

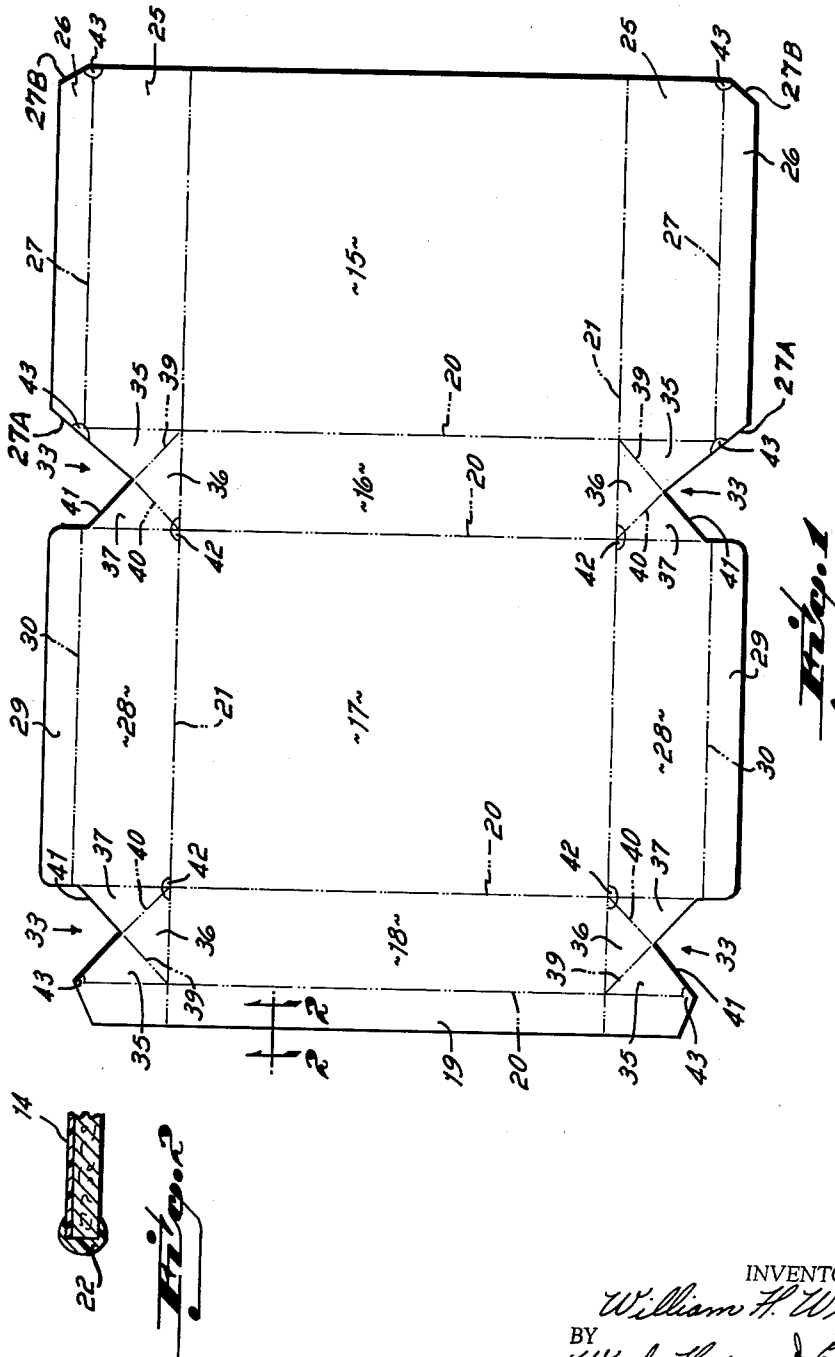
Jan. 18, 1966

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Filed Sept. 25, 1963

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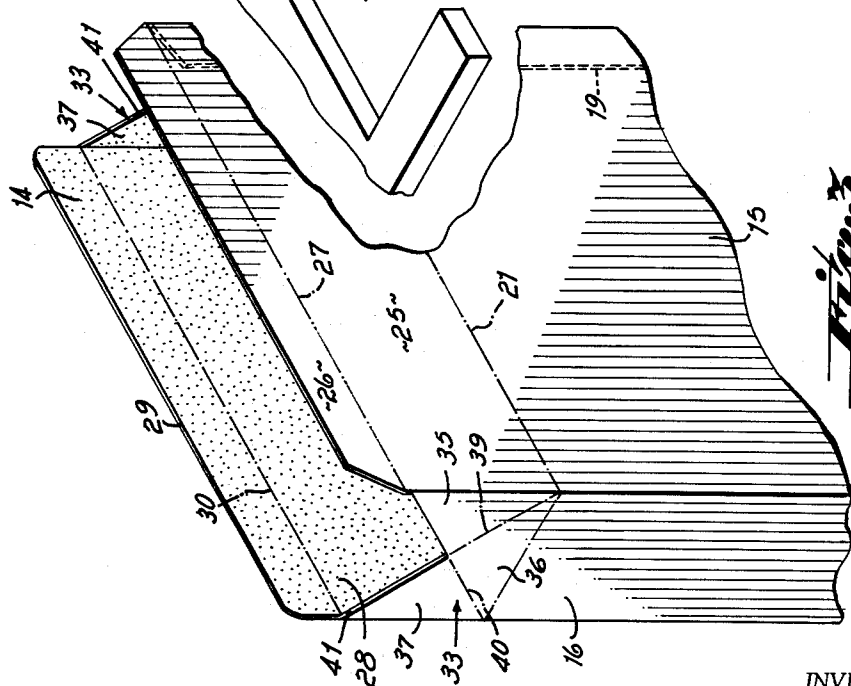
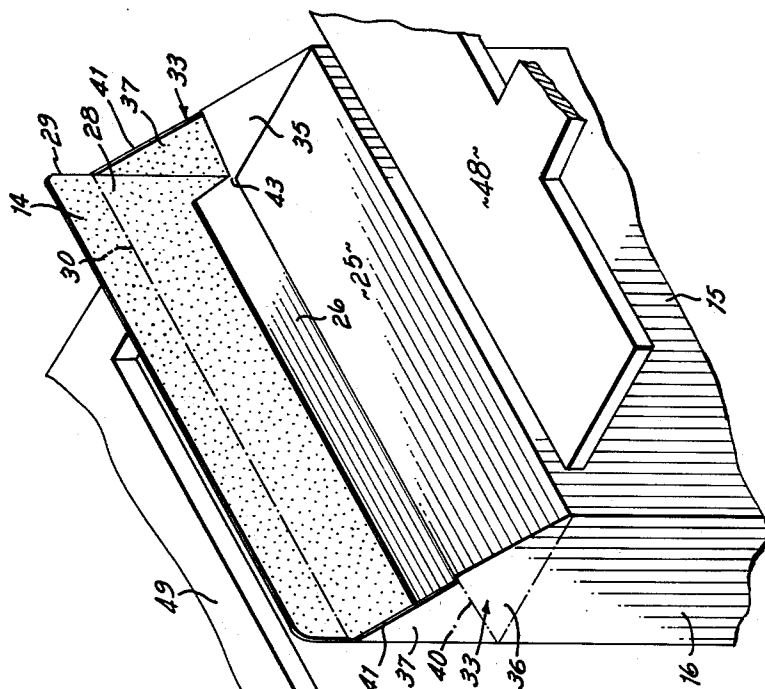
