Oct. 8, 1968 J. M. CARMODY 3,404,827

CORNER CUSHIONS

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Fig. 1.

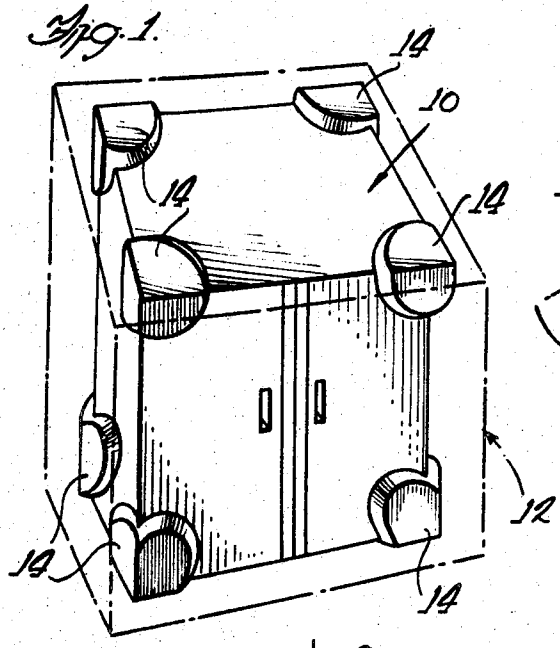



Fig. 2.

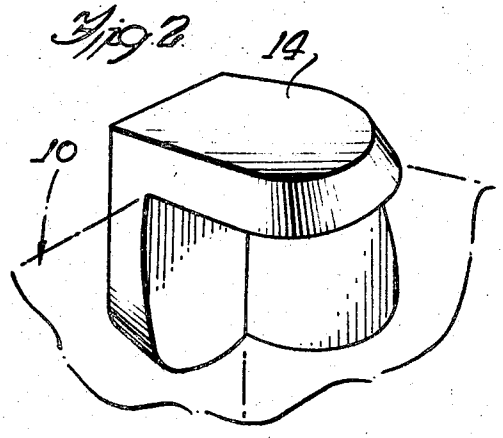



Fig. 3.

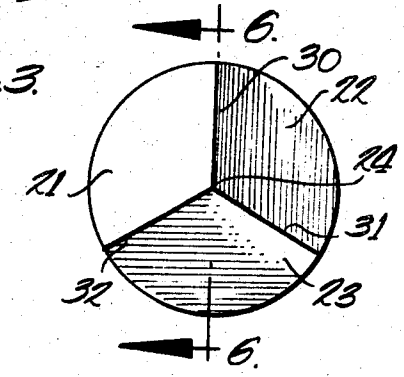



Fig. 4.

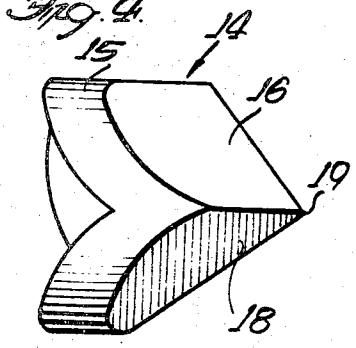



Fig. 5.

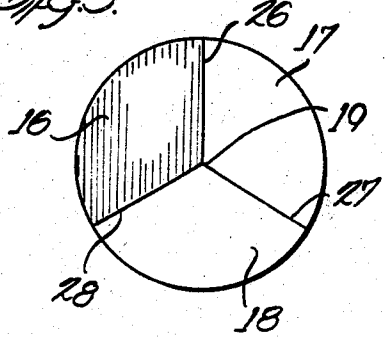
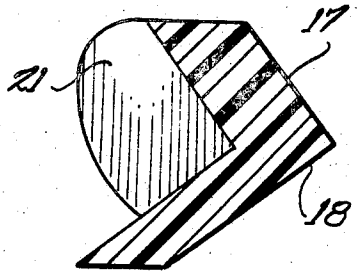



Fig. 6.




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Fig. 7.

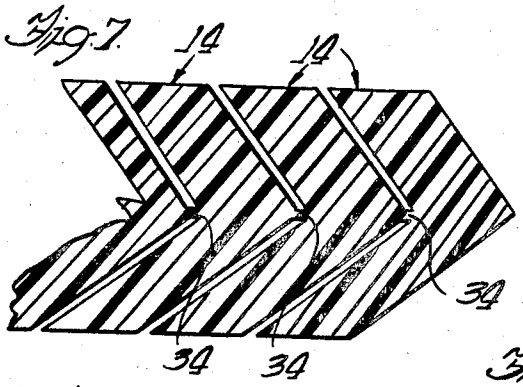



Fig. 8.

