Dec. 19, 1961 J. MENNEN 3,013,668

SUPPORT STRUCTURE

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FIG. 1

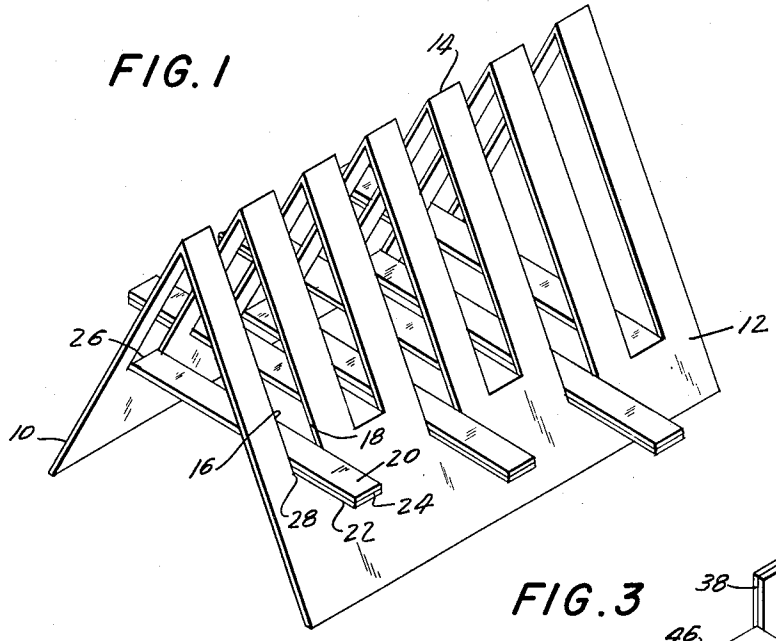


FIG. 3

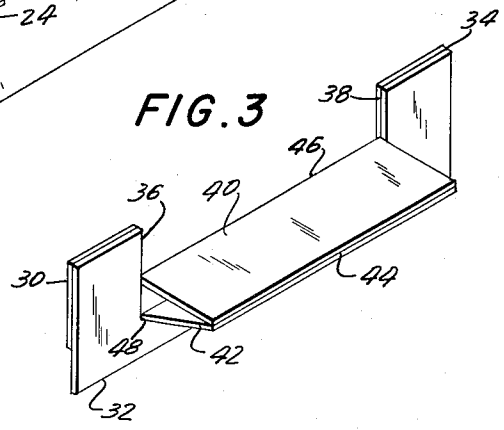
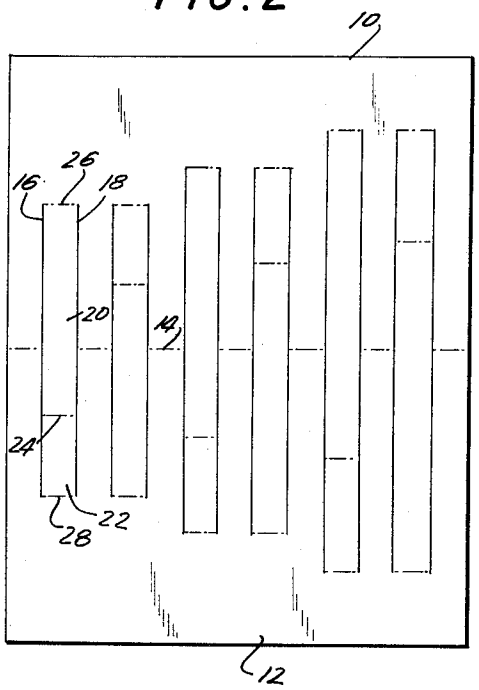