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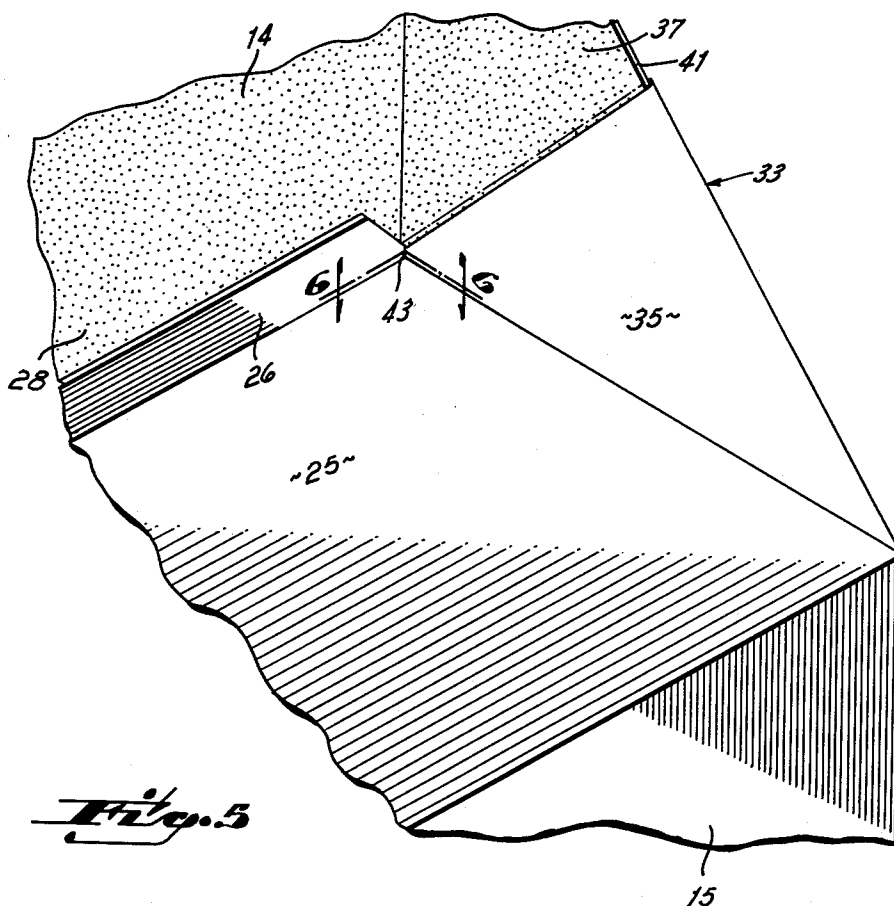


Fig. 5

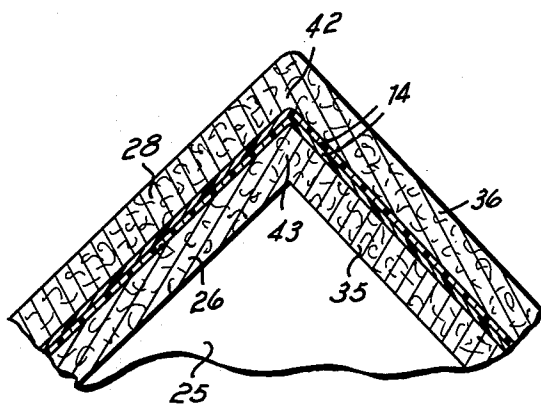


Fig. 6

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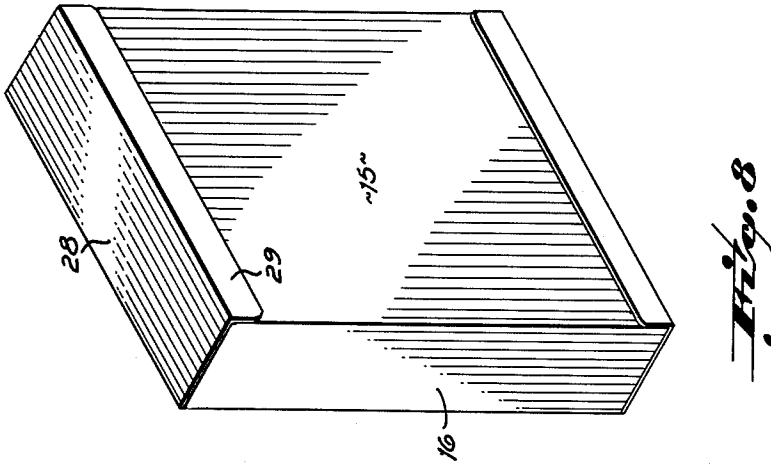


