

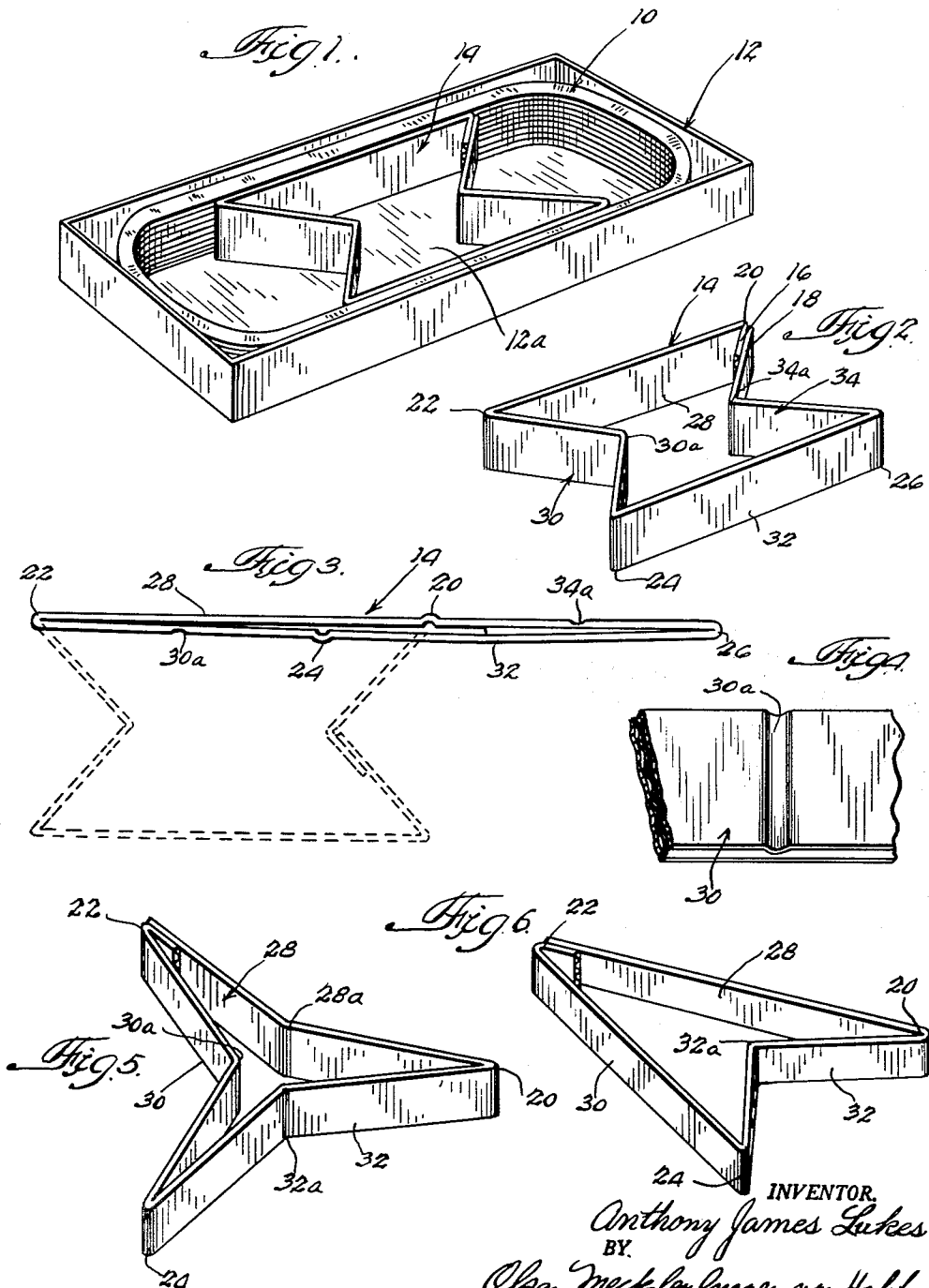
Nov. 22, 1960

A. J. LUKES
REINFORCING ELEMENT

2,961,141

Filed March 25, 1959

2 Sheets-Sheet 1



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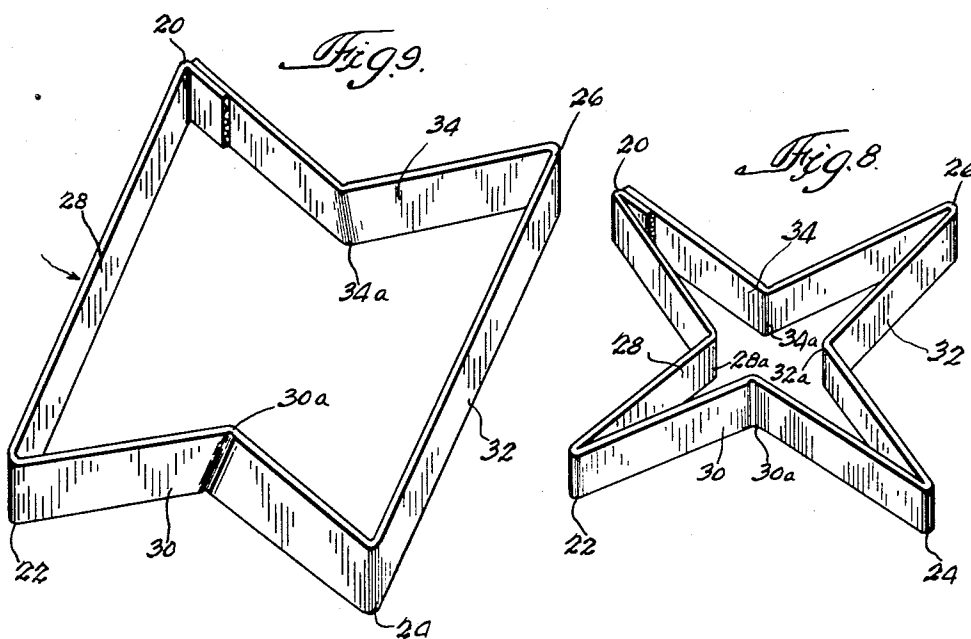
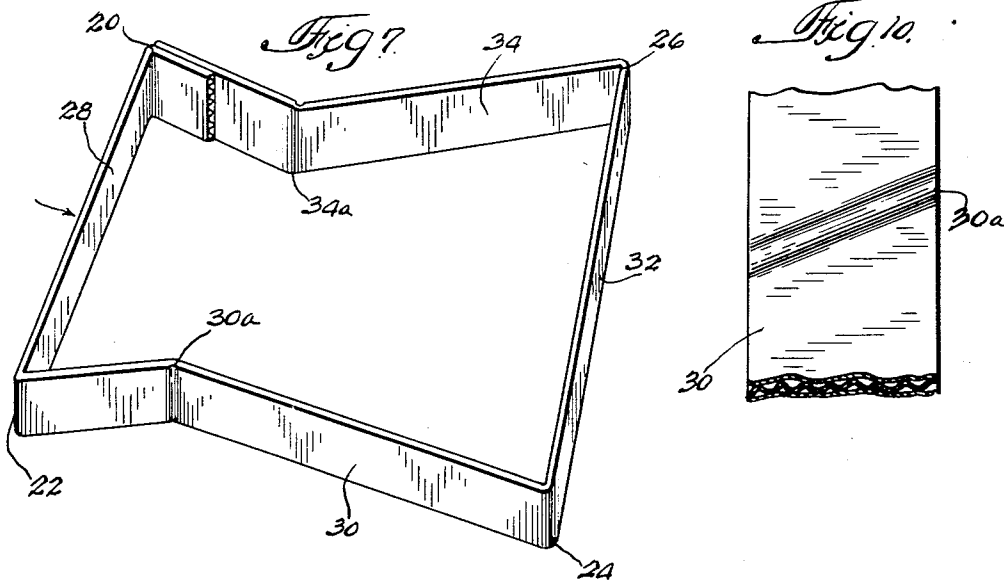
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REINFORCING ELEMENT

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1 Claim. (Cl. 229—14)

This invention relates to a reinforcing element and more particularly to a device for maintaining a plurality of similarly constructed articles in coincidental stacked relationship within a receptacle, the volume capacity of the receptacle being substantially greater than the volume of the stacked articles. This invention may also be utilized to maintain the central configuration of an individual hollow article.

