

Aug. 20, 1957

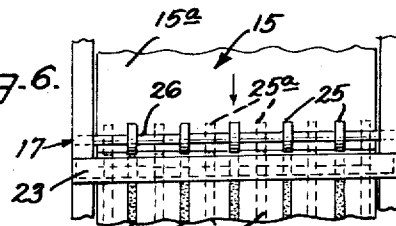
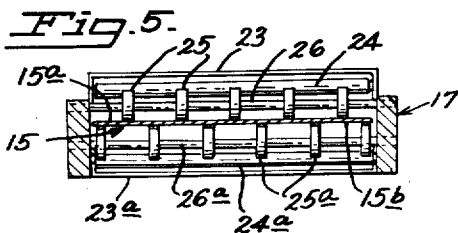
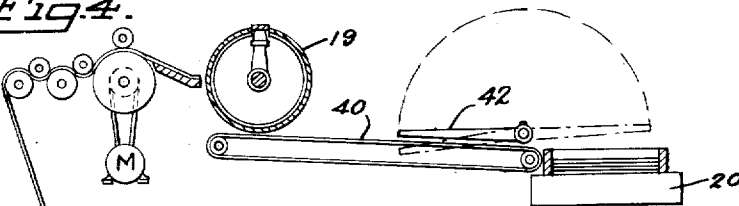
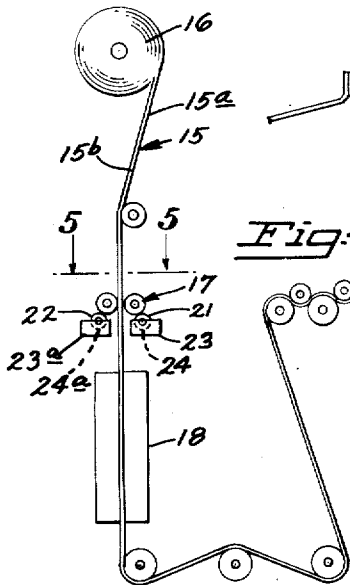
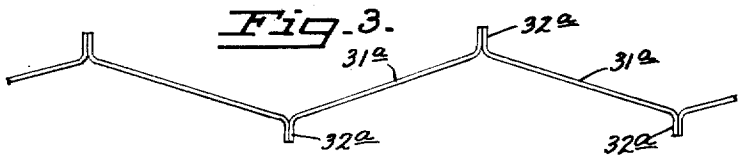
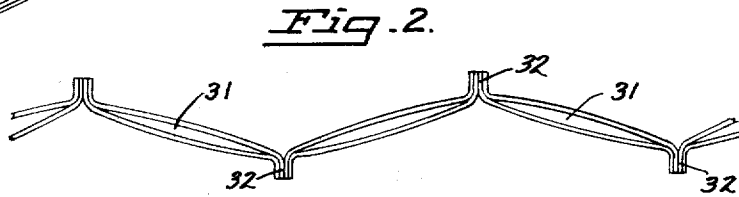
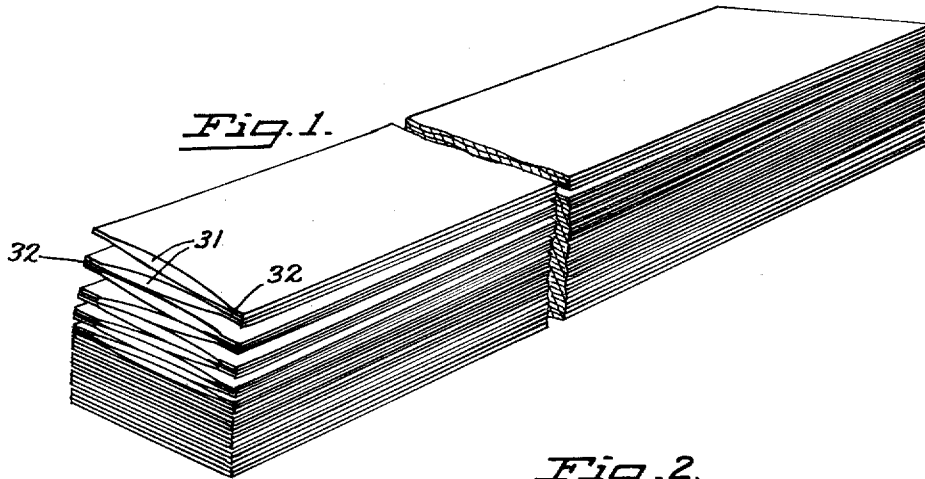
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EXTENSIBLE ZIGZAG PACK AND METHOD OF MAKING SAME