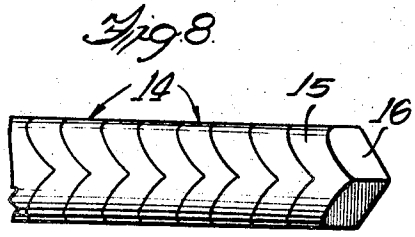



Fig. 9.

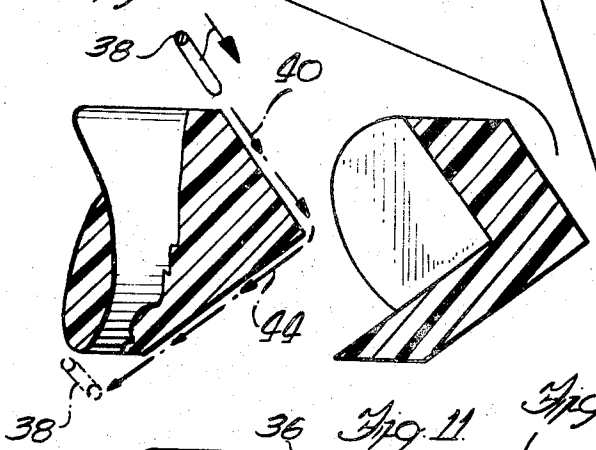



Fig. 10.

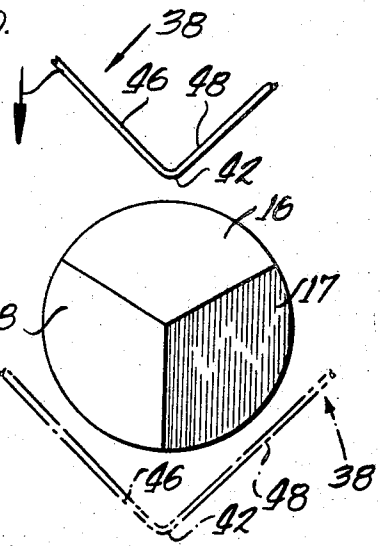



Fig. 11.

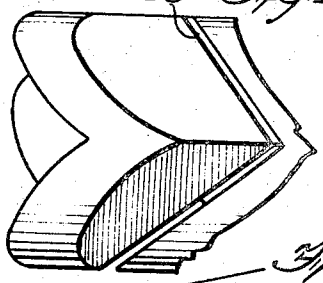



Fig. 12.

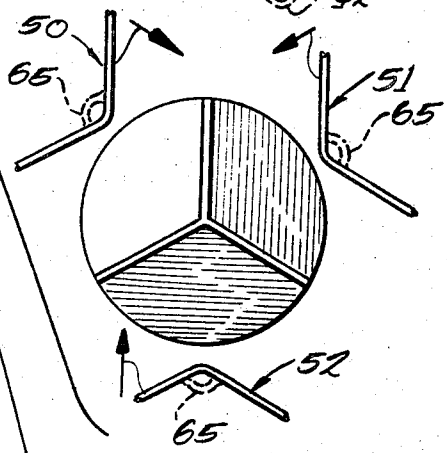
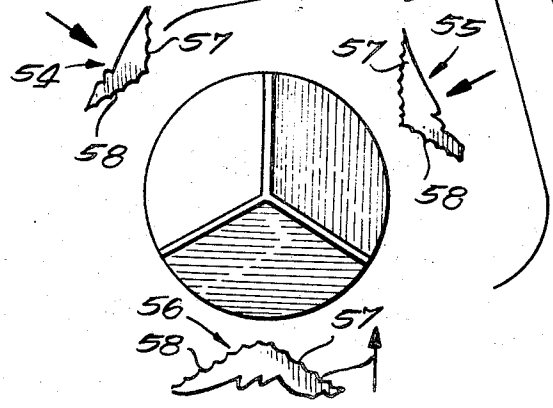



Fig. 13.




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Fig. 14.