FIG. 2



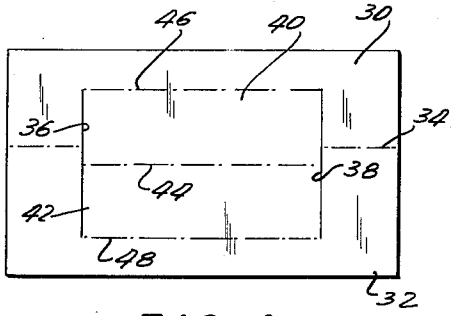


FIG. 4

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FIG. 5

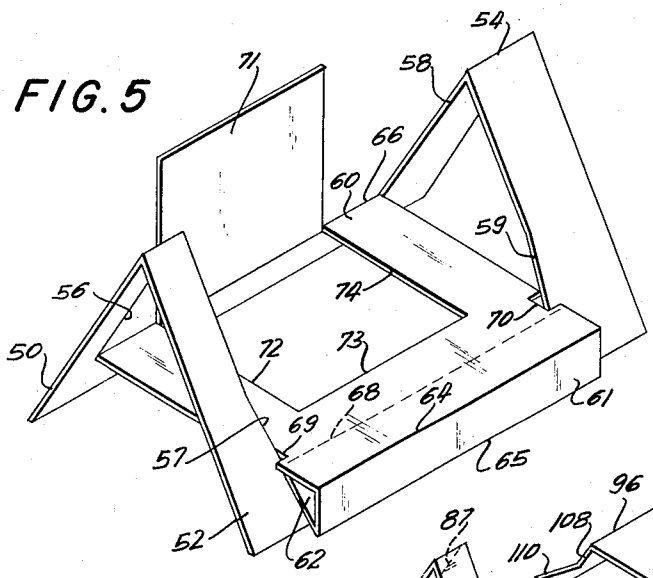


FIG. 7

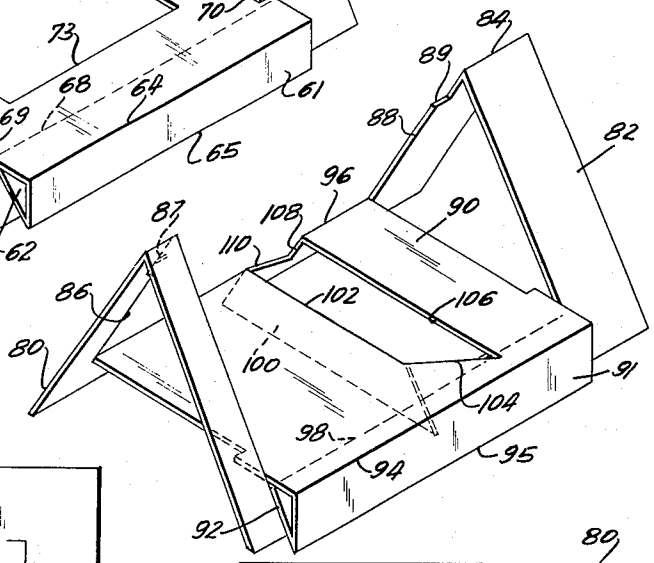
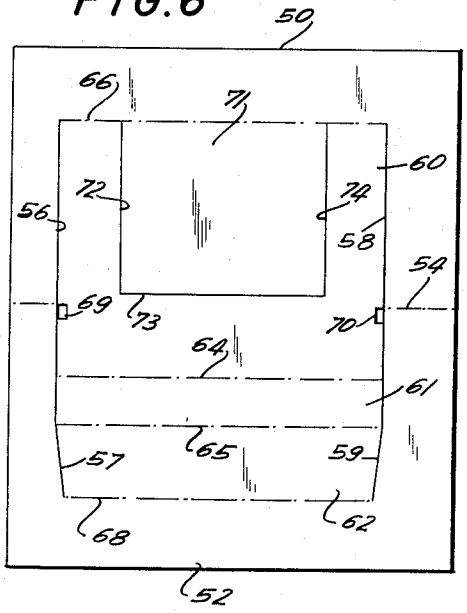