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2 Sheets-Sheet 1



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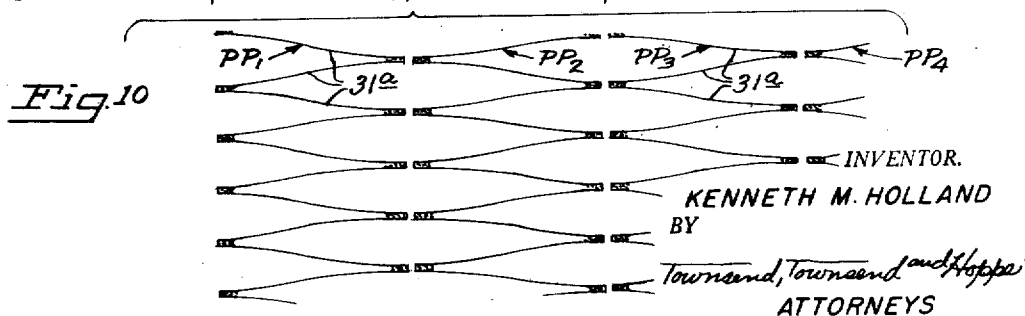
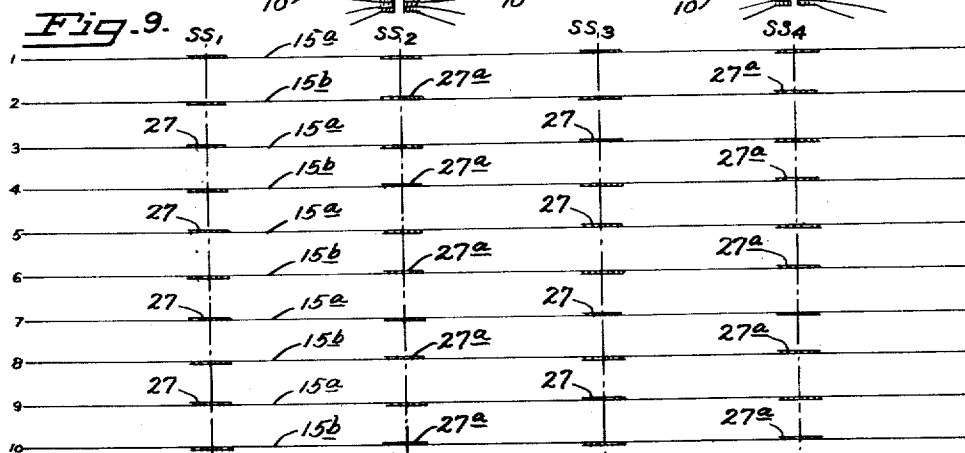
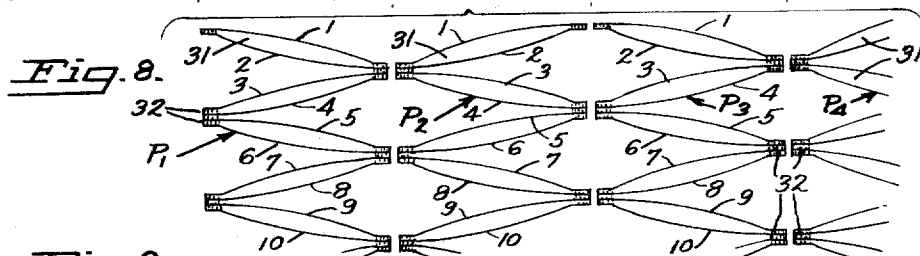
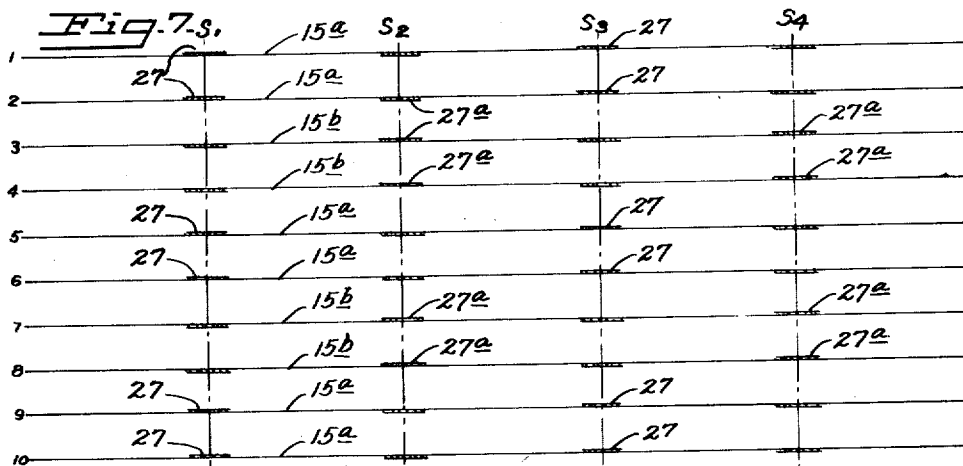
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EXTENSIBLE ZIGZAG PACK AND METHOD OF MAKING SAME

