

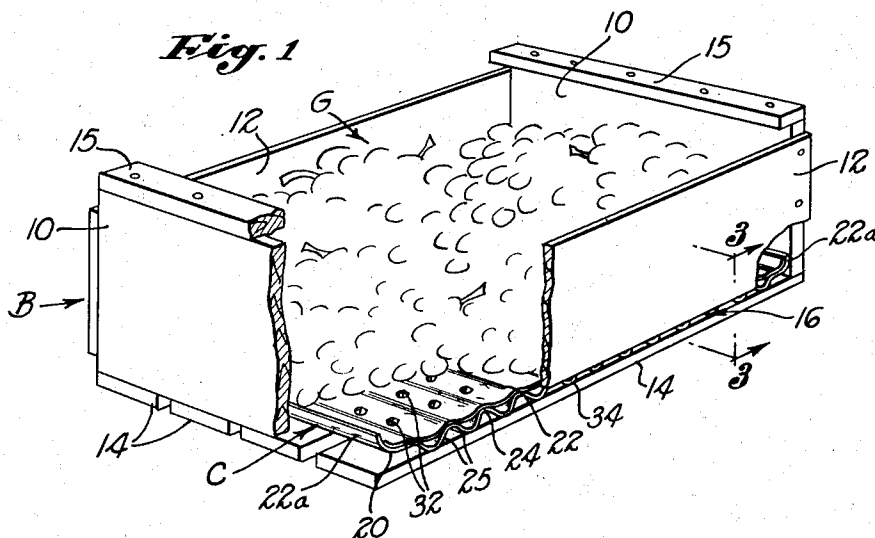
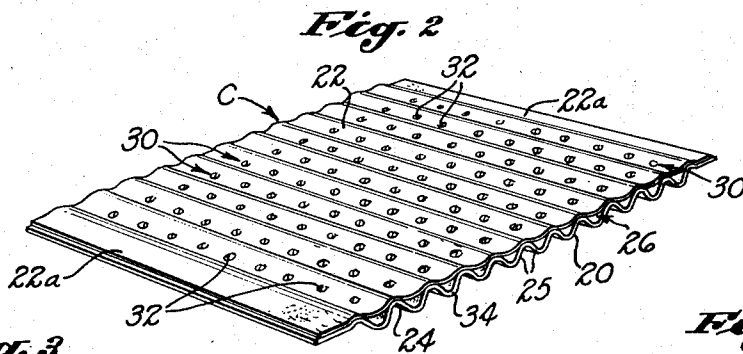
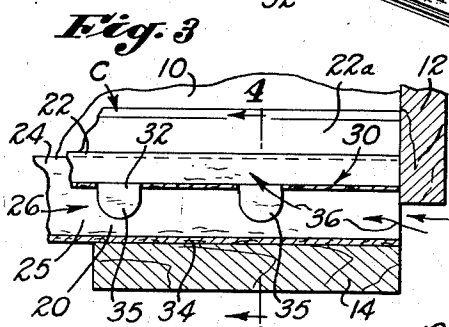
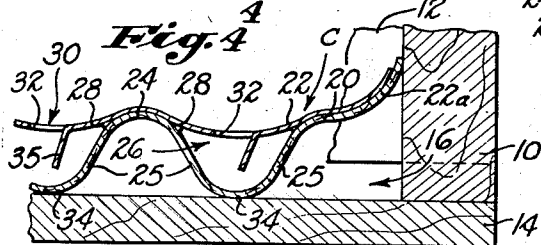
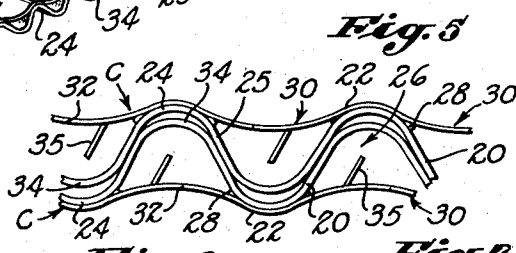
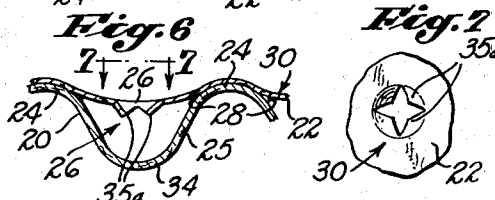
Sept. 9, 1952

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2,609,956

VENTILATED PACKING BOX AND CUSHIONING MEMBER THEREFOR

Filed March 26, 1951



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UNITED STATES PATENT OFFICE

2,609,956

VENTILATED PACKING BOX AND CUSHION-
ING MEMBER THEREFOR

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Application March 26, 1951, Serial No. 217,490

11 Claims. (Cl. 217-42)

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This invention relates to cushions used in the packing of small fruits and similar perishable produce and particularly applies to ventilated fiber cushions used in packing boxes during precooling, shipment, and display of such food stuffs.