FIG. 6



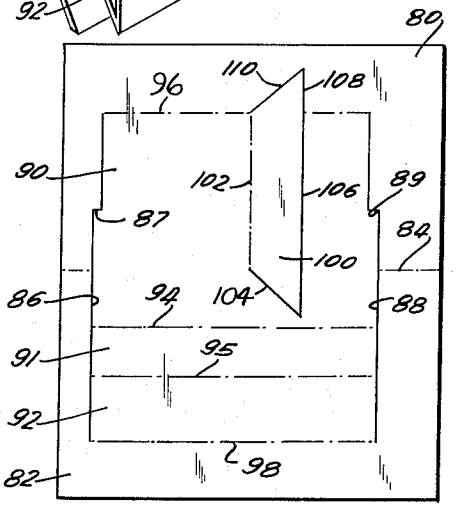


FIG. 8

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FIG. 9

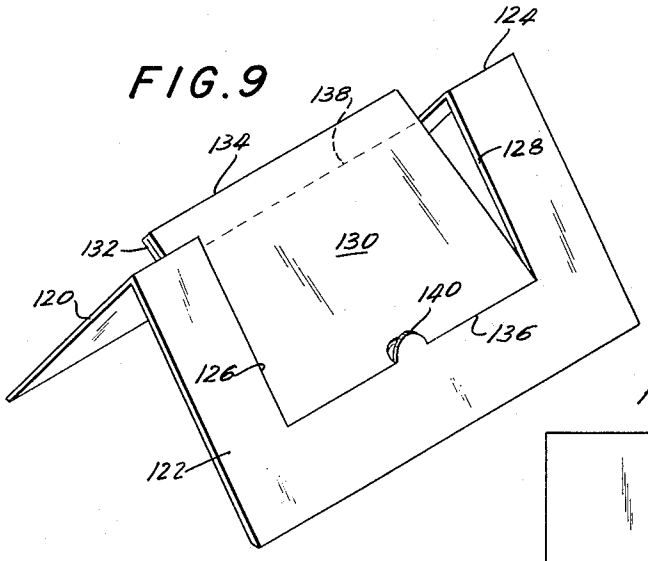


FIG. 10

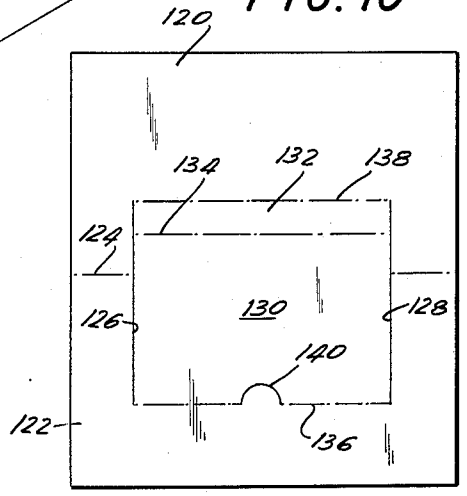


FIG. 11

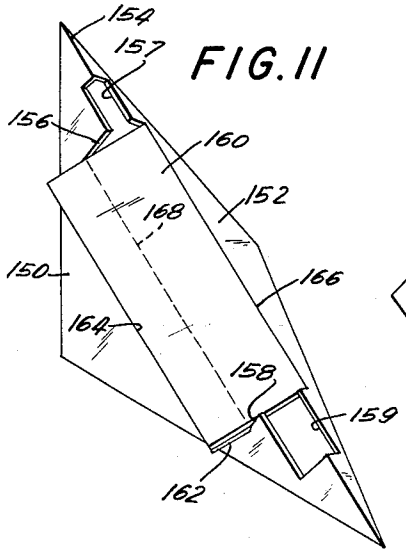
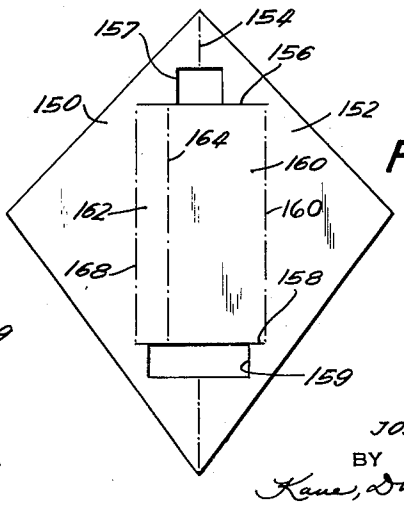