Although this invention may be described herein for use with a plurality of resilient peripheral gaskets, it is to be understood that the invention is not limited to such use but may be advantageously used with articles having a wide variety of shapes and packaging characteristics.

In packaging resilient peripheral gaskets for shipment, difficulty has heretofore been encountered in maintaining the coincident stacked relationship thereof. This difficulty is attributable to the lack of central supporting structure in the article. Although the box or receptacle in which the gaskets are packaged may quite satisfactorily conform to the exterior dimensions of the gasket, the latter, by virtue of their configuration and material, are resilient, pliable, and easily deformed. Unless the gaskets in some way are properly maintained in position, damage thereto during shipping is common.

Various attempts have been made to reinforce the center of the gasket during shipment. None have proved successful or desirable. One such reinforcing method which has been practiced is the taping of the stacked gaskets together along their sides. This procedure, however, is awkward, time-consuming, and somewhat expensive. It does not readily lend itself to mass production and rapid, assembly line techniques. In addition, once the tape is broken to remove one of the gaskets, the remaining gaskets are free to deform and entangle in the box, with the substantial possibility of ultimate damage to one or more of these gaskets. As a result, gaskets which have been packed in this manner often may be removed from their shipping receptacle by the user and placed on a permanent rack which is capable of maintaining the proper stacking and arrangement.

It is, therefore, one object of this invention to provide a reinforcing element which is resilient and which will firmly support the stack of gaskets to maintain the coincident relationship thereof during shipping.

It is another object of this invention to provide a resilient reinforcing element which may be utilized to maintain the ordered relationship of stacked gaskets even after one or more of the gaskets has been removed from the original shipping container.

It is a further object of this invention to provide a resilient reinforcing element which is capable of assuming a number of varied configurations.

It is still another object of this invention to provide a resilient reinforcing element which is entirely preassembled and does not have to be attached to the receptacle with which it is used.

It is still a further object of this invention to provide a neat, versatile and resilient reinforcing element which

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is capable of assuming a number of varied configurations and which may be quickly and easily employed.

It is another object of this invention to provide a resilient, versatile reinforcing element which may be stored in a flatly collapsed form and which may be expanded into any one of a number of varied configurations.

Other objects may be seen, and a fuller understanding of the invention may be had by referring to the following description and claims taken in conjunction with the accompanying drawings.

The device constructed in accordance with this invention is particularly useful or resiliently retaining the predetermined shape of the pliable interior surface of a gasket or other such article which is packed by itself or with other similarly constructed articles in a receptacle or shipping container. According to one embodiment of this invention, this device comprises a plurality of elongated sections formed of corrugated board material. The corrugations of each section extend substantially longitudinally in each section and the end limits of the sections are interconnected to form a polygon of predetermined configuration. At least one of the sections is scored along an axis intermediate the end limits of the section and angularly disposed relative to the longitudinal axis of the section. This section is thus resiliently foldable about this intermediate axis. The dimensions of the polygon thus formed are such that the device may be operatively positioned with respect to the receptacle and the element or elements being reinforced only when said one section is in resilient folded and slightly compressed condition.

It is preferred that two of the end-limit connections occur at diametrically opposite points of the polygon so that the device may be folded flatly for storage. In such a flatly folded condition, the device occupies very little space and, therefore, a great many devices may be preformed and stored until ready for use, whereupon they may be easily expanded and placed in position. This permits the preformed device to be used with great advantage in mass production on a rapidly moving assembly line.

In the drawings, in which like parts are given like identifying numbers:

Fig. 1 is a perspective view of a device constructed in accordance with this invention, showing the relationship between this device, the stacked articles, and the shipping container;

Fig. 2 is a perspective view of the device removed from the container and stacked articles;

Fig. 3 is a plan view of the device collapsed for storage and illustrates in dotted lines the manner in which the device may be expanded for use as shown in Fig. 1;

Fig. 4 is an enlarged perspective view of a portion of the device illustrating the manner in which the sections may be scored to facilitate transverse folding;

Fig. 5 is a perspective view of the device illustrating a modified configuration into which it may be formed;

Fig. 6 is a view of another configuration which may be formed with the device;

Fig. 7 is still another configuration which may be formed with the device;

Fig. 8 illustrates a further configuration which may be formed with the device;

Fig. 9 is a perspective view of the device constructed in accordance with this invention, illustrating a modified manner of folding; and

Fig. 10 is an enlarged view of a portion of the device illustrated in Fig. 9, showing the manner in which the sections are scored to facilitate transverse folding.