In the fruit industry in particular, it is common to store and ship small fruits, especially grapes, in relatively shallow packing boxes commonly termed in some districts as "lug boxes." Even with these shallow boxes, losses frequently are excessive, especially where long storage and long shipment are involved. For example, it has not been uncommon for losses of grapes being shipped across the country to run as high as 40%, and 20% loss has been very frequent. Fruit cushions of various types have been used in the bottoms of such packing boxes in an attempt to avoid crushing and other types of spoilage such as molding and rotting. The mere provision of a cushion offers very little reduction in spoilage, and even ventilated cushions ordinarily have been so constructed as to reduce spoilage to only a very limited extent.

One important object of this invention is to provide a cushion for employment in the handling of highly perishable fresh fruits and the like which may be used in precooling fruit, in storage of the fruit, and in shipment and display thereof.

It is a further object of the invention to provide for a fresh fruit industry a fruit-packing cushion so constructed and ventilated that substantially all spoilage heretofore suffered is avoided.

Another object is to provide a ventilated cushion which will make it easy to discharge sand which adheres to grapes in some areas and loosens and settles onto the cushion during packing, it being necessary merely to tip the packing box to discharge the settled sand. An incidental object is to provide for similar discharge of excess moisture which may accumulate on grapes in districts of high humidity and drain down to the packing cushion.

An additional object is to provide a cushion for the packing of fruits of the indicated character which will also insure a high degree of ventilation to keep the fruit dry. A kindred object is to provide for uniform gas circulation where gassing is employed for the purpose of avoiding molding. This prevents the common experience of excessive gassing or "burning" of the upper layers in some of the boxes and undergassing of intermediate and bottom layers. Also it permits

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treating with about one third of the gas normally used, and it is therefore another object of the invention to facilitate and economize gassing operations. With prior packing cushions it has often been necessary to repack grapes and the like at various stages to discard the spoilage, and under such conditions it has been necessary to use new cushions and discard the old ones.

It is therefore a still further object of the invention to provide a ventilated cushion for the packing of highly perishable fruits such as grapes which will make it possible to use the same cushion for the initial packing, the subsequent precooling and storage, and the subsequent shipment and display. It is thus an object of the invention to provide a ventilated cushion which will not require replacement, or make rehandling of the fruit necessary, between the time of the original packing and the placing of the fruit on sale or display.

An additional object of the invention is to provide a fruit-packing cushion which will permit quick precooling, will resist tendencies of the fruit to shift in transportation, and will prevent pinching and consequent crushing of the fruit at the ends of the cushion, which is a common occurrence.

Inasmuch as grapes represent a typical perishable fruit, losses of which during storage and shipping due to molding and crushing have been high, grapes will commonly be referred to in this specification as representative, although, as later to be indicated, larger fruits and vegetables such as peaches, tomatoes and small squashes also may be packed on cushions of the present invention with most satisfactory results.

Other objects of the invention, and various features of construction thereof, will become apparent to those skilled in the art upon reference to the following specification and the accompanying drawing wherein a preferred embodiment is disclosed.

In the drawing:

Fig. 1 is a perspective showing of a conventional packing box or "lug box" containing a quantity of grapes packed upon a ventilated cushion of this invention, parts being broken away the better to disclose the various relations;

Fig. 2 is a perspective view of a ventilated cushion of this invention;

Fig. 3 is an enlarged vertical sectional detail taken on the line 3-3 of Fig. 1;

Fig. 4 is a similar vertical sectional detail taken on the line 4-4 of Fig. 3;

Fig. 5 is an enlarged fragmentary detail indi-

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cating how two ventilated cushions may be nested, one in inverted relationship, for use or for storage and shipment of the cushions prior to use;

Fig. 6 is a fragmentary vertical section similar to that of Fig. 4 illustrating a modified form of punching to produce ventilating openings; and

Fig. 7 is a fragmentary plan taken from the line 7-7 of Fig. 6.