FIG. 12



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FIG. 13

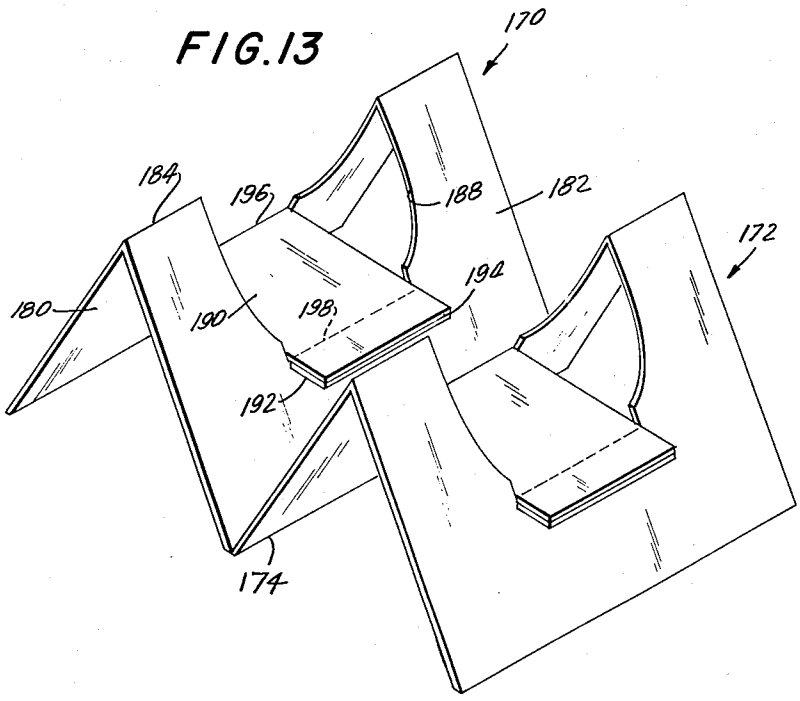
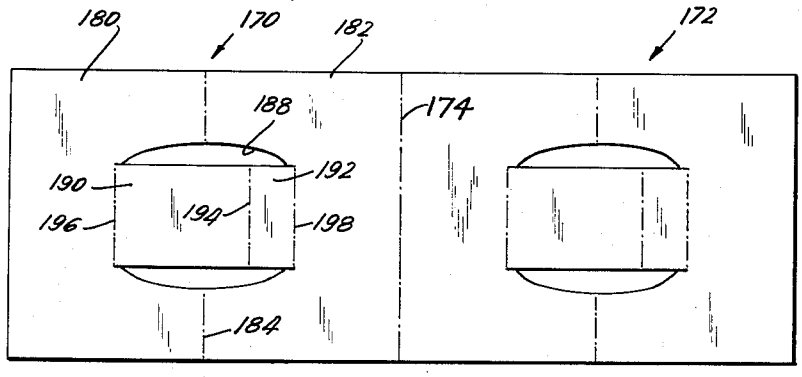


FIG. 14



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3,013,668

SUPPORT STRUCTURE

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Filed Apr. 28, 1958, Ser. No. 731,311
7 Claims. (Cl. 211—40)

This invention relates to a support structure having many uses; and one which is adapted to be fabricated from a single sheet of material and be supplied as a collapsible type unit.

An additional object of this invention is to provide a display structure for commodities such as those normally sold at retail, with the additional provision that both items may be delivered to or by the purchaser as a unit.

Another object of this invention is to provide a package stiffener for the protection of breakable items and the like and which may be subsequently employed as a support for such items or a number of other items.