With more particular reference to Fig. 1, a plurality of annular peripheral gaskets 10 are shown arranged in coincidental stacked relationship within a box-like container,

or receptacle 12. These gaskets may be of any one of a number of different sizes and shapes. In most instances, these gaskets will conform satisfactorily to the container in which they are placed; that is, the interior dimensions of the container will generally be the same as the exterior dimensions of the article, but the shapes of the two may differ. Even a circular gasket will be engaged on four points along its periphery by the container in which the gasket is shipped. In the illustration, elliptical gaskets 10 are engaged along a substantial portion of their periphery by the walls of container 12. Inasmuch as the gaskets have no central supporting structure and inasmuch as these gaskets must necessarily be constructed of a resilient pliable material, they are very difficult to maintain in their stacked coincident relationship. This is particularly true during the shipment of these articles when the container is often subjected to much abuse. The reinforcing element 14 constructed in accordance with this invention is adapted to engage the interior portions of gaskets 10 and to resiliently reinforce the gasket structure, thereby maintaining the coincident stacking thereof.

Reinforcing element 14 is preferably constructed of an elongate strip of double faced fiberboard having a corrugated or ribbed interlay. The end portions 16 and 18 of the reinforcing element are lapped and adhesively joined. Between end portions 16 and 18, the fiberboard strip is transversely scored or the longitudinal ribbing thereof is otherwise interrupted to facilitate the folding thereof to form the corners of a polygon.

In the embodiment illustrated in Figures 1, 2 and 3, reinforcing element 14 is folded transversely in four places, 20, 22, 24 and 26, to form a rectangle having side sections 28, 30, 32 and 34. Although the sections of the illustrated polygon are integral and part of a single elongate strip, as previously indicated, it is evident that separate sections may be interconnected at their end limits to form the desired polygon. The corrugations in each section, 28, 30, 32 and 34, extend substantially parallel to the longitudinal axis of the section.

At least one of the sections is scored between its terminal ends along a transverse line. In the embodiment illustrated in Figures 1, 2 and 3, section 30 is centrally scored or the longitudinal ribbing is otherwise interrupted along transverse line 30a to provide a guide along which the section may be folded. Section 34, which is diametrically opposite section 30, is also provided with a scored guide or fold line 34a intermediate its terminal ends. Guide lines 30a and 34a are centrally disposed across their respective sections and lie perpendicular to the longitudinal axis of their respective sections.

As may be seen in Figure 4, the scoring is accomplished by impressing a channel into only one face or lamination of the fiberboard to slightly compress and interrupt the longitudinally extending corrugated interlay or ribbing in that section. The longitudinal ribbing and the opposite face or lamination, the latter being unscored, resist bending of the material in a transverse direction. The scoring assures that the corrugated board may be folded along a predetermined line transverse to the corrugations. This forms a line of weakness across the corrugations and, when a bending force is applied to the section, bending will occur only along this line. If there were no scoring, it would be quite difficult to accurately fold the material along the desired line.

When the sections 30 and 34 are folded inwardly about their transverse intermediate guide lines 30a and 34a, a configuration such as illustrated in the Figures 1 and 2 is formed. In these figures, the reinforcing element is somewhat compressed and is exerting a resistive force transverse to the planes of sections 28 and 32. This resistive force is principally due to the intermediate folding of sections 30 and 34. It will be understood that when corrugated fiberboard is scored and folded transversely with respect to the corrugations, the material offers a resilient resistance to this folding due to the plac-

ing of certain portions of the material under tension while placing certain other portions of the material under compression. Inasmuch as the two facing layers of the fiberboard are separated by a corrugated interlay, whenever the material is transversely folded, the exterior surface and the interior surface are respectively placed under tension and compression. The amount of tension and compression is determined and substantially augmented by the spacing between the two faces as a result of the corrugated interlay. The corrugated interlay also resiliently resists the tendency of the two faces to move toward each other in the areas adjacent the transverse fold. Thus, when the reinforcing element is folded and compressed, it exerts a substantial resistive force. This resistive force is sufficient to, for example, maintain the peripheral gaskets 10 in their stacked coincidental relationship during shipping and during such time as the gaskets are being separately unstacked.