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2 Sheets-Sheet 2



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EXTENSIBLE ZIGZAG PACK AND METHOD OF MAKING SAME

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2 Claims. (Cl. 154—122)

This invention relates to a new and improved extensible zigzag pack formed of flexible sheet material and to a method of making same.

Both embodiments of the product shown in the drawings and to be described hereinafter in more detail comprise a structure having the general appearance of a fan-folded or accordion pleated sheet of flexible material which alternatively can be compacted into a flat pack or extended lengthwise to form a sheet structure having substantial length.

Although the embodiments of the product resemble in general appearance, fan-folded or accordion pleated sheet material, it is a principal object and advantage of the invention to eliminate folds or sharp bends in the material as is customary in the manufacture of such products. More specifically, it has been the usual practice in the manufacture of products of the general character and type here involved to fold or lap an integral section of sheet material back and forth over itself whereby, when the sheet is compacted together, opposite sides of the compacted unit are defined by a plurality of sharp bends or folds in the material. Generally speaking, the forming of sharp bends in an integral sheet of material (such as paper for example) has a tendency to weaken and break down the material along the fold lines. Accordingly, fan-folded structures of the general type alluded to herein, display a tendency to tear or wear away along the fold lines before any other portion or area of the material shows noticeable signs of wear.

The present invention provides an extensible pack of sheet material in which the zigzag legs of the pack comprise individual or separate sheets bonded along their opposite edges to similarly constructed adjoining legs of the pack. Bonding of individual strips together in this fashion eliminates the need of forming sharp fold lines or bends in an integral sheet of material in the more usual fashion with the resultant disadvantages above named.

By eliminating sharp bends or folds of material, there exists no substantial tendency for the material to first tear or weaken along the fold lines as will generally occur in the case of conventional fan-folded structures.

One embodiment of the invention shown in the drawings and to be hereinafter described in detail comprises a zigzag folded pack in which each leg of the pack comprises two sections or thicknesses of sheet material bonded to one another only along their adjacent opposite edges to define a plurality of open end packets or envelopes for containing film strips, hosiery, toothbrushes, pens, pencils, or like articles to be packaged.