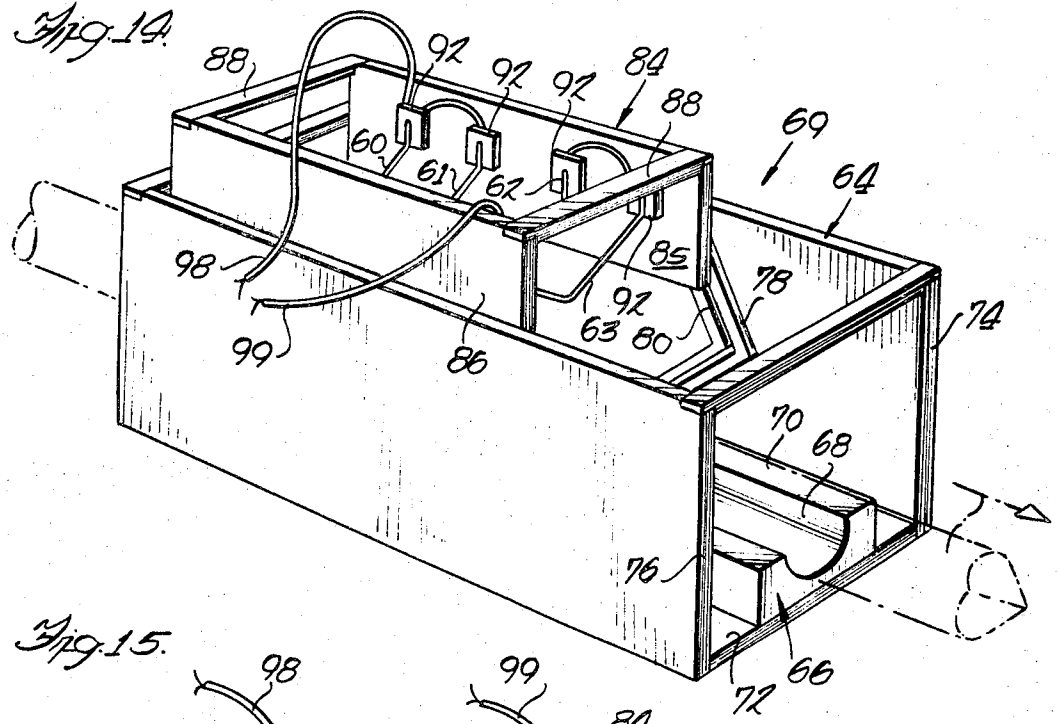



Fig. 15.

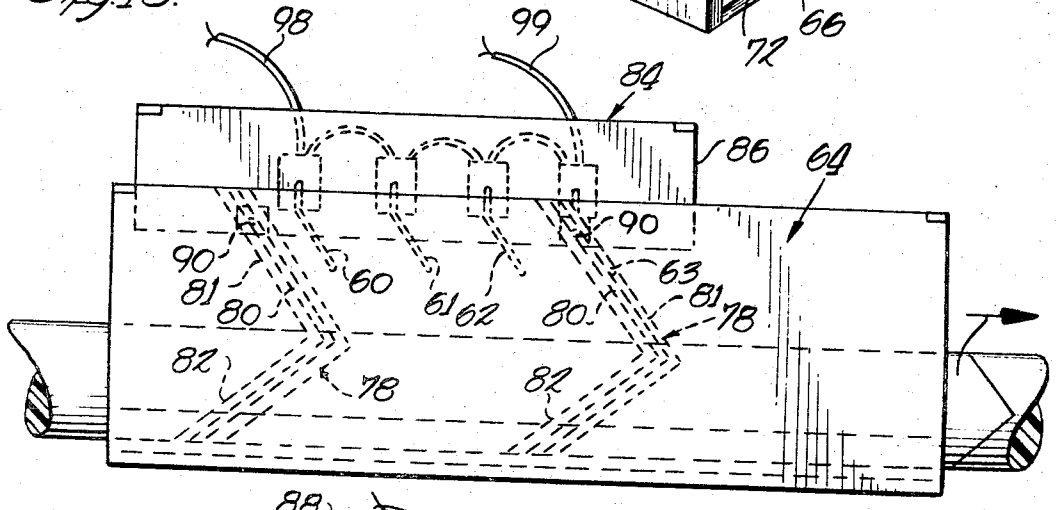
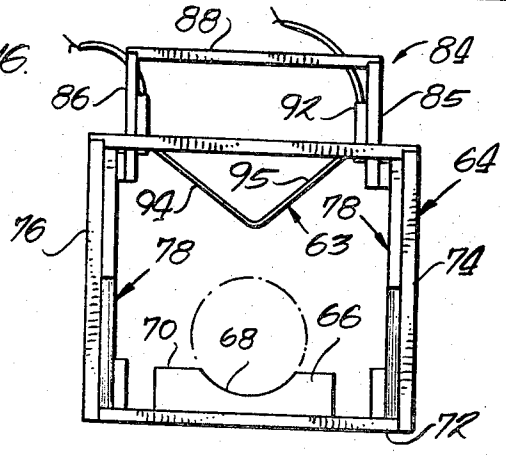



Fig. 16.




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Fig. 17.