Fig. 1 illustrates a conventional lug box B containing a quantity of grapes G packed upon a ventilated cushion C of this invention. The box B comprises two end walls 10, side walls 12 which are commonly thinner and longer than the end walls 10, and bottom pieces 14 which span the end walls 10 and sometimes are placed to leave substantial cracks between them and sometimes are fitted close together to reduce cracks as much as possible. The upper edges of the end walls 10 usually carry horizontally disposed cross pieces 15 which serve both to act as hand holds and to space and support above the fruit a similar lug box. In using the cushion C of the present invention, the lower edges of the side walls 12 are elevated above the level of the upper face of the bottom pieces 14 to provide at each side an elongated ventilating slot 16 approximating in width about one half of the total height of the cushion C.

The ventilated cushion C comprises a corrugated lower sheet 20 formed of relatively heavy paper or fiber stock as compared with a relatively flat upper fiber sheet 22. The corrugated sheet 20 provides a transverse series of parallel ridges 24 and downwardly sloping side walls 25 which define between them a series of transverse grooves 26.

The upper sheet 22 is cemented to the ridges 24 along attachment lines which have appreciable width, the cementing or pasting material ordinarily accumulating at the two edges of each attachment line along each ridge 24 as indicated at 28 in Figs. 4 and 6. Thus, the cemented strip on each ridge 24 has appreciable width, which may in practice be proportioned somewhat as shown or possibly a little less. As illustrated, the relatively flat upper sheet 22, when completed, presents a slight valley between each pair of ridges 24, which valley is an important feature of construction and may be formed in any appropriate manner, such as that described more fully below. These valleys are indicated at 30. At the bottom of each valley 30, a plurality of ventilating holes 32 is punched in a longitudinal series so located that water or sand may work through the holes 32 and fall into the channels provided by the grooves 26. Such water or sand drops onto the preferably unperforated trough walls 34 at the bottoms of the grooves, and may be dislodged by tipping the box B, in which case such water or sand passes out through the respective ventilating slot 16 immediately below the lower edge of the respective side wall 12.

In order to enhance ventilation through the holes 32, it is desirable that the material being punched to produce the openings 32 be not entirely severed but be left depending to form projections or tongues 35 somewhat as illustrated in Figs. 3, 4 and 5 so that they will serve slightly to obstruct the travel of air or gas through the grooves 26. The tongues 35 preferably are disposed in the direction of the axes of the respective grooves 26, rather than transversely thereof, because transverse disposition tends to obstruct air or gas flow excessively. The object is to have

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just enough obstruction to cause proper air flow through the holes 32 such as indicated by the two arrows 36 of Fig. 3 or other appropriate gas travel. However, instead of punching so as to produce a single depending tongue 35, it sometimes will be in order to form a plurality of short depending projections or tongues 35a approximately as indicated in Figs. 6 and 7. These short tongues 35a will be slightly transverse to the axes of the grooves 26, but, due to their shortness, will not produce excessive obstruction to air or gas flow.

In producing the ventilated fiber cushion of this invention, the materials employed include for the corrugated lower sheet 20, for example, a relatively heavy so-called fiber liner or board of 85 to 90 pound weight (based on 500 sheets 24" x 36") and commonly known as 9 point paper stock (about 0.009" thickness). The top sheet 22 is produced from a lighter weight stock which is more flexible and much less stiff than the liner stock for the corrugated sheet and may be, for example, a so-called 30 pound kraft material (based on 500 sheets 24" x 36" size), having a thickness of about 0.003". In other words, the lower corrugated sheet 20 is formed from a sufficiently stiff and rigid material to support satisfactorily a lug box full of grapes or similar produce where the corrugations are about 3/4" wide between the centers of the ridges 24 and between the bottoms of the troughs 34, with trough or corrugation heights of about 1/2". The kraft sheet or other material for the upper sheet 22 is tough enough to carry the transmitted load carried in the valleys 30. It is to be appreciated that the materials mentioned are merely illustrative of appropriate paper and paper board which may be employed, and that other similar stocks of appropriate weights and strengths may be used, especially as conditions might vary.