Fig. 8

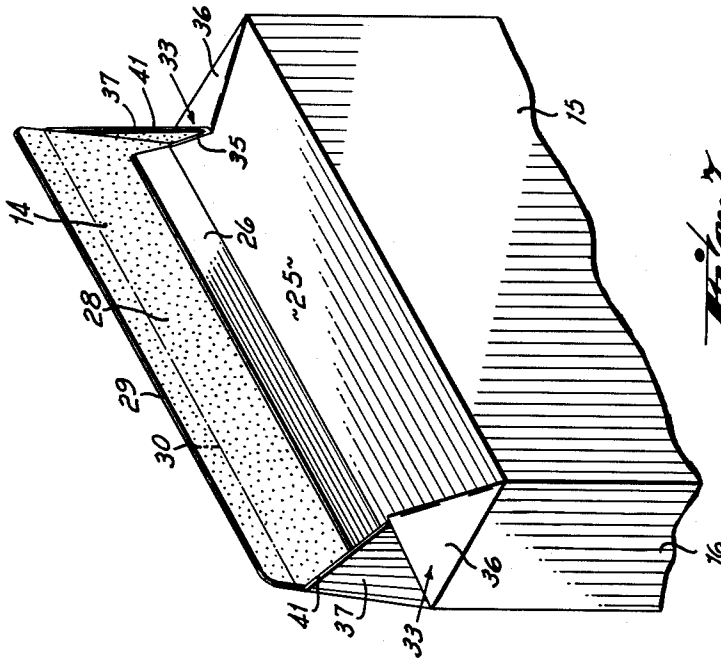


Fig. 7

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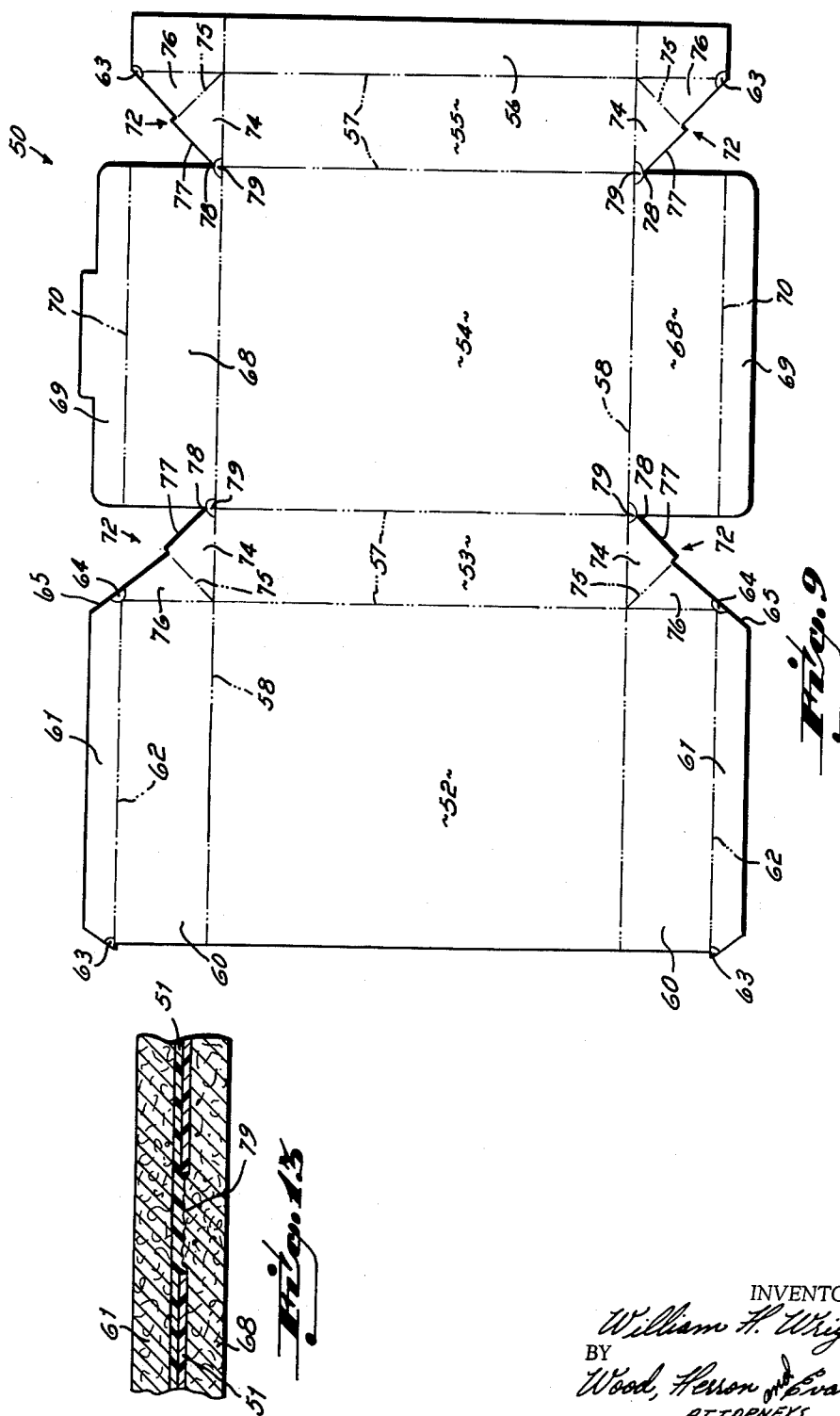
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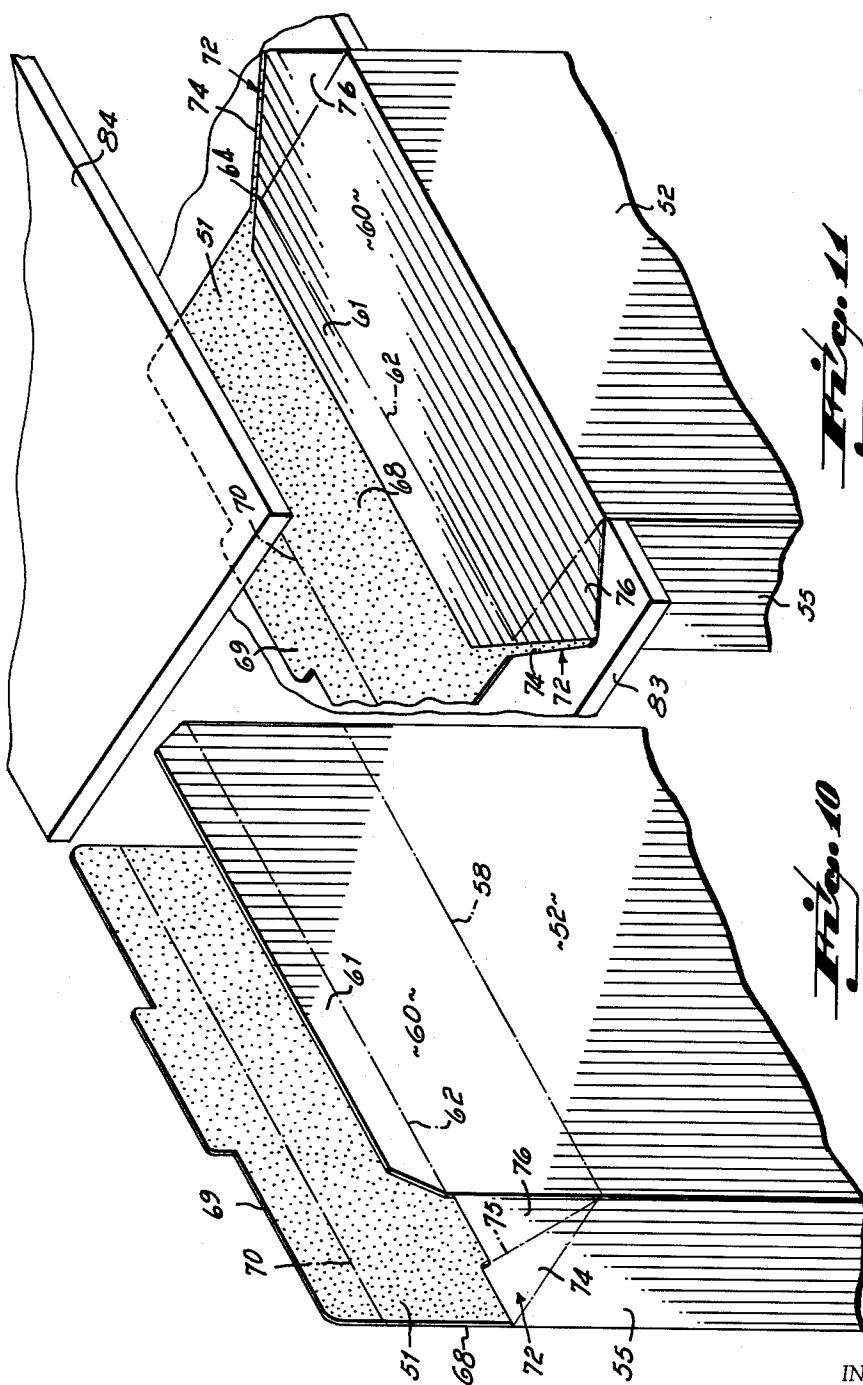