Still another object is to provide a display rack or support for such articles as phonograph records, books, magazines, greeting cards, tile, various shaped receptacles and the like.

A further object is to provide an inexpensive support capable of receiving large loads and adapted to be readily modified to endure increased loads thereby reducing and minimizing the possibility of failure.

Still a further object is to provide an inexpensive collapsible type support for receiving, if desired, a plurality of like articles in spaced-apart relationship.

An important object is to provide racks or supports adapted to be mounted on most any type of supporting surface, whether vertical, horizontal or inclined, with the further provision of selection of the plane on which a supported article rests.

Another important object is to provide a relatively simple and inexpensive support or rack which is adapted to be fabricated by employing inherently inexpensive manufacturing techniques.

Other objects and advantages will become apparent from the following detailed description, which is to be taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a support embodying the teachings of the present invention;

FIG. 2 is a plan view of a cut and scored sheet capable of forming the structure illustrated in FIG. 1;

FIG. 3 is a perspective view of an embodiment of this invention suitable for attachment to vertically-disposed surfaces;

FIG. 4 is a plan view of a cut and scored sheet adapted to be folded into the structure illustrated in FIG. 3;

FIG. 5 is a perspective view of still another embodiment of this invention suitable for advertising purposes as well as receiving increased loads;

FIG. 6 is a plan view of a cut and scored sheet adapted to form the structure illustrated in FIG. 5;

FIG. 7 is a perspective view of a further embodiment of this invention in which means are provided for strengthening the basic structure in order that increased loads can be suitably supported thereon;

FIG. 8 is a plan view of a cut and scored sheet capable of forming the structure illustrated in FIG. 7;

FIG. 9 is a perspective view of a structure embodying the teachings of the present invention and adapted to present an inclined surface for supporting an article thereon;

FIG. 10 is a cut and scored sheet capable of forming the structure illustrated in FIG. 9;

FIG. 11 is a perspective view of another embodiment of this invention on which articles having contoured surfaces resembling those of bottles, can be suitably supported and be disposed at an incline;

FIG. 12 is a plan view of a sheet adapted to form the structure illustrated in FIG. 11;

FIG. 13 is a perspective view of a multiple support structure incorporating the principles of the present invention; and

FIG. 14 is a plan view of a scored and cut sheet of material adapted to form the structure illustrated in FIG. 13.

Referring now to FIG. 1, wherein a support structure is comprised of a pair of divergent side walls **10** and **12** connected to one another along a zone represented by numeral **14**. This connection **14** for a majority of the contemplated applications is preferably hinged or articulated. The side walls **10** and **12** are preferably fabricated from sheet material, as will become evident shortly, especially when cost is of extreme importance.

The side walls **10** and **12** are each provided with at least one pair of spaced cut or slit portions **16** and **18** which are transverse to connection **14** and are in substantially spaced-apart relation with respect to one another. A pair of panels **20** and **22** are provided and are connected to one another at connection **24**, which similarly is preferably hinged or articulated. As shown, the panels are of unequal length, with the longer panel **20** connected to side wall **10** through connection **26**, which is also hinged or articulated. The shorter panel **22**, on the other hand, is similarly hinged or articulated with respect to the other side wall **12** along connection **28**.

Obviously, the angle at the apex of a triangle defined by side walls **10** and **12** is adapted to be selected from a value below 180° to and including 0°. Actually, the lengths of panels **20** and **22** will have to be adjusted to define the connection **24** at such a position that both panels will lie in the desired planes.

In FIG. 1, panels **20** and **22** are constructed and arranged to be substantially parallel to the horizontal, but this relative disposition can be selectively altered as will become apparent in the detailed description that is to follow. In this connection, if it is desired that panels **20** and **22** be parallel to the horizontal, connections **26** and **28** should be equi-distant from the apex defined by connection **14**. Clearly, the relative lengths of panels **20** and **22** will be dependent upon the angle to be defined by side walls **10** and **12**, as well as their disposition relative to the horizontal or side wall mounting surface.

