abutting relationship with the bottom and side walls thereof.

2. The cushioning unit of claim **1** wherein said beveled edges extend from the lower inner edge of said arms angularly upwardly to a height along the outer side wall of the corner members substantially corresponding to the thickness of said bottom cushion.

3. The cushioning unit of claim **2** wherein said bottom cushion is generally sinusoidal shape having rectilinear surfaces or edges thereon as opposed to curvilinear surfaces or edges.

4. The cushioning unit of claim **2** wherein said bottom cushion has a transverse dimension which is substantially equal to one-half its overall width.

5. The cushioning unit of claim **2** wherein each of said corner members is formed from a length of rectangular-shaped material which is cut to provide two substantially identical arms which are integrally affixed together by a flexible web, said material being folded at said web and said arms being heat sealed to said bottom cushion.

6. The cushioning unit of claim **2** wherein said resilient compressible foam-like cushioning material comprises expanded polyethylene foam.

7. The cushioning unit of claim **6** wherein said expanded polyethylene foam has a density within a range of 1.8–2.6 pounds per cubic foot.

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