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PAPER WRAPPING HAVING STRETCHABLE INSERT

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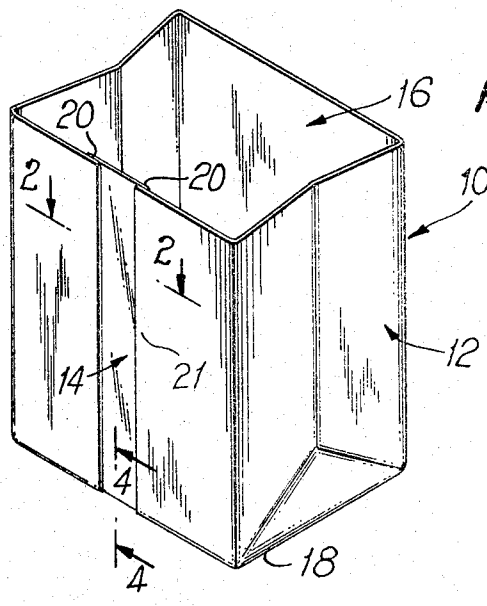


FIG. 1

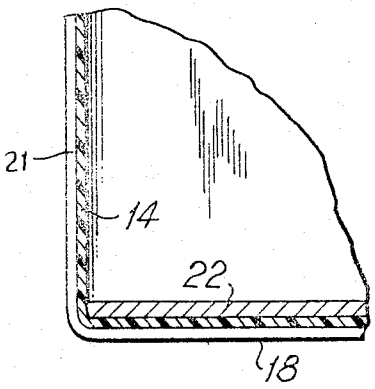


FIG. 4

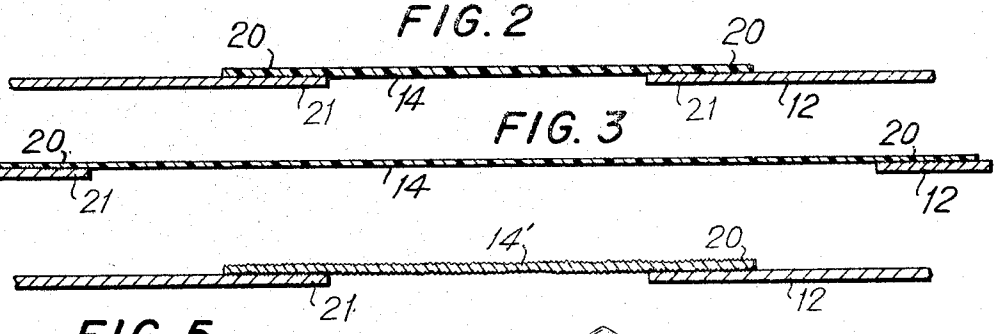


FIG. 2

FIG. 3

FIG. 5

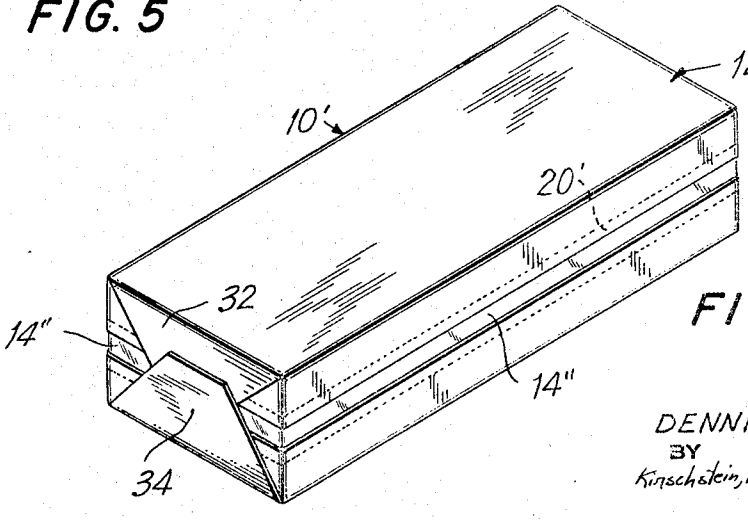


FIG. 6

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PAPER WRAPPING HAVING STRETCHABLE INSERT

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This invention relates to a paper wrapping having a stretchable insert running lengthwise of the wrapping. The term "wrapping" as used herein will denominate a tube or bag.