The position of the panels **20** and **22** with respect to the connection **14** may be varied simply by increasing or decreasing the distance between connection **14** and connections **26** and **28**. The longer panel **20** will function to provide a mounting or receiving surface for articles to be interposed between cuts **16** and **18**. As shown, an end portion of the longer panel **20** will project beyond one of the side walls. The shorter panel **22** functions as a strut to be cooperable with the longer panel **20** to prevent the side walls **10** and **12** from increasing or decreasing the apex angle at connection **14** and thus maintain these side walls in the selected assembled position.

A number of additional cuts **16** and **18**, with corresponding panels **20** and **22**, may be provided in the side walls. Accordingly, all of the panels **20** and **22** may be in a common plane with the connection **24** disposed at the same side of a reference side wall, or as shown in FIG. 1, this connection **24** may be staggered or alternated which further functions to supply additional rigidity to the support structure. The panels **20** and **22** need not be disposed in a common plane, but may be so located to lie in selected spaced-apart planes substantially as illustrated in FIG. 1.

In FIG. 2, provisions are made for fabricating the struc-

ture illustrated in FIG. 1 from sheet material. Thus, in providing the structure of FIG. 1, the side panels 10 and 12 may be included in a single rectangular sheet of material which is scored centrally along interrupted zones to provide the hinged or articulated connection 14. Cuts 16 and 18 are formed in side walls 10 and 12 and, for purposes of the structure illustrated in FIG. 1, are preferably normal to scoring 14. Hinged connections 26 and 28 are formed by simply scoring the side walls 10 and 12 respectively between the terminal ends of the cuts 16 and 18. Connection 24 is in turn provided by scoring, which will be located in an offset relationship with respect to scoring 14.

As will be evident from the foregoing, scoring 24 will be so located with respect to scoring 14 to place the panels 20 and 22 in the desired planes for the particular apex angle selected. In this connection, if the apex angle is 60°, the lengths of panels 20 and 22 will be in the ratio of 3 to 1, to thus render the panels parallel to the horizontal or to the mounting surface if the side walls 10 and 12 have identical dimensions.

When the structure of FIG. 1 is fabricated to possess the characteristics of collapsibility and assume the formation illustrated in FIG. 2, the single sheet of material of the latter figure can be employed as a backing or package stiffener, particularly suitable for phonograph records. In this connection, the commonly employed phonograph record jackets could be provided with cuts and scoring to subsequently provide a phonograph record display rack.

Additional support structures will now be described with reference to the drawings and the many ramifications of the foregoing embodiment are equally applicable to the following.

Referring now to FIG. 3, a support structure is there provided for suitable attachment to a vertically inclined mounting surface. A pair of side walls 30 and 32 are connected in substantially face-to-face contact and joined by a hinged connection 34. Cuts or slits 36 and 38 are provided in side walls 30 and 32 and are substantially parallel to each other and aligned transversely with respect to connection 34. A top panel 40 is connected to the side panel 30 and panel 42 which in turn is connected to side wall 32. The connection 34 of panels 40 and 42, connection 46 of top panel 40 and side wall 30 and connection 48 of panel 42 with side wall 32 is preferably hinged or articulated. As shown, top panel 40 is substantially normal to each of the side walls 30 and 32, with panel 42 slightly inclined to function as a diagonal strut capable of transmitting therethrough loads encountered by top panel 40.

The support structure of this embodiment can be of the collapsible type and, as illustrated in FIG. 3, may be formed from sheet material provided with suitable cuts and scoring. Thus, this sheet material will include side walls 30 and 32 which are separated by the interrupted scoring 34. Cuts and slits 36 and 38 extend into these side walls and are transversely disposed in spaced relationship with respect to the centrally appearing scoring 34. Scoring 46 and 48 extend between the terminal ends of these cuts, and together with scoring 44, define panels 40 and 42.