In order to produce the shallow valleys 30 in the upper sheet 22, the upper ridges 24 of the corrugated sheet 20 are striped with an appropriate cement or other adhesive to a width such that the adhesive material extends a short distance down the side of each sloping wall 25 of the respective grooves. The relative width of these attachment lines is somewhat exaggerated in the drawings, but in actual practice where the ridge centers are spaced about 3/4" the lines of adhesive will approximate 1/8" in width. The top sheet 22 is then applied to the ridges and pressed down, any excess adhesive working to the sides of the attachment lines approximately as indicated at 28 in Figs. 4 and 6. When the adhesive dries, it pulls the adjacent portions of the top sheet 22 downward slightly which has the effect of producing the shallow valleys 30. These valleys on the 3/4" ridge spacing will approximate in practice about 1/4". This effect might be slightly facilitated by stretching the corrugated sheet 20 slightly during the application of the top sheet 22, so that the return to normal spacing due to the limited normal resilience of the sheet 20 will tend further to produce the shallow valleys 30 and also facilitate the drawing down of the portions of the sheet 22 adjacent the attachment lines during drying.

With the structure shown and described, the shallow troughs or valleys 30 in the top sheet 22 positively resist tendencies of grapes and similar small articles of produce to slide endwise in the box B. Similarly, the ventilation and drainage holes 32 will assist to an extent in preventing sidewise slippage. Such holes 32 normally are

spaced about one inch apart, but this may be varied according to requirements. The indicated spacing of one inch in the bottoms of the valleys 30 provides for ready discharge of sand which is loosened from the grapes during handling or transport. Such spacing also adequately provides for drainage of condensed moisture when such condensation occurs. The unperforated channel bottoms or inverted ridge portions 34 provide for complete discharge of accumulated sand or water from the grooves 26 through the slot 16 at one side of the box B upon tipping of the box. In order to assure against "nesting" of grapes at the ends of the box B with consequent pinching and crushing, each cushion C is made about one inch longer than the box so that about one-half inch of the cushion turns up at each end as it is installed, approximately as indicated at 22a in Figs. 1 and 4, which prevents adjacent grapes from slipping down into what would otherwise be a narrow trough that would permit pinching and crushing.

As has been previously indicated, the downward disposition of the projections or tongues 35 resulting from punching the holes 32 offers slight resistance to airflow so that good ventilation through the holes 32 is assured and similarly so that good gas passage, when grapes or other fruits are being gassed, is likewise assured. A similar result occurs when the plurality of short projections or tongues 35a is formed so that they depend into the grooved channels 26 as indicated in Figs. 6 and 7.

Thus, with the present construction good circulation is assured by the holes 32 and the depending tongues 35 or 35a, pinching of the grapes at the ends of the packing boxes is avoided, sand cutting also is avoided by reason of the fact that loosened sand will pass through the holes 32, and molding or rotting due to collection of condensed moisture on the bottoms of the grapes in the bottom layer is avoided inasmuch as such condensation, if excessive, will also pass through the holes 32. If necessary, the top surface of the upper sheet 22 may be glazed or otherwise slightly water-proofed to facilitate movement of water of condensation away from the grapes and downward through the holes 32. Also, the entire cushion might be water-proofed after cementing.

Respecting the previously mentioned use of cementing material, to form the attachment lines along the tops of the ridges 24, the cementing material which has proved the most satisfactory is a water solution of dextrin containing between 70% and 75% water and around 25% to 30% dextrin with any incidental cementing solids which might be desirably used. I have found that too much of the adhesive material itself, for example 40% thereof, does not produce satisfactory valley formation and probably is as objectionable as too much water, such as 90% water, where using paper materials of the nature heretofore indicated. Similarly, thick pastes are undesirable. It is necessary that the water content be great enough, in conjunction with the particular glue or other adhesive, to result in the necessary shrinkage attraction upon drying. Apparently the water content of such adhesive is to be such as to satisfy inherent absorptive characteristics of the fiber sheets 20 and 22 while providing good shrinkage characteristics in the applied adhesive material itself.