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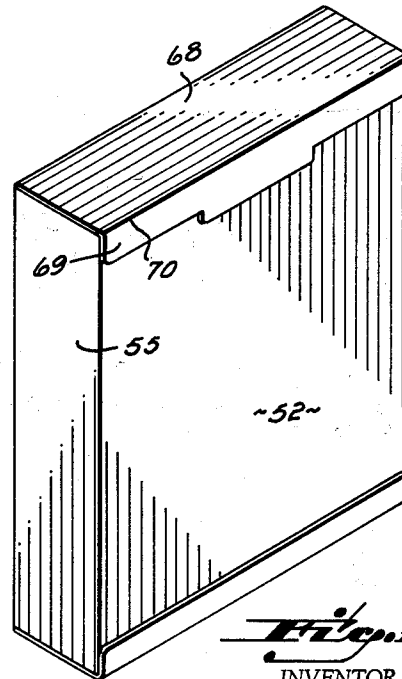
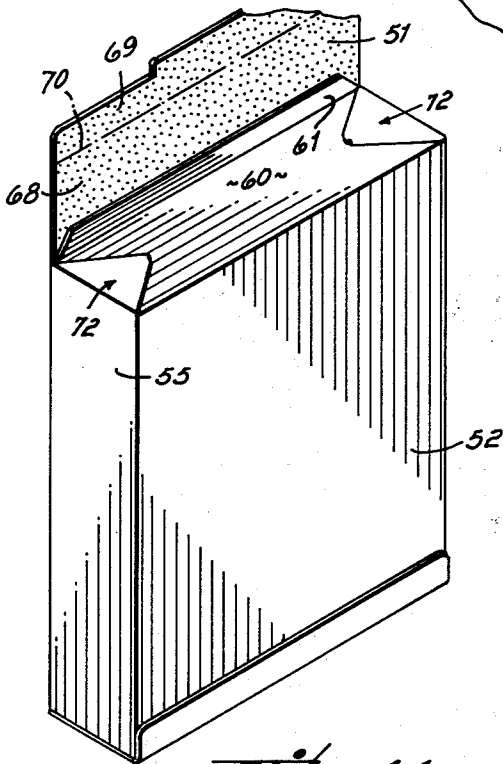
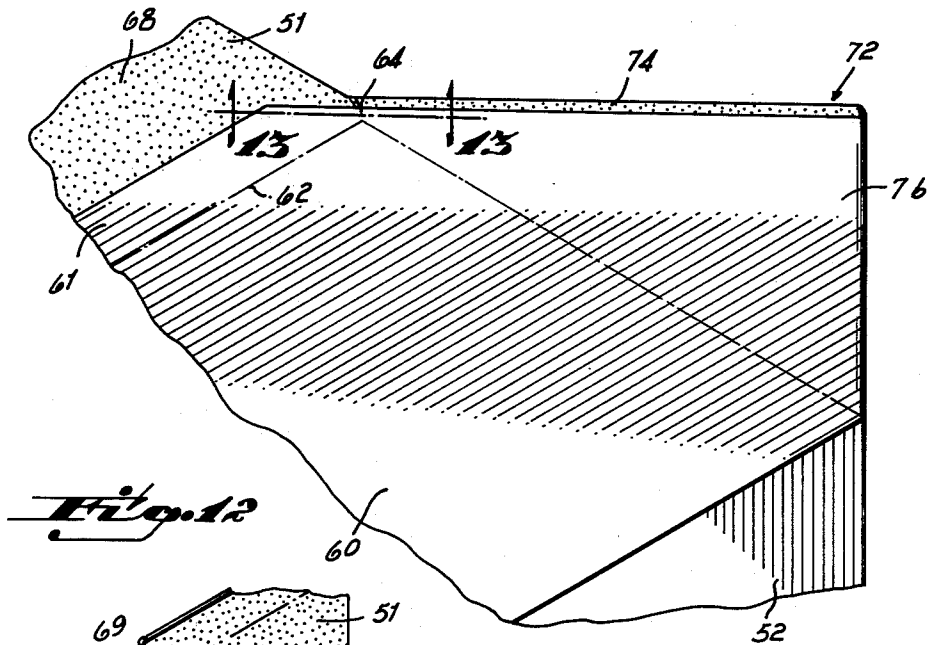
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Filed Sept. 25, 1963, Ser. No. 311,456