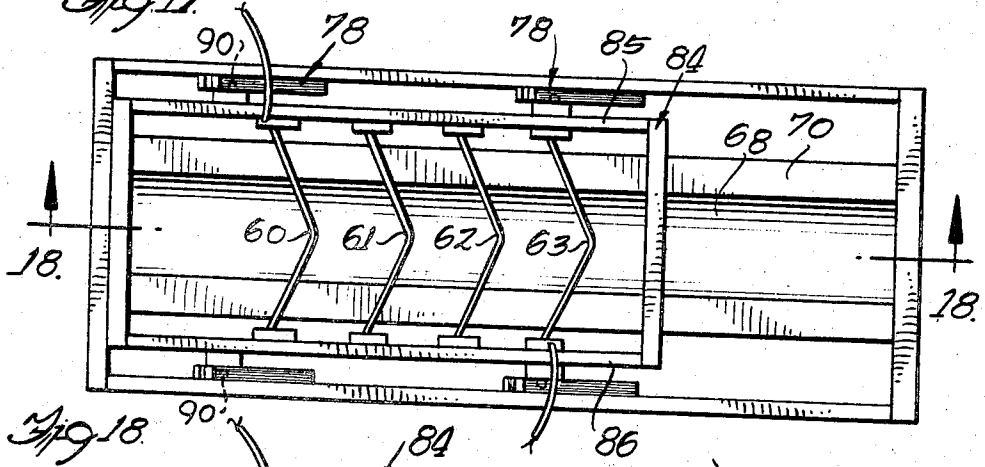



Fig. 18.

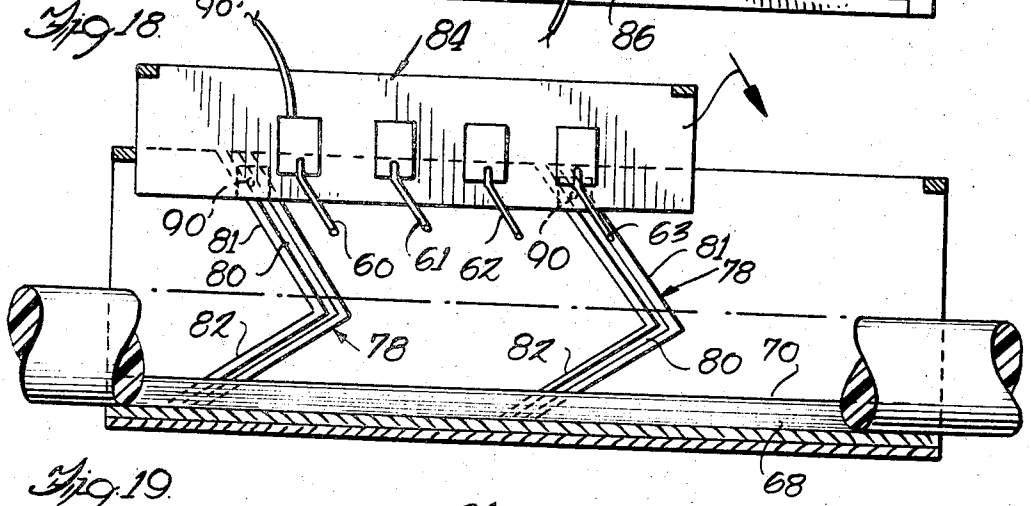



Fig. 19.

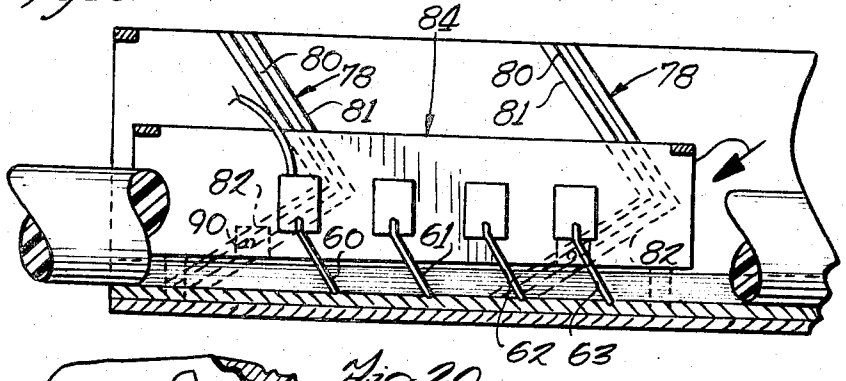
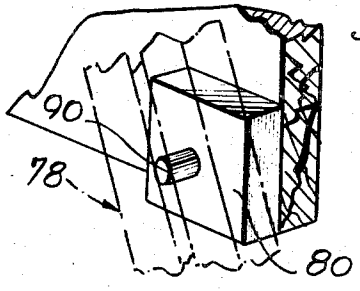



Fig. 20.




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United States Patent Office 3,404,827 Patented Oct. 8, 1968



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# CORNER CUSHIONS

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Filed May 18, 1967, Ser. No. 639,365
9 Claims. (Cl. 229—14)

## ABSTRACT OF THE DISCLOSURE

A corner cushion for packaging articles in cartons for shipping and/or storing them having a generally cylindrical-shaped body which has a three-faced pointed tip on one end thereof forming an outside corner and a three-faced interior cavity in the other end thereof forming an inside corner. The apparatus for cutting the corner cushions includes a number of electrically heated wires or cutting blades, for simultaneously cutting a number of the corner cushions from a length of cylindrical-shaped material, preferably foamed polyethylene. A sprue can be provided between the corner, during the cutting operation, to connect the corner cushions together to form a long length of connected corner cushions for ease in storing and/or shipping them.