It is the primary object of my invention to provide a paper wrapping having a stretchable insert whereby the wrapping will distend under excessive tensile pressure.

It is another object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein the insert will expand transversely when excessive strain is applied to the wrapping so that bursting of the wrapping is prevented as would be the case if the stretchable insert were not present.

It is another object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein the wrapping has the configuration of a paper bag with the stretchable insert running between the mouth and bottom of the bag, so that when such a bag is loaded, handled, stacked, shipped or stored, the shocks, strain and tension naturally imparted to said bag in the course of such actions will be absorbed by the "give" of the insert whereby tears and rents in the bag are prevented.

It is a further object of my invention to provide a paper wrapping having a stretchable insert, of the character described, particularly suited for use in automated machine packaging of goods whereby excessive force applied to the wrapping for example in forming the wrapping into a desired shape for the goods, in ensheathing the goods with the wrapping, or in opening the wrapping to receive the goods, causes distension of the stretchable insert and thereby prevents or deters failure of the wrapping.

It is an ancilliary object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein said insert has the additional characteristic of elasticity so that after the insert has yielded to absorb excessive strain applied to the wrapping and then said strain is removed, the paper wrapping will spring back into or towards its original configuration.

It is yet another object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein the insert is elastic so that the wrapping can snugly receive objects whose dimensions are slightly larger than those of the unstretched wrapping.

It is still another object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein the insert comprises only a comparatively small portion of the wall of the wrapping so that the inherent desirable characteristics of the wrapping such as its good tensile strength, low cost, conformability, light weight, and ability to be stored in folded condition are not affected while the extendability of the insert enables the wrapping to perform its intended containing function in an improved manner.

It is a further object of my invention to provide a paper wrapping having a stretchable insert, of the character described, wherein the wrapping with said insert is of simple configuration which can be manufactured by mass-production methods in a speedy and efficient manner at an economical cost.

In accordance with the teaching of my invention, I provide a paper wrapping having a stretchable insert which distends to absorb excessive suddenly or gradually applied forces bearing on the wrapping when the wrapping is being utilized in the packaging of commodities, or subsequently when the wrapping is enclosing commodities and is being handled, stored or transported. I have found that during the utilization of conventional paper wrappings, excessive tensile force applied to the wrappings causes rents or tears therein which render the wrappings useless. The aforesaid excessive pressure is usually of a transitory nature in the form of a sudden impact or shock to the wrapping, which causes said wrapping to burst and fail. For example, when a wrapping in the form of an open-mouthed paper bag is being rapidly loaded with bulky articles, the articles may strike the wall of the bag or in association with articles already in the bag distort the wall of the bag so as to generate an excessively high though only momentary tensile force which leads to failure of the bag. The same may happen when the wrapping is quickly loaded with granular or powdered materials, wherein the sudden pressure of a large load of said material may cause excessive strain on the wrapping.

In another example, in automated high speed packaging machinery wherein inserting and spreading jaws spread the mouth of a paper wrapping open to receive goods which are to be placed therein, the spreading movement of the jaws beyond intended limits due to play or wear in the machinery may impact and tear the wrapping. The same problem arises when the contents of a wrapping shift in transit or during handling, or when external force is applied to the wrapping as when the wrappings, with commodities therein, are piled in stacks. In the foregoing instances, some measure of yieldability in a wall of a wrapping would permit the same to expand in a direction parallel to the direction of applied tensile pressure in order to absorb any impact without splitting the wrapping.

Notwithstanding the desirability of adding the characteristic of yieldability in response to applied shock or impact to a paper wrapping, said characteristic must not interfere with the normal containing function of the wrapper. That is, if an entire wrapping were formed from a more yieldable material, said wrapping would unduly stretch, distort and sag whenever the weight of its contents bore on the wall of the wrapping. Also, to form a wrapping entirely out of a yieldable materal which would have most of the desirable characteristics of conventional wrapping would unduly raise the cost of the wrapping and price such an article out of the competitive market.