4 Claims. (Cl. 229—37)

This invention relates to improvements in the art of packaging, and more particularly, the invention is directed to an improved paperboard package for comestibles. The package of the present invention is particularly useful in packaging many types of food stuffs which are in a particulate or powdery form such as cereals, cake mixes; as well as food items which require a package which protects against atmospheric elements.

In packaging good for human consumption the package must be designed in such a way as to admit of attractive display on the counters of the retail stores in which the goods are purchased. Further and more important the packages must protect the goods containing within, against the deleterious effects of atmospheric conditions, mice, vermin and the like. In many instances the goods which are packaged are of such a greasy nature that contact of the goods with the paperboard will result in "wicking," which is a capillary absorption of the grease into the fibers of the paperboard which results in an unsightly, greasy blotch on the surface of the package. Since wicking destroys the attractiveness of the package, care must be exercised in the package design in order to eliminate its effects. Still further it is necessary for the package to protect against the ingress and egress of gaseous elements which would tend to alter the original condition of the goods. For example oxygen causes chocolate to change white, moisture causes certain goods to become soggy, cheese will dry out and certain cake mixes pick up odor of chlorine from adjacent packages of cleaning goods.

A package designed for generally universal application must not only meet the requirements outlined above, but must meet them in such a way as to be manufactured economically; to be filled and sealed conveniently on automatic machinery and to be conveniently usable by the ultimate consumer of the goods.

One of the principal packages which purports to meet these severe demands is constituted by an inner-bag of cellophane, wax paper or comparable material, a paperboard carton and possibly a printed or transparent overwrap. This is a slow and expensive package to produce because it requires two or three major steps in its filling and closing. Further, when used by the consumer the inner-package may become torn when it is opened and thereafter, become useless in so far as reclosing the package is concerned.

An objective of the present invention has been to provide a single element package which can be completely sealed with the goods contained within and which meets all the requirements outlined above for universal application to the packaging of food stuffs, and which can be formed, filled and sealed at economical high speeds.

There have been prior proposals of single element paperboard packages. These have not enjoyed any substantial success, particularly in the application of packaging powdery and greasy substances such as cake mixes, which are among the most difficult of all to package satisfactorily. While the prior single element packages appear to provide a complete closing of the package which will prevent wicking and the introduction of moisture into the package and which will provide a sift proof barrier for the powdery goods, the actual fact is that these prior packages fail to provide a critically impor-

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tant seal at the corners of the package and it is through these imperfect corners that the package fails. The powdery substances sift through the corner and the attractiveness of the package is impaired. The greasy substances contact the paperboard at the corners and the unsightly wicking occurs. The aroma of the food stuffs is discernable through the corners and vermin and mice are attracted to the package.

It has been another objective of the invention to provide a paperboard package manufactured from a one piece blank which is coated on one surface with a thermoplastic, heat sealable material such as polyethylene or Saran (polyvinylidene chloride), the carton having an improved end closure structure, including gussets, which when folded to closed position and sealed provides a complete plastic to plastic seal around each end of the carton. To this end, the invention contemplates the use of an excess of material in the carton at the critical corner area, the excess of material making a plastic to plastic surface engagement with the corner portions of the carton whereby, upon heat sealing, a plastic to plastic seal is formed at the corners.

Another objective of the invention has been to provide an end closure for a carton employing a plastic to plastic seal of the coated surface of closure members, the closure members being so oriented as to permit a backup pressure to be applied to the sealed area when sealing heat is applied.

These and other objectives of the invention will become more readily apparent from the following detailed descriptions taken in combination with the accompanying drawings:

FIG. 1 is a plan view of a one piece blank from which the carton is constructed.

FIG. 2 is an enlarged cross sectional view taken along lines 2—2 of FIG. 1.

FIG. 3 is a perspective view of the upper end of the box which has been filled and is ready to be closed.

FIG. 4 is a view similar to FIG. 3 showing the first step in closing.

FIG. 5 is an enlarged fragmentary view of one corner area of the carton when in the condition of FIG. 4.

FIG. 6 is a cross section view taken along 6—6 of the FIG. 5, illustrating the plastic to plastic seal at the corner of the carton.

FIG. 7 is a view similar to FIG. 3 showing a further step in the closing operation.

FIG. 8 is a perspective view of a completely closed carton.