As illustrated in Figure 1, one longitudinal edge of each of the polygon sections contacts and rests upon the bottom or base 12a of receptacle 12, and the sections extend upright from base 12a such that the other longitudinal edge of each section is substantially flush with the top edges of the receptacle. Thus, when the receptacle is closed by applying a top cover (not shown), the element 14 will reinforce the top and bottom panels of the closed receptacle. This feature is also very important, for when a plurality of these receptacles are stacked as they often are during shipment and storage, there must be a uniform support over the entire top and bottom surfaces of each box. The gaskets by virtue of their shape and material cannot supply this firm uniform support.

As may be seen in Figure 3, reinforcing element 14 may be initially folded flat. This permits a number of the reinforcing elements to be preformed and prefabricated, for after they are formed, they may be easily stored until ready for use. Thereafter, when the device is needed for packing an article or articles, it may be removed from its storage container, expanded, partially compressed, and inserted in place. No assembly is necessary and no delay is encountered. In order to achieve the flat folding characteristic, folds are provided at diametrically opposite points of the polygon. In the illustrated embodiment, the element is folded flatly at corner connections 22 and 26 as illustrated in Figure 3, and in this condition may be easily stored and occupies very little space. The flattened element may be expanded, as shown in dotted lines in Figure 3, into its stressed condition, whereupon it is ready for insertion centrally in the stack of gaskets. The folding of the element into its flattened state, as shown in Figure 3, about connections 22 and 26 may render these connections somewhat less resistive to the compressive forces which it may encounter in service. It is therefore preferred that none of the other folds be compressed or tightly (obliquely) folded until the device is ready for use, although such prestressing will not render the device useless nor under most circumstances will it materially detract from its effectiveness in providing reinforcement. The springiness is, however, greater in the material if it has not been previously overstressed.

A number of other polygonal configurations may be formed with the reinforcing element constructed in accordance with this invention. In each of these alternative shapes, at least one of the sections forming the polygon is folded intermediate its end limits about a transverse axis. Thus, in every case, the resistance to stressing or compressing is attributable to the resistance of at least three folds, the two folds which connect one of the sections to its adjacent sections and the intermediate fold in that section. In the case of the embodiment illustrated in Figures 1, 2 and 3, the compressive resistance is contributed by the resistance to folding in corner connections 22 and 24 as well as intermediate fold 30a in section 30. This resistance is also balanced and aided on the opposite side of the polygon by the resistance

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of the material to be folded at corner connections 20 and 26 as well as along intermediate fold line 34a in section 34.

In Figure 5, the polygon formed is a triangle having three sides, 28, 30 and 32, connected at corner folds 20, 22 and 24. The sides are folded about intermediate transverse axes, 28a, 30a and 32a, respectively. Thus, the compression of the polygon illustrated in Figure 5 is resisted by the aforementioned corner folds 20, 22 and 24, as well as intermediate folds 28a, 30a and 32a. The polygon is initially flatly folded for storage about corner fold 22 and intermediate fold 32a. Thus, these two folds will be prestressed, although fold 32 will be prestressed outwardly in the opposite direction, which should not adversely affect its compressive resistance in the expanded configuration.

Figure 6 is another configuration into which the element may be formed. This configuration is also a triangle having sides 28, 30 and 32, and corner fold connections 20, 22 and 24. In this case, only section 32 is folded transversely intermediate its terminal ends about axis 32a. This configuration is also initially flattened for storage, the outward folds being at 22 and along axis 32a. The outward folding of section 32 about axis 32a should not adversely affect to a marked degree the compressive resistance of fold 32a when section 32 is folded inwardly for use.