To add yieldability in response to shock and impact to the wrapping while yet preserving the conventional characteristics of paper wrapping, I provide the mentioned stretchable insert for the wrapping. The insert is linear and elongated, that is, long as compared to its width and is formed from imperforate sheet material. The insert is oriented with respect to the wrapping with its length in a direction generally perpendicular to the circumferential i.e., girthwise direction in which the excessive tensile force will usually be applied. Generally, the excessive force will be applied circumferentially of the wrapping so that the insert will run between the end walls, i.e. the mouth and bottom of the wrapping. The insert may terminate at said end walls or may continue part way across one or both end walls.

In order that the conventional characteristics of the paper wrapping be preserved, the insert comprises a strip, i.e. a relatively small elongated portion of the wall of the wrapping in which it is located and preferably less than 35% but at least 5% of the width of said wall of the wrapping. Said insert is formed from flexible imperforate sheeting significantly more yieldable than the paper or other material from which the remainder of the wrapping is made. The material of the strip is yieldable in at least

a girthwise direction of the wrapping and preferably is yieldable bidirectionally, i.e. parallel and perpendicular to the length of the strip. In other words, in its preferred form, the strip has a biaxial or two-way stretch. The strip is made an integral part of the wall of the wrapping by having its edge margins firmly secured to adjacent borders of the wrapping, and the strip is desirably located at the seam in the wrapping.

In yet another aspect of my invention, I provide a paper wrapping including an insert which is elastic as well as yieldable in order that after it has stretched due to impact or shock, said insert is biassed back to its contracted position of repose. This may be desirable from the standpoint of attractiveness of the appearance of the wrapping when it encloses goods. Moreover it enables the wrapping to snugly ensheath its contents. The elasticity of an insert integral with the wrapping will maintain a snug fit even when the goods slightly vary in their relevant dimensions.

Other objects of my invention will in part be obvious and in part will be pointed out hereinafter.

My invention accordingly consists in the features of construction, combination of parts and arrangement of components which will be exemplified in the paper wrappings hereinafter described and the scope of which will be indicated in the appended claim.

In the drawings in which various possible embodiments of my invention are illustrated,

FIG. 1 is a three quartered perspective view of a paper bag with a stretchable insert in accordance with the teaching of my invention,

FIGS. 2 and 3 are fragmentary sectional views of the wall of the bag containing the stretchable insert, taken substantially along the line **2—2** of FIG. 1 and showing said wall, respectively, in normal or repose condition and in a transversely extended condition;

FIG. 4 is a fragmentary sectional view of the bottom corner of the bag, taken substantially along the line **4—4** of FIG. 1;

FIG. 5 is a view similar to FIG. 2 but illustrating the insert formed from crepe paper; and

FIG. 6 is a three quartered perspective view of a paper tube with opposed stretchable inserts therein, the tube having its end walls overlapped to enclose commodities therein.

Referring now to the drawings, and, more particularly, to FIGS. 1–4, the reference numeral **10** designates a wrapping in the form of a paper bag constructed in accordance with my invention, the bag comprising a walled container **12** including as an integral part thereof an elongated linear stretchable insert **14**. The term "walled container" as used herein and in the claim is intended to denote in a very broad sense receptacles having the general characteristics of non-rigid open-mouthed paper containers (open-mouthed for insertion of goods although usually the mouths are closed after goods are inserted in the receptacles) of a variety of sizes, shapes, configurations and materials. The term encompasses such art-recognized types as heavy duty paper sacks, normal and light duty sacks, industrial bags and covers, and preformed bags including the flat, square, automatic, satchel, pouch style and contour-shaped types. Also included in the term are wraps and over-wraps, that is, flexible containers made from sheet stock and formed in place by automatic packaging machinery around the contours of a product or a primary package. My invention is most likely to find its best acceptance in the industrial and commercial packaging field.

The walled container can be formed from any lightweight, low-cost, flexible, strong-in-tension, non-stretchable material from which such containers are conventionally made. The term "non-stretchable" indicates an elongation by ASTM D 882 of not greater than 7%. The material is desirably chosen from the paper and textile classifications, and can be single, double or multiplied.

The material from which the container is formed can be plain, plastic lined, coated, impregnated or laminated and preferably is paper in the weight range of from 25 to 200 lbs., this being the weight of a ream of 24 in. by 36 in. sheets of the material, the same having a stretch of about 1½% to 3%. It is to be understood that the paper selected is conventional for any given size or use of the wrapping.