This invention relates to corner cushions for packaging articles in cartons for shipping and/or storage, and to the method and apparatus for making them.

It has always been a problem to package, for shipping or storage, articles such as electronic instruments, cabinets, desks, appliances, as well as a whole host of other similar articles having a substantially rectangular or square-shape, in a fashion such that they are protected from damage. In the past, articles of this type have been packaged in innumerable different ways, however, in each case, the packaging has been generally unsatisfactory, for one reason or another. For example, in some cases, the shipping cartons were partially filled with a packing material such as shredded or wadded paper. Thereafter, the article was placed in the carton atop the packing material and additional packing material then stuffed into the carton about the sides and top of the article so that it was effectively cushioned, on all sides, within the carton. This method of packaging articles is tedious, time consuming and therefore costly and, furthermore, provides little protection for the articles. It is entirely unsatisfactory for packaging articles such as electronic instruments and the like which are quite delicate.

Recently, some articles such as electronic instruments, television sets and the like have been packaged in cartons, using pre-formed cushions of a resilient material such as rubber or expanded polystyrene. The cushions are formed to snugly fit completely about or partially over the top and bottom of the article, so that the article is enclosed within or effectively "sandwiched" between the cushions. The cushions also generally fit tightly in the carton, so that the cushions and the article both are securely retained within the carton. These pre-formed cushions generally provide a high degree of protection to the articles, however, they are relatively expensive since the cushions must be formed or molded to fit the articles. This necessitates the use of relatively costly molds. Also, being preformed to fit a particular article, the cushions cannot be used with other articles so that each cushion has an extremely limited application. Furthermore, these cushions are both inconvenient to ship and to store since they are relatively bulky.

It is an object of the present invention to provide improved corner cushions for packaging articles in cartons for shipping and/or storage.



Another object is to provide improved methods and apparatus for making corner cushions for packaging articles in cartons for shipping and/or storage.

Still another object is to provide corner cushions of the described type which can be easily and inexpensively extrusion molded, and therefore cut to desired shapes.

A still further object is to provide corner cushions of the described type which can be formed in a long length of a number of connected corner cushions for ease in shipping and/or storing them, and thereafter easily individually separated for use.

A still further object is to provide improved corner cushions of the described type which are made of a foamed polyethylene.

Still another object is to provide improved corner cushions of the described type having a three-faced interior cavity configuration which permits supporting at the corners of any substantially rectangular or square-shaped article, or other articles having a number of corners whereat the articles can be supported.

A still further object is to provide apparatus for cutting the corner cushions which is both simple in construction and in operation.

Still another object is to provide apparatus which is adapted to cut individual ones of the corner cushions from a long length of material, or alternatively, to precut the material in a fashion such that a number of the corner cushions are connected together, in a longitudinal connected form, by a sprue or sprues between each of the corner cushions.

The invention accordingly comprises the apparatus embodying features of construction, combination of elements and arrangement of parts, and the article possessing 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 a perspective view, generally illustrating the manner in which the corner cushions are affixed to an article, to package the same in a carton for shipping and/or storage;

FIG. 2 is a perspective view of one of the corner cushions, and further illustrating the manner in which it is affixed to a corner of an article;

FIG. 3 is a front plan view of a corner cushion, illustrating the three-faced interior cavity formed therein;

FIG. 4 is a side plan view of a corner cushion;

FIG. 5 is a rear plan view of a corner cushion;

FIG. 6 is a sectional view of a corner cushion, taken along lines **6—6** of FIG. 3;

FIG. 7 is a transverse sectional view of a number of the corner cushions, illustrating the manner in which they are cut to form a long length of individually separable corner cushions;

FIG. 8 is a side plan view of a number of connected corner members.