The second embodiment of the invention shown in the drawings and to be described more fully hereinafter comprises an extensible zigzag pack in which each leg thereof consists of a single section or thickness of the sheet material. It is contemplated that units constructed in accordance with this latter embodiment of the invention will have particular utility in providing relatively inexpensive extensible window shades, curtains or drapes. Thus, for

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example, it is contemplated that, depending upon the type and quality of sheet material from which the units are made, said units can be fabricated into window draperies, shower curtains, window covering or shades, as well as numerous other articles where more conventional fan-folded or accordion pleated sections of sheet material have been or can be utilized advantageously.

Another principal object and advantage of the invention is to provide unique methods for producing articles constructed according to the embodiments of the invention briefly mentioned above.

Numerous other objects and advantages of the invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views:

In the drawings:

Fig. 1 is a perspective view of one embodiment of the invention shown in compacted arrangement.

Fig. 2 is a fragmentary and elevational view of said first embodiment showing the pack extended.

Fig. 3 is a fragmentary end elevational view of a second embodiment of the invention showing the pack extended.

Fig. 4 is a schematic view of an apparatus suitable for producing units constructed in accordance with either of the first or second embodiments of the invention.

Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is an enlarged fragmentary front elevational view of the adhesive applying rollers.

Fig. 7 is an enlarged end elevational view of a pack of material arranged in accordance with the first embodiment of the invention and in which the sheets in the pack are shown in an exploded relationship and are indicated schematically by lines of single thickness.

Fig. 8 is related to Fig. 7 and discloses schematically how the pack may be sliced to form individual extensible zigzag packs having leg sections of double thickness.

Fig. 9 is an enlarged end elevational view of a pack of material arranged in accordance with the second embodiment of the invention and in which the sheets in the pack are shown in an exploded relationship and are indicated schematically by lines of single thickness.

Fig. 10 is related to Fig. 9 and discloses how the pack may be sliced to form a plurality of individual extensible zigzag packs having leg sections of single thickness.

Referring now more specifically to the drawings the first embodiment of the invention, in which each leg of the zigzag pack comprises two sections or thicknesses of material defining an open ended envelope or packet, is shown particularly in Figs. 1, 2, 7 and 8. The second embodiment of the invention in which each leg of the zigzag pack consists of a single thickness section of sheet material is shown particularly in Figs. 3, 9 and 10. The initial steps involved in producing either embodiment of the invention according to the preferred methods herein disclosed are the same and will now be described.

Referring particularly to Figs. 4, 5, and 6, a continuous web of flexible sheet material 15, such as for example, paper, may be fed from a roll 16 between glue applying means 17, then through a drying oven 18, and thence through a rotary cutter 19 which may be operated to cut the continuous web 15 into rectangular sections of equal dimension for stacking on table or joggle box 20.

The glue applying means rollers designated generally at 17 in Fig. 4 are shown as comprising series of glue applicators 21 and 22 arranged to apply spaced, parallel, alternately staggered lines of adhesives to opposite sides of the web 15, as the latter is continuously forwarded between said rollers. Assembly 21 comprises more specifically a reservoir tank 23 for containing liquid

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adhesive, a glue pick-up cylinder 24 and a plurality of equidistantly spaced applying rollers 25 mounted on shaft 26. Roller assembly 22 may be similarly constructed and is shown as comprising an adhesive reservoir 23a; glue pick-up cylinder 24a, and glue applying rollers 25a mounted on shaft 26a. It is noted that rollers 26a are disposed in alternately staggered relationship with respect to rollers 26, whereby the two assemblies 21 and 22 operate to apply adhesive lines 27 to the obverse side 15a of the web in alternately staggered relationship with respect to glue lines 27a applied to the reverse side 15b of the web by roller assembly 22.