The type of walled container referred to finds particular use in the packaging of bulkly and hard-to-handle objects. The advantages of speed, economy and low weight in the use of these containers make them preferable over the more traditional alternatives of rigid containers or hand wrapping. Also, less storage space is necessary, and when appropriate loading machines are used, faster packing speeds are attained. The various uses include mattress bags for enclosing mattresses as well as inner and box springs, bags for compressible products as foam rubber cushions and pads, can bags for packaging empty metal or fibre cans, and bags for building materials including plywood sheets, wallboard and acoustical tiles. From the nature of the commodities to be enclosed by my wrapping, it is evident that severe shocks and impacts will be imparted to the wrapping during the loading, handling, storing and shipping thereof, imparting intense though primarily momentary stresses to the wrapping wall.

The stretchable insert **14** is, as has been mentioned, linear and elongated, having a width substantially less than its length. The insert is desirably oriented in a direction with respect to the wrapping so that stresses applied to the wrapping will assume a direction generally transverse to the length of the insert. Generally, the insert will be parallel to a dimension of the wrapping and will usually run lengthwise of the wrapping. That is to say, the insert generally lies in a direction perpendicular to the circumference, i.e. girth of the wrapping. In wrappings of the type illustrated in FIGS. 1–4 that are preformed with an open end or mouth **16** and have a rectangular closed end wall or bottom **18**, the insert is in the form of an elongated strip that bridges an elongated slot in the container and which runs between said mouth and bottom, generally perpendicular to the mouth. The effective length of the strip terminates on one end at the mouth and at the other end at the bottom, and said strip is of a substantially uniform width and cross-section. The effective width of the strip, that is, the width of the strip between linear zones of connection to the wall of the container **12** does not exceed 35% and is not less than 5% of the width of the wrapping wall in which it is located.

If the wrapping has a generally cylindrical configuration with a continuous single wall, each half of the wall may be considered "the wall in which the strip is located," for the purpose of determining the effective width of the strip.

The material from which the insert is formed is thin, flexible, tough, yieldable, imperforate film sheeting, having a high tear strength. The term "stretchable" used in reference to the insert means that the insert is significantly and measurably more elongatable without failure than the material from which the walled container **12** is made. Specifically, "stretchable" as used herein denotes an elongation of at least 60% by ASTM D 882 and with no upper limit. Materials with an elongation of as much as 600% are acceptable.

In the preferred form of my invention, the material is bidimensionally stretchable so that it can distend circumferentially, i.e. girthwise of the bag and also lengthwise of the insert. If the material is only stretchable in a single direction, the insert must be oriented so that its direction of stretch is circumferential of the bag. The insert can, for example, be made of crepe paper having

a stretch of 60% to 300% ASTM D 882. This type of crepe paper is known as "secondary" crepe in the paper field and the creping is performed during the paper making operation, after the paper is fully formed and dry. By means of known techniques, kraft papers of up to 80 lbs. cans be creped. Such papers may be creped to stretch in one or two directions.

The insert preferably is made of a synthetic resin, thermoplastic or theromsetting, in imperforate thin film sheeting having the properties of flexibility, yieldability of at least 60%, high impact strength and high tear strength. These include polyethylene with an elongation of from 60% to 600%, polypropylene with an elongation of from 200% to 500%, polyvinylchloride with an elongation of from 60% to 500% and rubber hydrochloride with an elongation of from 200% to 500%. Other desirable films with a minimum elongation of 60% ASTM D 882 can be selected from the charts of composite and noncomposite films, pp. 179–180, in the October 1964 issue of Modern Packaging.

It is appropriate at this point to mention that an insert width of less than 5% of the width of the wall in which the insert is located is deemed to provide a resultant yieldability which is insufficient for commercial usage even when the material utilized for the strip has a high percentage of yieldability. I believe this may be due in part to the small maximum stretch which can be obtained from such a narrow insert and partly due to the inability of such a narrow insert to absorb the energy of impact stresses to which the wrapping may be subjected.

On the other hand, where the insert width exceeds about 35% of the width of the wall in which it is located, the bag tends to be incapable of maintaining its own shape to a sufficient degree for proper utilization thereof, e.g. to be compatible with existing machine packing equipment.

A yieldability (stretchability) of less than 60% is commercially unsatisfactory due, I believe, to the inability of such materials to assimilate shock imposition of stress.