Obviously the length of cuts 36 and 38 and location of the associated scoring 46 and 48 together with the relative positioning of scoring 44, will be such that when the collapsed sheet is folded into the assembled form, the top panel 40 will be substantially normal to the side walls 30 and 32. If desired, the lower panel 42 can be provided with a greater incline with respect to the top panel 40 by simply increasing its length and correspondingly increase the distance at which the cuts 36 and 38 extend into side wall 32. Naturally, scoring 48 will then be at a greater distance from scoring 34 because of such increase in length of the cuts 36 and 38.

In the event that the mounting surface, which is to receive side wall 30, is not truly vertical or is inclined with respect to the horizontal, the various cuts and scorings will have to be relocated in order that the top panel 40 will be substantially parallel to the horizontal. The manner in which this is accomplished is within the scope of one skilled in the art and will not be fully amplified for this reason at this time. Any of the conventional attaching or securing means may be employed in connecting the side wall 32 with the mounting surface and these may include nails, screws, nuts and bolts, adhesives, or other appropriate means.

In FIG. 5 a support structure is illustrated which is adapted to receive increased loads thereon. In this regard, side walls 50 and 52 are connected along zone 54 and this connection 54 is preferably hinged or articulated. The apex angle defined by the side walls 50 and 52 can be selectively varied in the manner discussed in connection with the structure of FIGS. 1 and 2.

Cut or slitted portions 56 and 58 are provided and extend into each of the side walls 50 and 52. A locking means is preferably included in the structure of this embodiment, the necessity of which will become apparent from the description that is to follow. Included within this locking means are converging terminal cut portions 57 and 59 of cuts 56 and 58, respectively. Disposed substantially between the confines of these defined cut or slitted portions are panels 60, 61 and 62. The longer, substantially horizontal panel 60 is connected to the substantially vertical panel 61 by a hinged or articulated connection 64. This vertically disposed panel 61 is in turn connected to the inclined panel 62 by connection 65, which is similarly hinged or articulated. The longer panel 60 is additionally connected to side wall 50 by hinged connection 66. The inclined panel 62 is connected to the other side wall 52 by means of the hinged connection 68.

The mentioned locking means further includes the openings 69 and 70 formed in the horizontal panel 60. These openings 69 and 70 are sufficiently dimensioned to receive therein the converging cut portions 57 and 59 respectively, thereby preventing the side walls 50 and 52 from increasing or decreasing the apex angle defined therebetween.

The dimensions of the side walls 50 and 52 and panels 60, 61 and 62 are preferably such that the juncture between panels 61 and 62 will be disposed in the plane defined by the bottom edge of the side walls 50 and 52. Consequently, the bearing area provided by surfaces of this embodiment when in contacting relationship with a mounting surface, will be appreciably increased. Additionally, means are thus provided for facilitating proper stress distribution. The panel 61 is preferably normal to panel 60 in order that the loads encountered by the cantilevered end of panel 60 are effectively transmitted to the mounting surface.

To illustrate one of the many versatile features of the instant invention, a flap 71 may extend from panel 60 and form an integral part thereof and further be hingedly connected thereto by means of the hinged connection 66. This flap 71 may be cut from panel 60 along the lines 72, 73 and 74. The surfaces of this flap 71 can receive advertising matter concerning the article or articles to be mounted on the upper face of panel 60.

The structure of FIG. 6 is readily fabricated from sheet material and is adapted to be of the collapsible type. Thus, this sheet material will embrace the side walls 50 and 52 hingedly connected to one another by means of the interrupted scoring 54. Cuts or slits 56 and 58 are provided in these side walls and have corresponding terminal end portions 57 and 59 thereof converging toward one another. Panels 60, 61 and 62 are disposed between the cuts 56 and 58, with panel 60 hingedly connected to panel 61, and panel 61 in turn connected hingedly to panel 62 by means of scoring 64 and 65, respectively. Panel 60 is hingedly connected to side wall 50 by means of scoring 66 extending between the terminal ends of cuts 56 and 58. Scoring 68 provides the hinged connection between panel 62 and side wall 52 and extends between the ter-

minal ends of the converging cut portions 57 and 59. Openings 69 and 70 are formed in the longer panel 60 to cooperate with surfaces of the converging cut portions 57 and 59, to provide the desired locking means for the support structure when in an assembled or folded condition. As previously mentioned, a hinged flap 71 may be formed from the longer panel 60 by means of scoring 66 and cuts 72, 73 and 74.