Although there are any number types of adhesive which can be employed in the practice of the present invention it is convenient to employ a so-called dry line type of adhesive such as a thermosetting synthetic epoxy resin. Adhesives of this type may be applied in liquid solution to the web by glue applying means of the type above mentioned and thereupon subjected to oven heat for a sufficient period to drive off volatile solvents leaving lines of adhesive deposits which are substantially non-tacky and dry to the touch. The use of dry-line adhesives facilitates to a considerable extent the forwarding of the web through a machine of the type shown in the drawings, including the rotary cutter 19 and stacking table 20. After the web has been cut into sections of equal dimensions and the sections stacked relative to one another in the manner to be described, the entire stack may then be subjected to heat and pressure adequate to cause the lines of adhesive to soften into flowable or tacky state to cause the sections to adhere to one another. If, in the example already suggested, an epoxy resin is employed as the dryline adhesive, the volatile solvents may be driven off by running the web through an electric or infra-red lamp oven 18 at a temperature of about 250° F., for a period of about 30 seconds. Subsequently when the sections of material are stacked together the entire stack (of 1 to 2 inches thick) may be placed within a suitable press under pressure of about 50 p. s. i. and oven heated at a temperature of approximately 140° for about 1 to 2 hours to cause the adhesive lines to initially assume a flowable or tacky condition as aforesaid, and thereafter bake to a final cured condition.

It will be appreciated that any number of suitable types and kinds of adhesives, including thermoplastic, pressure sensitive, or other types of wet or dry line thermosetting adhesives may be employed in the practice of the invention; and that the scope of the present invention is in no way limited to the choice or use of any particular adhesive or type of adhesive.

In producing the embodiment of the invention shown in Figs. 1, 2, 7 and 8, according to the preferred method the sections of sheet material, after passing through the cutting station 19, may be stacked in the relationship shown in Fig. 7 wherein it is seen that, in consecutive order, the first two sections are stacked obverse side up, the next two reverse side up, the next two obverse side up, and so on. The stack of this character is then compacted tightly together and oven heated in the manner above suggested to cause the adhesive lines to adhere to contiguous areas of adjacent sections of the stack.

The stack is then sawed or cut along lines S₁, S₂, S₃ and S₄, which extend along the median lengthwise axis of the vertically aligned adhesive lines. The width of cut along lines S₁, S₂, S₃ and S₄ is substantially smaller than the width of the glue lines themselves so that the adjacent bonded sections along each line of cut will remain adhered to one another. Each slice of the stack formed by the cutting of the stack in the above manner will form an individual extensible pack such as shown schematically at P₁, P₂, P₃ and P₄ in Fig. 8. More specifically, and as shown particularly in Figs. 1 and 2, each leg 31 defining the zigzag pattern of the pack comprises a pair of individual strips of the sheet material which are bonded as at 32 to one another only along

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their opposed parallel side edges, thereby defining a zigzag series of double thickness open-ended envelopes or packets into which may be inserted film strips, pens, pencils, toothbrushes, hosiery, or other articles to be packaged.

In producing the second embodiment of the invention of the type shown in Figs. 3, 9 and 10, the initial steps of applying alternately staggered lines of adhesive to opposite sides of the web followed by the cutting the web into sections of equal dimension, may be accomplished in the same fashion as described with reference to the preferred method of producing the first embodiment of the invention. However, the cut sections of web material 15 are stacked in the manner shown schematically in Fig. 8. In this arrangement each section in a stack is disposed with its obverse side contiguous to the reverse side of an adjacent section and vice versa. After a stack arranged in this manner is compressed and adhered together in the manner indicated above, it is sawed or sliced along the medial lengthwise axis of each vertically aligned column of adhesive lines to form a plurality of individual extensible zigzag packs of the type illustrated schematically at PP₁, PP₂, PP₃ and PP₄, in Fig. 10. It is noted that each leg 31a defining the zigzag pattern of a pack of this latter type comprises an individual strip of single thickness of the sheet material 15. As suggested above, it is contemplated that a zigzag pack of this latter type can be effectively utilized in the manufacture of numerous articles such as window drapes or shades, or shower curtains, for example.