In applying the adhesive, the thickness of the coating is not particularly critical but should be sufficient to wet satisfactorily both of the sheets

when the thin, upper sheet 22 is laid on the coated ridges 24, and a satisfactory guide is found in the accumulation of small beads of adhesive along the edges of the attachment strips when the upper sheet is pressed down into place, approximately as indicated at 23 in Figs. 4 and 6 and as previously mentioned. While the dextrin solution of the nature stated has been found commercially satisfactory and economical, other cementing materials which produce analogous results may be used. Starch has been successfully used according to well known processes, and known water-proofing agents also may be employed in the adhesives used. Otherwise adhesive agents might be rubber cements or nitrocellulose type cements with highly volatile solvents having proper penetrative properties for the paper sheets used and adequate shrinkage characteristics, or glue solutions whether or not of the type which is water-proof when set.

Of course any other means may be employed for causing adhesion between the thin upper sheet 22 and portions of the ridges extending somewhat down the sides of the sloping walls 25 of the corrugated sheet, as might be effected by applying pressure for a suitable interval of time through the medium of a tool having slightly concave areas to be presented along the attachment lines and roughly conforming with the curvature of the top portions of the ridges 24. In other words it is immaterial how the shallow valleys 30 are produced, so long as they appear in the product to an extent sufficient to perform the required, described functions.

Not only may small fruits such as grapes be successfully packed on cushions of this invention, but larger perishable produce such as peaches and tomatoes may also be packed thereon with considerable advantage. In such instances, the heavier articles tend at bearing points to make slight depressions in the ridge portions 24 so that adjacent upstanding ridge portions which remain will tend to reduce slippage laterally while other ridge portions 24 tend to reduce slipping longitudinally of the packing box B. In all cases the efficiency of the present cushion is such that commonly the produce may be initially packed on a given cushion C which will endure throughout subsequent precooling, storage, shipping, and display without significant spoilage and consequent loss. As indicated above, precooling takes place quickly by reason of good ventilation through the holes 32, especially as assisted by the depending projections or tongues 35 or 35a. Uniform gassing of fruits and the like to prevent molding also occurs because the described arrangement of holes and tongues assures uniform travel through the box. Additionally, the amount of gas heretofore commonly required is reduced very greatly, for example to about one half or one third, and "burning" by the gas of the upper fruit layers, also a common result heretofore, is completely avoided. Inasmuch as a second sheet 22 is not attached to the bottom ridges 34 of the corrugated sheet 20, space required for storing and shipping cushions C of this invention may be cut substantially in half by inverting one cushion and nesting it in another, as indicated in Fig. 5. Also, absence of vent holes in the corrugated sheet 20 avoids weakening thereof, and absence of a bottom sheet like the sheet 22 insures ready drying out of moisture which drops through the holes 32 into the channels of the corrugated sheet and is absorbed thereby.

In addition to the specific structures herein dis-

closed, it is intended to protect all variations falling within the scope of the patent claims.

I claim as my invention:

1. A ventilated fiber packing cushion for packing perishable fruits and the like, consisting essentially of the combination of: a corrugated lower fiber sheet providing on its upper and lower sides alternating grooves and ridges which extend across the sheet in one direction only and in substantial parallelism; and an upper fiber supporting sheet which, as compared with the corrugated sheet, is relatively flat and has greater flexibility and is of lighter weight material, said upper sheet being cemented to the ridges on the upper side of said corrugated sheet along substantially parallel attachment lines of appreciable width so that the upper sheet is held down a short distance along the opposite sides of each ridge and adheres thereto thereby producing shallow valleys in the upper sheet in overlying relation to the respective grooves below while forming underlying air channels in the respective grooves; said upper sheet having a plurality of holes punched in the bottom of each valley for passage of air and gas and for liquid drainage, the punched sheet portions at the holes remaining attached at the sides of the holes and depending into the respective grooves to form partial obstructions generally lying along the axes of such grooves for assisting movement of gases and ventilating air through said holes, the corrugated sheet being free from perforations, and the grooves on the under side of said corrugated sheet being unenclosed.

2. A ventilated fiber packing cushion including in combination: a corrugated lower fiber sheet presenting alternating grooves and ridges extending across said sheet; and an upper fiber sheet cemented to and spanning said grooves between said ridges and enclosing said grooves to form open-ended ventilation channels, said upper sheet being attached to said ridges on attachment lines of appreciable width whereby such attachment holds portions of said upper sheet at the sides of each ridge down to the corrugated sheet along the opposite sides of the ridges thereby forming in the upper sheet shallow valleys which overlie the respective grooves and channels; said upper sheet having a series of spaced ventilating holes in the bottom of each valley, the corrugated lower sheet being free from perforations to provide for drainage and discharge at the ends of said channels, the grooves and ridges in said corrugated sheet being rounded to provide broad bearing lines at the bottoms of the grooves and broad attachment lines at the ridges.