FIG. 9 is a plan view of a one piece blank from which an alternating carton is formed.

FIG. 10 is a perspective view similar to FIG. 3, illustrating the box filled and ready to be closed.

FIG. 11 is a perspective view illustrating the first step in closing of the carton.

FIG. 12 is an enlarged fragmentary view of one corner area of the carton when in the condition of FIG. 11.

FIG. 13 is an enlarged cross sectional view taken along 13—13 of FIG. 12.

FIG. 14 is a perspective view similar to FIG. 10 showing a further step in the closing operation.

FIG. 15 is a perspective view of the completely closed carton illustrated in FIG. 9.

The carton according to the invention is constructed from a one piece blank such as is illustrated in FIG. 1. That one piece blank has a coating 14 over its entire surface (FIG. 2) of a thermoplastic material which will seal to itself when heat is applied. Two such materials which have been found to be quite satisfactory are polyethylene and polyvinylidene chloride, commonly referred to as Saran. The manner in which the coating is applied to the

blank forms no part of the present invention as any satisfactory method of applying a thermoplastic coating or film will suffice. The carton has a back panel 15, a side panel 16, a front panel 17, another side panel 18 and a side sealing flap 19 which are serially interconnected in the sequence recited above. The designation of "front" and "back" panels is not intended to be a limitation on the invention, but rather is a designation employed in order to clarify the description.

The panels 15-18 and flap 19 are hinged together along creases 20. The blank also has two hinge lines formed by creases 21 run perpendicularly to the crease 20. Projecting to each side of the blank are end closing elements whose configurations and orientation with respect to each other provide the desired sealed closure for the carton. The raw edge of side sealing flap 19 may be treated with a grease resistant material 22 (FIG. 2) during manufacture to prevent wicking of the grease. This is the only board edge in contact with the packaged material.

The back panel 15 has at each end an inside flap 25. A sealing tab 26 is hinged to the edge of the inside flap 25 along the crease 27 and has side edges 27A and 27B. The front panel 17 has an outside flap 28 hinged to it along the crease 21. The outside flap 28 has an overtuck 29 hinged to it along the crease 30.

A gusset 33 is located on each side of the outside flap 28. When the side sealing flap 19 is secured to the back panel 15 to form a rectangularly configured carton, the gusset 33 interconnects the outside and inside flaps 28 and 25 respectively (FIG. 3).

Each gusset is formed of two principal triangular portions, 35 and 36, and in this embodiment, a third triangular portion 37 whose principal function is to provide an excess of material for the reasons discussed below. Each triangular portion 35 is hinged to the inside flap 25 along crease or hinge line 20. (One triangular portion 35 is hinged to the side sealing flap 19, but when it is joined to the front panel, the triangular portion 35 becomes hinged to the inside flap.) The triangular portions 36 are hinged to the side panels 16 and 18 along crease 21. The two triangular portions 35 and 36 are hinged to each other along a diagonal crease 39. The third triangular portion 37 is hinged to the triangular portion 36 along a diagonal crease 40 which intersects the diagonal crease 39. The resultant gusset 33 is thus a $\frac{3}{4}$ square having a quarter square V forming its free edge 41.

As indicated above, the function of the triangular portion 37 is to provide an excess of material in the corner forming areas of the carton indicated at 42. The sealing tab 26 is joined to the inside flap 25 at the hinge line 27 in such a manner as to provide an excess of material at the corner forming areas indicated at 43. Stated another way, on each side of the carton the hinge line 20 of triangular portion 35 intersects the hinge line 27 of the sealing tab 26 at a point located inwardly of the side edge of the sealing tab and the free edge of the triangular portion 35 to create the area of excess material 43. As will appear below the corner forming areas 43 engage the corner forming areas 42 when the carton is closed and provides the critical plastic to plastic seal.

Referring to FIG. 3, the first step in the operation of erecting the boxes is illustrated. The panels are folded with respect to each other through an angle of ninety degrees to provide the rectangularly configured box as illustrated in FIG. 3. Prior to erecting the carton as illustrated in FIG. 3, the side sealing flap 19 is adhesively secured to the back panel and to a portion of each inside flap with the coated surface on the inside of the carton. That preliminary seal of the side sealing flap 19 is made by the carton manufacturer and the cartons are shipped in a flattened condition to the packager. The packager thereafter erects the box into rectangular configuration illustrated. One end of the box is then closed and sealed in the manner to be described below. Both ends of the box are closed and sealed in an identical manner and

therefore, only one will be described. After one end has been closed and sealed the box is filled and the remaining end closed and sealed. For the purpose of this description it is assumed that the package has been filled and the last closing operation, identical to the first, is to be done.

The first step in the closing operation is illustrated in FIG. 4. That step requires the initial outward bowing of the gussets 33 along their hinge lines and swinging of the inside flap across the end of the carton. The inside flap 25 has a width equal to the width of the opening across which it extends. Therefore, in swinging the inside flap 25 across the end of the box the sealing tab 26 engages the outside flap 28 and is folded through an angle of ninety degrees with respect to the inside flap. This operation brings the plastic coating of the sealing tab into facial engagement with the plastic coating of the outside flap. It also causes the excess material 43 at the hinge line of the sealing tab to deform into facial engagement with the plastic coating on the excess material 42 provided by the triangular portion 37.

When the inside flap 25 has been brought straight across the end of the carton as illustrated in FIG. 4, triangular portion 35 is folded over upon triangular portion 36, thereby bringing their plastic coatings into engagement. This critical plastic to plastic engagement between the corner engaging surfaces is best illustrated in FIGS. 5 and 6. From these two views it can be seen that at the corner area there is a continuous plastic to plastic seal formed by the engagement of triangular portion 35 with triangular portion 36, by excess material 43 in engagement with excess material 42 and by engagement of sealing tab 26 with outside flap 28.