Although the preferred methods of making the two embodiments of the invention herein described have been explained and indicated with particular reference to a type of apparatus which has been found suitable for the practice of the methods, it is understood that the practice of the methods are not limited or restricted to the use or function of any particular equipment, machinery or apparatus. Thus, for example the sections of web material as they leave the cutting zone may be either hand or machine stacked in either of the arrangements shown in Figs. 7 or 8. I have found it economical and convenient, however, to employ automatic stacking means such as shown schematically in Fig. 4. The stacking means therein shown comprises a conveyor 40 consisting of a plurality of spaced endless belts for conveying the cut sections of web from rotary cutter 19 to a joggle table 20. A sheet turning arm 42 having its turning axis disposed slightly above the plane of the conveyor and adapted to swing back and forth in an arc between the conveyor and joggle table, may be operated in synchronization with the rotary cutter 19 to permit certain sections of the web material to pass directly from the conveyor to the joggle table and to turn or flip over other sections as they pass into the joggle table according to the desired order of sheet stacking. Thus, in forming a stack of the character shown in Fig. 7 the turning arm 42 is operated in relation to rotary cutter 19 to alternately turn or flip over every other consecutively cut pair of sections of the web material as said sheets are conveyed from the cutter to the stacking table. In stacking the sheets in the manner shown in Fig. 9 the turning arm is synchronized to turn or flip over every other sheet as it is conveyed from the rotary cutter to the joggle table.

It is also readily understandable that in the practice of the methods the glue lines may be applied to the web by other means than those shown, such as by a silk screen process. Moreover, the cutting of the web into sections may obviously be accomplished by means other than the rotary type cutter shown.

Although the present invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that numerous changes and modifications may be practiced

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within the spirit of the invention as limited only by the scope of the claims appended hereto.

I claim:

1. A method of making extensible packs or sheet material arranged in zigzag formation comprising the steps of: providing a plurality of rectangular sections of sheet material of equal dimension each defining obverse and reverse faces and first and second opposed parallel edges; providing equidistantly spaced parallel lines of adhesive to the obverse and reverse sides of each sheet, with the adhesive lines on the obverse side of each sheet arranged in alternately staggered relationship with respect to the adhesive lines on the reverse side of said sheet; stacking said sections of sheet material one upon the other with the adhesive lines on the obverse side of each section contiguously aligned with the adhesive lines on the reverse side of adjacent sections disposed to either side of said first mentioned section; securely adhering the sections in the stack to one another along their contiguous lines of adhesive; then slicing said stack along the medial lengthwise axis of each contiguously aligned column of adhesive lines to form a plurality of extensible packs of sheet material arranged in zigzag formation.

2. A method of making extensible packs of sheet material arranged in zigzag formation comprising the steps of: providing a plurality of rectangular sections of sheet material of equal dimension each defining obverse and reverse faces and first and second opposed parallel edges; providing equidistantly spaced parallel lines of adhesive to the obverse and reverse sides of each sheet, with the adhesive lines on the obverse side of each sheet arranged

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in alternately staggered relationship with respect to the adhesive lines on the reverse side of said sheet; then stacking said sections of material one upon the other with the odd numbered consecutively stacked pairs of sections disposed obverse side up and with the even numbered consecutively stacked pairs of sections disposed reverse side up and also stacking said sheets with all of the adhesive lines extending lengthwise of the stack and relative to one another to define a plurality of equidistantly spaced vertically aligned columns of adhesive lines; then adhering the sections of said stack to one another throughout the areas of adhesive line contact between the stacked sections; then slicing said stack along the medial lengthwise axis of each vertically aligned column of adhesive lines to form a plurality of individual extensible packs of sheet material arranged in zigzag formation.

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