3. A packing cushion as in claim 2 wherein material of the upper sheet displaced to form said holes remains attached at the hole edges and depends into said grooves to form partial obstructions facilitating ventilation through said holes and through said open ended grooves.

4. In combination: a packing box for perishable produce having end walls, a bottom wall secured to said end walls, and side walls secured to said end walls with the lower edges of said side walls spaced somewhat above the level of the upper face of said bottom wall for passage of air into the box above said bottom wall and below said lower edges; and a ventilated fiber packing cushion disposed on said bottom wall, said packing cushion including a corrugated lower fiber supporting sheet presenting alternating upper and lower grooves with intervening upper

ridges and lower ridges, said lower ridges being supported by said bottom wall, and an upper fiber sheet on said upper ridges and spanning said upper grooves, said upper sheet having shallow valleys disposed between said upper ridges and overlying and spaced above said lower ridges and forming elongated channels in said upper grooves, said upper sheet having in the bottoms of said shallow valleys a series of ventilating holes communicating with said channels, the depths of said grooves being greater than the spacing of the lower edges of said side walls above the level of the upper face of said bottom wall, whereby sand and liquid passing through said holes in the bottoms of said valleys may be discharged from said channels and from said box and ventilation may occur through said channels by way of said holes and the spaces at the lower edges of said side walls, and whereby the lower portions of said side walls retain said packing cushion in said box.

5. A combination as in claim 4 wherein the overall length of said cushion is materially greater than the length of said box and the ends of said upper and lower sheets curve upward against the inner faces of said end walls to prevent nesting and pinching of articles of produce carried on said cushion.

6. A combination as in claim 4 wherein said holes are produced by partially punching out corresponding portions of said upper sheet, such portions remaining attached to the sides of said holes and depending into said channels to facilitate ventilation through said channels and holes.

7. A combination as in claim 4 wherein said corrugated sheet is free from holes.

8. A pair of nested fiber cushions, each cushion including: a corrugated fiber sheet having the corrugations exposed on one side; and an article-supporting sheet secured to the ridges of the corrugations at the other side of said corrugated sheet, the portions of such supporting sheet between said ridges being in the shape of shallow valleys spaced from the bottoms of the respective underlying grooves to form ventilating channels, the middle portions of such valleys being provided with series of ventilation openings leading to said channels, and the exposed corrugations of the two corrugated sheets being nested in unattached relation.

9. A structure as in claim 8 wherein the material of the supporting sheets displaced to form said openings remains attached at the sides of the respective openings and extends into said channels to obstruct the channels partially for assisting ventilation through said openings.

10. A ventilated fiber packing cushion including in combination: a corrugated bottom fibrous sheet which is stiff enough to support a body of perishable vegetable produce, said sheet presenting a plurality of elongated alternating grooves and ridges at its upper side; and an upper fiber sheet secured to said upper ridges of said corrugated sheet and having formed in the upper side thereof shallow valleys overlying said grooves to receive and retard shift of small articles of produce over the upper edges of said valleys, said upper sheet being spaced from the bottoms of said grooves and providing elongated channels in such grooves below the respective overlying shallow valleys, said upper sheet being provided with a plurality of ventilating openings in the bottom of each shallow valley and in communication with the respective underlying channels.

said ventilating openings being formed by partially punching out portions of said upper fiber sheet, punched portions remaining attached to said upper sheet at the sides of the respective openings and depending into the respective channels as partial obstructions to assist ventilation through said openings.

11. A ventilated fiber packing cushion including in combination: a corrugated fiber sheet having its corrugations exposed on one side; and an article-supporting fiber sheet secured to the ridges of the corrugations at the other side of said corrugated sheet to form elongated ventilating channels from the grooves of the corrugated sheet between the two sheets, said article-supporting sheet presenting elongated portions between the ridges to which it is secured, such elongated portions being provided with a series of ventilation openings leading to said channels, the

material of the supporting sheet displaced to form said openings remaining attached at the sides of the respective openings and extending into the respective channels to obstruct such channels partially for assisting ventilation through said openings.

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