FIGS. 9 and 10 are a section view and an end plan view illustrating the manner in which the corner cushions are cut from a continuous length of material, using a hot wire;

FIG. 11 is a partial sectional view, illustrating the web sprues formed between the individual ones of the connected corner cushions;

FIG. 12 is an end plan view, illustrating the manner in which the corner cushions are cut from a long length of material, using three hot wires;

FIG. 13 is an end plan view, illustrating the manner

in which the corner cushions are cut from a long length of material, using three saw blades;

FIG. 14 is a perspective view of the apparatus used to cut the corner cushions from a continuous length of material;

FIG. 15 is a side plan view of the apparatus;

FIG. 16 is an end plan view of the apparatus;

FIG. 17 is a top plan view of the apparatus;

FIG. 18 is a sectional view of the apparatus, taken along lines **18—18** of FIG. 17;

FIG. 19 is a similar sectional view of the apparatus, after its cutting head has been operated to cut a corner cushion from a continuous length of material; and

FIG. 20 is a partial perspective view, illustrating the track-guide for the cutting head of the apparatus.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to the drawings, in FIG. 1 there is shown a cabinet **10** which is packaged within a carton **12** (illustrated in dot-dash lines) for shipping and/or storage, using a number of corner cushions **14** of the present invention. It can be seen that the corner cushions **14** support the cabinet **10**, at each of its corners, in a substantially suspended position within the carton. As explained more fully below, the corner cushions **14** are formed of foamed polyethylene and are relatively strong and sturdy, but yet resilient, so that the cabinet **10** is both firmly and resiliently supported in this suspended position. Accordingly, the carton **12** can be dropped from a substantial height, without resulting damage to the cabinet **10**.

More specifically, the corner cushions **14** are cut from a long length of extruded foamed polyethylene, which preferably has a density within a range of 1.8 to 2.6 lbs./cubic foot so as to provide a substantially strong, sturdy, firm but yet resilient corner cushion. Material of this density has been found to be satisfactory to provide a corner cushion which will firmly and resiliently support most articles against damage, when the corner cushions are formed in the manner described below. In cases of extremely heavy objects, material having a greater density, approximately 4 lbs./cubic foot, can be used.

The corner cushions **14**, as can be best seen in FIGS. 2–6, have a body **15** which is illustrated to be of generally cylindrical shape, with three flat faces **16–18** (FIG. 5) on one end thereof which are tapered to a point **19**, and with an interior cavity **20** in the opposite end thereof which likewise has three flat faces **21–23**, which taper inwardly to a point **24**. The body portion **15** also can be polygonal-shaped, for example, triangular or hexagonal, as exampled more fully below. The three faces **16–18** are radially spaced approximately 120° apart on the periphery of the body **15** and taper inwardly from the side wall of the cylinder to form the point **19**, at the central axis of the body **15**. The faces **16–18** each also can be in a plane so as to form right angles at their respective intersecting edges, indicated by the reference numerals **26–28**. The three faces **21–23** of the interior cavity **20** likewise taper inwardly to form the point **24**, at the central axis of the body **15**, and are in planes so that their respective intersecting edges, indicated by the reference numerals **30–32** form right angles. The faces **16–18** on one corner cushion **14** and the faces **21–23** on another corner cushion can be advantageously simultaneously formed, as explained below.

The recessed interior cavity **20**, that is, the faces **21–23** forming it, therefore substantially correspond to and form an inside corner which can be easily fitted about a corner on any rectangular or square-shaped article, such as the cabinet **10**. The faces **16–18** on the opposite end of the corner cushions likewise substantially correspond to and form an outside corner, and therefore will seat within a corner of a carton, such as the carton **12**. Accordingly, an article like the cabinet **10** is easily packaged within a carton for shipping and/or storage by, for example, affixing a corner cushion **14** to each of its corners at one end thereof, placing the open end of a carton over the cabinet until the corner cushions **14** seat within the corners of the carton, inverting the carton and the cabinet, affixing a corner cushion **14** to the remaining corners of the cabinet, and then closing and sealing the carton. As indicated above, the corner cushions **14** will firmly and resiliently support the cabinet in a substantially suspended position within the carton, so that it is completely protected from damage.

A number of the corner cushions **14** can be formed in a long length, for ease in shipping and/or storing them, as illustrated in FIGS. 7 and 8. Each of the individual corner cushions **14** are affixed to one another by a severable member which can be, for example, a tip sprue **34**, at the points **19** and **24**, as illustrated in FIG. 7, or by a web sprue **36**, as illustrated in FIG. 11. The tip sprue **34** and the web sprue **36** are formed by not completely cutting or severing the individual corner cushions during the cutting operation, as explained below, and are of sufficient strength to hold the corner cushions together. The sprues can thereafter be easily broken, however, by pulling and/or twisting the corner cushions, to remove individual ones of the corner cushions for use, as desired.

In FIGS. 9 and 10, there is illustrated one manner in which the faces **16–18** can be formed on one corner cushion **14** and the faces **21–23** simultaneously formed in another corner cushion **14**, using a V-shaped wire **38**, best seen in FIG. 10. The wire **38** is electrically heated and then simultaneously lowered and moved forward, generally along the path defined by the arrows **40**, until its tip **42** extends through approximately ½ the thickness of a length of the cylindrical-shaped material. Its direction of travel is then reversed so that the wire moves generally along the path defined by the arrows **44**.