In Figure 7, another modified form, or polygon, is illustrated. This polygon is a trapezoid having a top section 28, a bottom section 32, and side sections 30 and 34. These sections are connected at their end limits to form corner folds 20, 22, 24 and 26. Side sections 30 and 34 are folded inwardly about transverse axes 30a and 34a, respectively, intermediate their end limits. One significant difference between the device formed in Figure 7 and the device illustrated in Figure 2 is that in the latter the intermediate folds 30a and 34a are not centrally disposed across their respective sections 30 and 34 but rather are disposed closer to section 28. It is evident, therefore, that not only will there be compressive resistance through the corner connections and intermediate folds but, also, this compressive resistance will be transmitted to section 28 by virtue of the off-center disposition of intermediate axes 30a and 34a. By way of illustration, if a compressive force is applied perpendicular to the plane of section 28, in the direction indicated by the arrow, the polygon will tend to fold inwardly about intermediate folds 30a and 34a. It is apparent, though, that this force will have less effect in folding the polygon about corner folds 24 and 26, inasmuch as the portions of sections 30 and 34 between base section 32 and intermediate folds 30a and 34a, respectively, are practically in line with the force being applied; i.e., the angle at corner 24 and corner 26 is very large, and the resistance met in this instance is a resistance to axial compression in those portions of sections 30 and 34 adjacent base section 32. This greatly augments the folding resistance offered to the applied compressive force by the corner and intermediate folds.

In Figure 8, the original configuration formed by the element is a square or rectangle having sides 28, 30, 32 and 34, and being connected and hinged along corner folds 20, 22, 24 and 26. The major difference between this configuration and the configuration illustrated in Figures 1, 2 and 3 is that all four of the side sections are scored and centrally folded transversely on lines 28a, 30a, 32a and 34a.

Figure 9 illustrates an alternative method of folding which greatly increases the compressive resistance of the expanded element. The illustrated element is a rectangle having side sections 28, 30, 32 and 34, which side sections

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are interconnected at their end points to form corner folds 20, 22, 24 and 26. As in the case of the configuration illustrated in Figures 1, 2 and 3, side sections 30 and 34 are transversely scored and foldable about a central axis. It is to be noted, however, that the scoring in each of the two sections is not perpendicular to the longitudinal axis of the section but, rather, is obliquely disposed or canted with respect thereto. Also, it is to be noted that the two axes are skew and disposed obliquely with respect to each other. Thus, a compressive force acting perpendicular to the plane of section 28, in the direction of the arrow, will cause folding of the polygon somewhat as described in connection with Figure 2. However, intermediate fold axis 30a is not parallel with corner-connecting folds 22 and 24, and central fold 34a is not parallel to corner-connecting folds 20 and 26. It is therefore apparent that a substantial resistance to the inward folding of side sections 30 and 34 is encountered, for the sections cannot be folded in this manner without some resilient deformation occurring at one or more of the folds. The resistance of the corrugated fiberboard to such resilient deformation increases the compressive resistance of the polygon.

In Figure 10, the method of scoring the two side sections is shown. This scoring is similar to the scoring described in connection with Figure 4, but rather than extending perpendicular to the axis of the section, it is disposed at some other transverse angle. It will be understood that this angular scoring may be utilized in each of the configurations previously described wherein the intermediate fold lines were perpendicular to the longitudinal axis of the section.

It may be seen that a reinforcing structure constructed in accordance with this invention is resilient, neat, and easily used. The device is capable of assuming a number of varied configurations and is collapsible for easy storage.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

I claim:

A package comprising a boxlike container, a plurality of pliable elements arranged in stacked substantially coincident relation within said container, each of said elements being of an endless continuous loop of predetermined configuration, said stacked elements being in contact with side walls of said container, and expander means positioned within the loop of said stacked elements; said means including an elongated flat strip of resilient bendable material, the ends of said strip being interconnected, said strip having a width substantially the height of said stacked elements and having at least four transverse fold lines defining a polygonal configuration having inner and outer folds, said means being collapsed under stress and positioned within the stack of elements and resiliently contacting substantially opposed inner surfaces of said stacked elements whereby said stacked elements are held in substantially coincident relation within said container.

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