As indicated above it is necessary to the heat sealing operation that a backup pressure be applied to the surface to be sealed, that is to say the two walls to be sealed must be clamped between an anvil device and the heated element. When the carton is in the condition illustrated in FIG. 4, an element 48 may be slid into the space defined by the sealing tab 26 and gussets 33 to form one side of the clamp and a U shaped bucket 49 brought into engagement with the outside surface of the carton immediately above the hinge line 21. Either or both of these elements may be heated. In either event, at least one of the elements should be heated, the other element providing the clamping or backup pressure to bring the plastic to plastic surface tightly together during the sealing process.

Any surface irregularities which might occur in the excess material 43 when it is deformed during the process of bringing it into engagement with the excess material 42 are pressed out by the pressure of the clamping operation effected by elements 48 and 49.

Following the application of the heat seal with the elements 48 and 49 as described above, the end of the box has been closed for the practical purpose of retaining the goods within the box against deleterious effects referred to above. The remaining operations are primarily for the purpose of bringing the gussets and the outside flap in against the end of the carton. To this end, as illustrated in FIGS. 7 and 8, the gussets 33 are folded inwardly toward each other to overlie the inside flap 25. The outside flap 28 is swung over the inside flap, thereby sandwiching the gussets by the outside and inside flaps. The over tuck 29 is then glued or otherwise adhesively secured to the top edge portion of the back panel 15, thereby holding the outside flap in the closed position against the back pressure of the gussets whose inherent resilience tends to urge the outside flap to an open position.

The construction of the embodiment of FIGS. 9 to 15 is similar to the construction of FIGS. 1 to 8, the principal distinction being in the gusset structure. The carton is a one piece blank 50 which has a film on that surface which forms the inside of the carton. The film is a thermoplastic material such as polyethylene or Saran, as

discussed above and is indicated at 51 in the cross sectional view of FIG. 13. The blank has the following serially interconnected members: a back panel 52, a side panel 53, a front panel 54, a side panel 55 and a side sealing flap 56. These elements are interconnected by parallel creases 57 which form fold lines used in the erection of the box. These elements are also defined at their ends by creases 58 running perpendicular to the creases 57, the creases 58 forming fold lines for the end structure of the carton.

The back panel 52 has at each end an inside flap 60 which is hinged to the back panel along the crease 58. A sealing tab 61 is hinged to the extreme edge of the inside flap along the crease 62. Each sealing tab has an excess of material which projects beyond the outline of the inside flap a short distance to form corner sealing areas 63 and 64. The sealing area 64 is formed by disposing the intersection of creases 57 and 62 at a point spaced inwardly from the diagonal cut 65 which forms the free edge of the gusset 76 and the side edge of the sealing flap 61.

The front panel 54 has at each end an outside flap 68 which is hinged to the front panel along the crease 58. An overtuck 69 is hinged to the extreme edge of the outside flap along a crease 70.

Gussets 72 are disposed of on each side of the flap 68. When the side sealing flap 56 is joined to the back panel 52, either on the inside or outside thereof, the gussets 72 will be symmetrically located between the outside and inside flaps. Each gusset is formed of two triangular portions. One triangular portion 74 is hinged to the side panel 53 or 55, respectively along the crease 58. A second side of the triangle is delineated by a crease 75 by which the triangular portion 74 is hinged to the other triangular portion 76. The third side of the triangular portion 74 is formed by the cut edge 77 which intersects the outside flap lateral edge at a point 78 spaced outwardly from the crease 58. The area between the point 78 and the crease 58 is indicated at 79 and is a corner sealing area cooperating with corner sealing areas 63 and 64 respectively, as will be described below.

The second triangular portion 76 is formed at one side by a cut edge 65. The crease 57 forms another side thereof, and the crease 75 by which it is hinged to the first triangular portion 74 forms the third side thereof.

The manner in which the carton is erected is illustrated in FIGS. 10 to 15. In the manufacture of the carton the blank is cut and the cut, creased and coated with the thermoplastic film as indicated above. The side edges of the one piece blank may be coated with a grease resistant material, such as a plastic or a lacquer as illustrated in FIG. 2 of the earlier described embodiment. The manufacturer also glues the side sealing flap 56 to either the inside or outside surface of the back panel 52. In this condition the carton can be folded flat and shipped to a packager of goods.

The packager of goods will, in automatic machinery, open the carton, seal one end of the carton, fill the carton, and seal the other end, thereby forming the package of goods. The sealing of the bottom end of the carton is identical to the sealing of the top end of the carton and only one will be described. When the carton has been opened from its flat condition, sealed at one end and filled, the carton is in the condition illustrated in FIG. 10. From the condition of FIG. 10 the first step in the sealing operation is to bring the inside flap 60 across the open end of the carton. In so doing, the triangular portions 74 and 76 are folded upon each other with their plastic surfaces in engagement and the sealing flap 61 is brought into engagement with the outside flap, the thermoplastic surfaces of each being in contact. The outside flap, sealing flap and gusset may be held generally in the attitude illustrated in FIG. 4 of the earlier embodiment with the outside flap projecting upwardly from the end of the carton. In the earlier embodiment, this position of

the elements is made necessary by the three triangular portion construction of the gussets. In the present embodiment of FIGS. 9 to 15 the two triangular portion construction of the gussets permits the gussets, outside flap and sealing tab to be laid flat as shown in FIG. 11. A U-shaped bucket 83 which is normally in engagement with the front and side panels as the carton passes through the automatic filling and sealing machinery provides an anvil type surface against which the gussets and outside flap can be laid flat during the sealing operation. A heating element 84 is then brought into contact with the gusset 72 and the sealing tab 61 to form a seal over all contacting surfaces.

In this embodiment, as well as in the earlier embodiment the sealing at the corners is of paramount importance. The corners adjacent the outside flap are the areas of greatest vulnerability from the standpoint of leakage. In accordance with the invention, the excess of material provided at the areas 79 is engaged by the excess material adjacent the ends of the sealing flap as indicated at 63 and 64. If the carton is sealed as indicated in the earlier embodiment and as shown in FIG. 4, the seal at the corners will be as shown in FIG. 6. The seal is slightly different when the carton is in the condition of FIG. 11 with the gussets and back panel lying in the same plane. In this condition, as shown in FIG. 13, there may be a slight tearing of the carton at the areas 79, due to the forcing of the outside flap out of the plane of the front panel. However, the thermoplastic film in the sealing areas 63 and 64 will, upon engagement by the heating element 84, flow into the slightly torn corner portions and will form an effective seal in those areas.