It is, therefore, my present belief that a wrapping having an effective width of at least 5% of the width of the wall in which it is located with a yieldability which at least includes a girthwise direction of stretch and with a yieldability of at least 60% is a minimum requirement necessary to practice my invention.

It is advantageous under many circumstances to utilize materials such as aforesaid which also are pellucid so that the contents of a filled wrapping can readily be seen.

The elongated margins of the side edges **20** of the yieldable strip **14** are secured to affiliated linear borders **21** of the slot in the walled container in any conventional manner resulting in a permanent connection. In the illustrated embodiment, the strip is disposed internally of a broad wall of the container where the overlapped seam normally would be located and its edges are overlapped by the borders of the slot in the container.

The strip can be secured to the paper by the use of an adhesive chosen from the vegetable, animal, or synthetic classes. The strip can also be heat sealed to the container, stitched to the container, or secured by the use of adhesive tape.

In FIGS. 1–4, my invention is illustrated in a rectangular reinforced-bottom "automatic" type paper bag **12**. The strip **14** as well as the broad wall of the container in which it forms an insert is folded underneath the paperboard floor **22** of the bag and then adhered to said floor. Said figures show by way of example a large industrial 80 lb. kraft bag intended to contain 18 two gallon empty paint cans. The bag is 2 ft. 8 in. in height and is 18 in. x 22 in. in its circumferential dimensions, the strip being disposed in the 22 in. wall. The effective width of the strip **14** in repose is 3 inches, the same being formed from polyethylene film of 2 mil thickness, seven inches in total width.

FIGS. 2 and 3 are cross-sections of the wall of the container in, respectively, reposed or unstretched condition and partially expanded condition.

FIG. 5 illustrates another embodiment of the invention wherein the strip **14** is formed from crepe paper.

Where the strip is formed from an elastic material, e.g. rubber hydrochloride, after shock has been absorbed by elongation of the strip, it will tend to resume its original repose condition. This is valuable where the outward apearance of the wrapping is important, wherein a snug fit is desired between the wrapping and its contents, and where repated tensile stresses are expected to be absorbed by the wrapping.

In FIG. 6, another embodiment **10'** of my paper wrapping is illustrated, this form being well adapted for use in automated packaging machinery. The wrapping here is shown as it appears after formation from flat sheet material about a rectangular box by an automated packing machine. Said wrapping at this time is in the configuration of a tube **12'** having two parallel like strips **14''**, each strip being integral with and comprising an insert in an opposed elongated side wall of the tube. The tube has closed end walls formed by tucking the side walls and overlapping and fastening the end flaps **32, 34.** Of course, the previously discussed specifications for the paper wrapping apply to this embodiment **10'** as well. It may be noted in passing that the strips **14''** continue around the edge of the tube and run across the end walls of the tube toward one another. Thereby, some limited yieldability is imparted to the end walls of the tube.

It should also be noted that, in general, by virtue of the ability of the stretchable insert to absorb shock, stress and impact, the strength of the remainder of the walled container may be lowered without a reduction in the over-all capability of the wrapping. This is because the strength of the walled container need only be sufficient to bear normal loads while the yieldable strip can absorb unusually high transient stresses. Therefore, through the use of the present invention, obvious economies can be effected without a reduction in the quality of the wrapping.

It thus will be seen that I have provided paper wrappings which achieve the several objects of my invention and which are well adapted to meet the conditions of practical use.

As various possible embodiments might be made of my above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matters herein described or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and useful and desire to secure by Letters Patent:

A paper bag for commodities such as mattresses, inner and box springs, metal and fiber cans, plywood sheets, wall board and acoustical tiles, said bag being adapted to absorb applied shock and impact without failure, said bag comprising:

(a) a ring of walls formed of non-stretchable flexible paper;

(b) said bag having an open mouth and a closed bottom;

(c) one wall having a slot therein running the entire length of the bag from the mouth to the bottom thereof, and

(d) an elongated linear stretchable insert formed from imperforate sheet material integral with the container, bridging the slot and running coincident with the slot;

(e) the width of the insert constituting between about 5% and about 35% of the width of the wall of the bag in which it is located;

(f) the insert being formed from a synthetic resin film having an elongation and direction of stretch

girthwise of the bag of from about 60% to about 600%.

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