The two legs **46** and **48** of the wire **38** move in parallel planes as they traverse the path defined by the arrows **40** and cut, by melting the material, the face **16** on one corner cushion and the face **21** on another corner cushion. When the direction of travel of the wire **38** is reversed, the two legs **46** and **48** still move in parallel planes, along the path defined by the arrows **44**, however, as can be seen in FIG. 10, being angularly disposed at a right angle to one another, the legs cut the respective faces **17** and **18**. The faces **21–23**, of course, also are simultaneously cut in the material. Accordingly, by using two wires **38** and moving them both in the same above-described fashion, one and one-half corner cushions **14** can be formed. Correspondingly, three wires **38** will form two corner cushions, four wires will form three corner cushions, and so on.

In FIGS. 12 and 13, there are shown two additional methods for cutting the corner cushions **14** using three V-shaped wires **50–52** and three heated or saw blades **54–56**, respectively. Each of the wires **50–52** is positioned and advanced into the material, to cut one of the faces **16–18** on one corner cushion (and simultaneously one of the faces **21–23** on another corner cushion). The heated or saw blades **54–56** each are substantially V-shaped and, if of the saw type, have serrated cutting edges **57** and **58** on them. These blades **54–56** are likewise positioned and advanced into the material, to cut respective ones of the faces **16–18** (and **21–23**). If saw-type blades **54–56** are used, they preferably are oscillated while being advanced into the material, so as to have more effective cutting action.

The tip sprue **34** between the individual ones of the corner cushions **14** can be provided, by using three V-shaped wires, each having the tip thereof reversely bent so as to project rearwardly between the two legs thereof, as illustrated by the dotted lines **65** in FIG. 12. The wires are extended, tip first, into the material generally in the manner described above. The wires can be moved into and out of the material, either one at a time or simultaneously. The corner cushions are not completely severed, as before, however, since the reversely bent tips **65**

thereof do not intersect. Accordingly, a small, generally cylindrical-shaped tip sprue **34** is left between each of the individual ones of the corner cushions.

The web sprues **36** can be provided between the individual ones of the corner cushions **14**, by moving the three hot wires **50–51** or the three heated or saw blades **54–56** into the material, until the adjacent edges of the respective ones of them are spaced approximately ⅛ to ¼ inch apart. In other words, the cutting edges of the wires, or the blades, are not overlapped or abutted so that the corner cushions are not completely severed, but are joined together with the narrow-in-width web sprues **36**.

In FIGS. 14–17, cutting apparatus **69** including a number of V-shaped wires **60–63** which can be used to cut three complete corner cushions is illustrated. The cutting apparatus **69** includes a box-like frame **64** which is open at both ends and along its top. A generally rectangular-shaped support block **66** having a substantially semi-circular shaped groove **68** in its top wall **70** is affixed to the bottom wall **72** of the frame **64**, centrally between its side walls **74** and **76**. Affixed to each of the side walls **74** and **76** are two pairs of tracks **78**, each having a guide slot **80** therein. These tracks **78** are of a right angle construction and are disposed so that the one leg **81** thereof is at an angle of approximately 55° from the top wall of the frame **64**, with the right angled tip thereof projecting towards the right end (as illustrated) of the frame. The other leg **82** of each of the tracks **78** is disposed at an angle of approximately 35° from the bottom wall of the frame.

The above-defined angular relationship of the legs **81** and **82** of the tracks **78** is preferred, however, other angular relationships also can be used to vary the thickness of the side walls of the corner cushions, as explained more fully below. In any case, however, the tracks **78** must form right angles.

A cutting head **84** having a pair of side walls **85** and **86** which are held in parallel spaced relation by end bars **88** is mounted between the side walls **74** and **76** of the frame **64**. The cutting head **84** has a pair of guide pins **90** (FIG. 20) affixed to each of its side walls **85** and **86** which are slidably received within the guide slots **80** in respective ones of the tracks **78**, so that the cutting head **84** can be moved downward within the frame **64**, along the path defined by the guide slots **80** in the tracks **78**.

The V-shaped wires **60–63** (four wires are illustrated, however, a greater or lesser number of them can be used) are affixed between the side walls **85** and **86** of the cutting head **84**, by means of wire retaining blocks **92**. These wires **60–63** each are disposed so the legs **94** and **95** (FIG. 16) thereof extend downwardly at an angle of approximately 55° with respect to the top wall of the frame **64**, and with the pointed tips **96** thereof projecting toward the right end (as illustrated) of the frame, as can be best seen in FIG. 15.

The wires **60–63** function as electrical resistive heating element and each is coupled to a source of electrical power (not shown), by means of a pair of conductors **98** and **99**. The wires **60–63** are heated sufficiently to melt the foamed polyethylene, preferably at a temperature within the range of 600° to 900° F. so that a relatively fast, effective cutting speed which can be easily controlled can be used. Also, clean, relatively smooth surfaces on the faces of the corner cushions are provided.