At this stage in the operation the carton is completely sealed. The remaining steps are for the purpose of folding the gussets and outside flap against the end of the carton. The next step, as illustrated in FIG. 14, is to fold the gussets over the outside surface of the inside flap. Thereafter, the outside flap is brought over the gussets and the end of the carton and the overtuck is glued to the back panel of the carton.

Having described my invention I claim:

1. A paperboard box comprising a one piece blank having its inner surface coated with a thermoplastic material, said box comprising,

front and back panels joined by side panels to form a rectangular parallelepiped, said box having closing means at each end as follows:

a rectangular inside flap hinged to the edge of said front panel and a sealing tab joined on a hinge line to the edge of said inside flap, said sealing tab having side edges, said sealing tab having an excess of material projecting laterally from its hinge line to form a corner sealing area,

a rectangular outside flap hinged to the edge of said back panel,

a gusset at each side of said box, each gusset having at least two triangular portions: a first hinged on the edge of a side panel and a second joined by a hinge line on the side edge of said inside flap, said portions being joined together along a diagonal fold line, the hinge lines of said sealing tab and said second triangular portion intersecting at a point located inwardly of the side edge of said sealing tab and the free edge of said second triangular portion,

said gusset being connected to said outside flap to provide an excess of material extending outwardly beyond the corner formed by said front panel, a side panel and said outside flap,

said box, when closed, having said inside flap folded across the end of said box with the sealing tab having its coated surface engaging the coated surface of said outside flap; with the coated surfaces of the triangular portions in engagement with each other; and with the coated surface of the projecting material of the sealing tab contacting the excess material at said

corner, said gussets being inwardly folded and said outside flap being folded over said gussets and said inside flap.

2. A paperboard box having its inner surface coated with a thermoplastic material, said box comprising, front and back panels joined by side panels, said box having closing means at each end as follows:
- a rectangular inside flap hinged to the edge of said front panel and a sealing tab joined on a hinge line to the edge of said inside flap, said sealing tab having side edges, said sealing tab having an excess of material projecting laterally from its hinge line to form a corner sealing area,
 - an outside flap hinged to the edge of said back panel, a gusset at each side of said box, each gusset being formed of at least two portions hinged together: a first hinged on the edge of a side panel and a second joined by a hinge line to the side edge of said inside flap, said portions being joined together along a diagonal fold line,
 - the hinge lines of said sealing tab and said second triangular portion intersecting at a point located inwardly of the side edge of said sealing tab and the free edge of said second triangular portion,
 - said gusset being connected to said outside flap to provide an excess of material extending outwardly beyond the corner formed by said front panel, a side panel and said outside flap,
 - said box, when closed, having said inside flap folded across the end of said box with the sealing tab having its coated surface engaging the coated surface of said outside flap; with the coated surfaces of the triangular portions in engagement with each other; and with the coated surface of the projecting material of the sealing tab contacting the excess material at said corner.
3. A paperboard box having its inner surface coated with a thermoplastic material, said box comprising, front and back panels joined by side panels to form a rectangular parallelepiped, said box having closing means at each end as follows:
- a rectangular inside flap hinged to the edge of said front panel and a sealing tab joined on a hinge line to the edge of said inside flap, said sealing tab having side edges, said sealing tab having an excess of material projecting laterally from its hinge line to form a corner sealing area,
 - a rectangular outside flap hinged to the edge of said back panel and an over tuck hinged to the edge of said outside flap,
 - a gusset at each side of said box, each gusset having only two triangular portions: a first hinged on the edge of a side panel and a second joined by a hinge line to the side edge of said inside flap, said portions being joined together along a diagonal fold line,
 - the hinge lines of said sealing tab and said second triangular portion intersecting at a point located inwardly of the side edge of said sealing tab and the free edge of said second triangular portion,
 - said first triangular portion having a free edge intersecting the side edge of said outside flap at a point spaced outwardly from the edge of said back panel,
 - said box, when closed, having said inside flap folded

across the end of said box with the sealing tab having its coated surface engaging the coated surface of said outside flap; with the coated surfaces of the triangular portions in engagement with each other; and with the coated surface of the projecting material of the sealing tab contacting the corner area formed by the first triangular portion and said outside flap, said gussets being inwardly folded and said outside flap being folded over said gussets and said inside flap.

4. A paperboard box having its inner surface coated with a thermoplastic material, said box comprising, front and back panels joined by side panels to form a rectangular parallelepiped, said box having closing means at each end as follows:
- a rectangular inside flap hinged to the edge of said front panel and a sealing tab joined on a hinge line to the edge of said inside flap, said sealing tab having side edges, said sealing tab having an excess of material projecting laterally from its hinge line to form a corner sealing area,
 - a rectangular outside flap hinged to the edge of said back panel,
 - a gusset at each side of said box, each gusset having three triangular portions: a first hinged on the edge of a side panel, a second joined by a hinge line to the side edge of said inside flap, said first and second portions being joined together along a diagonal fold line, and a third hinged on the side edge of said outside flap and on the edge of said second triangular portion, said third triangular portion providing an excess of material at the corner formed by the front panel, side panel and outside flap,
 - the hinge lines of said sealing tab and said second triangular portion intersecting at a point located inwardly of the side edge of said sealing tab and the free edge of said second triangular portion,
 - said box, when closed, having said inside flap folded across the end of said box with the sealing tab having its coated surface engaging the coated surface of said outside flap; with the coated surfaces of the first and second triangular portions in engagement with each other; and with the coated surface of the projecting material of the sealing tab contacting the excess material at said corner, said gussets being inwardly folded and said outside flap being folded over said gussets and said inside flap.

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