In operation, the wires **60–63** are coupled to the source of power to heat them. A length of the cylindrical-shaped polyethylene material is placed within the cutting apparatus **69** and supported within the groove **68** in the support block **66**. The cutting head **84** next is moved downwardly and forwardly, along the path defined by the slot **80** in the leg **81** of the track **78**. The wires **60–63** are thereby caused to engage and cut into (or melt) the polyethylene, to simultaneously cut the faces **16** and **21** on four corner cushions.

When the guide pins **90** reach the end of the slots **80** in the legs **81**, the cutting head **84** and hence the wires **60–63** are caused to move backwardly and downwardly, by the slots **80** in the legs **82** of the tracks **78**. During this movement, the faces **17**, **18** and **22**, **23** are simultaneously formed on four corner cushions. Three complete corner cushions are formed and can be removed from the cutting apparatus **69**. The length of polyethylene material is then positionally advanced, to form additional corner cushions.

It is apparent that additional corner cushions can be simultaneously formed, by providing additional cutting wires. Also, the cutting apparatus can be easily automated, for fast, efficient operation so that the corner cushions can be easily and quickly formed.

If the corner cushions are to be formed in a continuous length of connected ones of the corner cushions, wires having the tips thereof appropriately formed, in the manner described above, are used. Also, additional cutting heads are provided, and adapted to be moved in the described fashion, to provide a severable member such as the tip sprues **34** or the web sprues **36** between the corner cushions.

As indicated above, the corner cushions **14** are preferably fabricated of foamed polyethylene since this material exhibits superior elastic memory and is sufficiently strong but yet resilient to withstand severe punishment and use. The corner cushions also can be cut from material which has a polygonal shape such as triangular or hexagonal so that the body portions **15** are correspondingly shaped. These shapes also can be easily extruded and have certain advantages over the cylindrical-shaped material. For example, there is some savings in material in using the triangular-shaped material and both of these shapes can be more easily and compactly packaged together for shipping and/or storage. This latter feature is particularly desirable when the corner cushions are formed connected together in long lengths.

The angular relationship of the tracks **78** within the cutting apparatus **69**, as indicated above, can be varied to vary the thickness of the side walls of the corner cushions **14**. For example, by having the legs **81** at a more acute angle, that is, nearly vertical, the thickness of the side wall between the faces **16** and **21** will be far more thick than the thickness of the side walls between the respective pairs of faces **17**, **22** and **18**, **23**. By varying the thickness of the side walls in this fashion, greater spacing can be provided between the object and the carton, along the thicker face. As indicated, however, the legs **81** of the tracks **78** must be disposed at right angles to the legs **82**, so that the faces **16–18** and **21–23** are properly spaced to form outside and inside corners, respectively.

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 construction and 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 corner cushion for protectively packaging articles having corners, in cartons for shipping and/or storing them, said corner cushions having a body portion cut from a length of substantially resilient sturdy material of a predetermined geometrical cross-section in a fashion such as to form three faces on one end thereof which

are substantially equally radially spaced about its periphery and taper to a point at the central axis thereof, the respective intersecting edges of said faces being disposed at right angles to one another and at the other end thereof an interior cavity formed by three faces which are substantially equally radially displaced and taper to a point at the central axis of said body portion, the respective intersecting edges of said faces being disposed at right angles to one another.

2. The corner cushion of claim 1, wherein said body portion is cut from a length of solid cylindrical-shaped material having a circular-shaped cross-section.

3. The corner cushion of claim 1, wherein said body portion is cut from a substantially continuous length of extruded material having a circular-shaped cross-section.

4. The corner cushions of claim 1, being formed of a foamed polyethylene material.

5. The corner cushions of claim 4, wherein said foamed polyethylene material has a density within a range of 1.8 to 2.6 pounds per cubic foot.

6. The corner cushions of claim 1 wherein one of said faces at each end of said body portion is angularly disposed at approximately 55° and the intersecting edge between the other two of said faces at each end of said body portion each is angularly disposed at approximately 35°.



7. The corner cushions of claim 3, having a severable member thereon by which said corner cushion is connected to another like corner cushion, whereby a long length of connected ones of the corner cushions can be formed for convenient shipping and storage.

8. The corner cushions of claim 7, wherein said severable member comprises a tip sprue connected between the point at the one end of one of said corner cushions and the point within the interior cavity in another one of said corner cushions.

9. The corner cushions of claim 7, wherein said severable member comprises a web sprue connected between two corner cushions, at the respective intersecting edges of said faces on the pointed end of one corner cushion and forming the interior cavity on the other corner cushion.

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