Turning now to the structure illustrated in FIG. 7, it will be observed that a support structure is provided with side walls 80 and 82 converging at apex connection 84, which is again preferably hinged. Cut portions 86 and 88 extend in side walls 80 and 82 substantially transverse to the hinged connection 84. These cut portions 86 and 88 may be so formed as to provide shoulders 87 and 89, respectively, which serve to provide a bearing or supporting means for articles intended to be associated with the supporting structure of this embodiment.

As provided in the embodiment of FIGS. 5 and 6, the instant support structure includes panels 90, 91 and 92. Panel 90 is connected to panel 91 along the zone 94, preferably in a hinged manner. Similarly panel 91 is hingedly connected to panel 92 along the zone 95. The other edge portion of panel 90 is connected to side wall 80 by means of a hinged connection 96. Panel 92 is connected to the other side wall 82 preferably by means of hinged connection 98. In an effort to provide additional structural strength to the support structure when increased loads are encountered by top panel 90, means are provided for increasing the support bearing area with a mounting surface and for decreasing the amount of flexure of top panel 90. This means includes a flap 100 preferably hingedly connected to top panel 90 along the zone 102. Further, this entire flap may be suitably formed by supplying cut portions 104 and 106 in top panel 90. The cut portion 106 is extended as at 108 into side wall 80. A cut portion 110 may then be extended from the juncture of hinged connections 96 and 102 to the terminal end of cut portion 108 substantially as shown. The flap 100 additionally serves the function of preventing undesirable movements of side walls 80 and 82 toward one another. As previously mentioned, the vertical panel 91 functions to transmit loads applied to the cantilevered end of top panel 90 and cooperate to distribute these loads to the mounting surface for the support structure. Obviously the locking means, provided for in the form of the invention of FIGS. 5 and 6, can be incorporated into the structure of the present embodiment.

In FIG. 8, cut and scored sheet material is disclosed which is capable of being folded to form the structure illustrated in FIG. 7. Thus, the sheet material will include side walls 80 and 82 hingedly connected by means of interrupted scoring 84. Cuts or slits 86 and 88 may then be provided in side walls 80 and 82 substantially normal to scoring 84. These cuts may be so formed as to provide shoulders 87 and 89. Panels 90, 91 and 92 are defined by scoring 94, 96 and 98, which are substantially parallel to and spaced from centrally located scoring 84. These score lines conventiently render the structure of FIG. 7 readily collapsible as well as facilitating its erection from the unfolded collapsed state. Flap 100, as previously mentioned, is formed by providing cuts 106, 108 and 110 and is advantageously hinged to panel 90 by means of scoring 102. In folding the sheet material illustrated in FIG. 8, it may prove to be desirable to displace panel 100 downwardly about its pivot 102 prior to folding the side walls 80 and 82 about their hinged connection 84.

Referring now to FIG. 9, a supporting structure is provided which facilitates the supporting and display of an article in an inclined relationship with respect to the horizontal. Accordingly, side walls 120 and 122 are connected to one another along the line 124, preferably by means of a hinged connection. Cut portions 126 and 128 are provided in side walls 120 and 122 and extend for a greater distance into one side wall than the other. A relatively long panel 130 and short panel 132 are disposed between the confines of the cut portions 126 and 128 and are preferably hingedly connected to one another along the zone 134.

The longer panel 130 is connected to side wall 122 in a hinged manner along the line 136. The shorter panel 132, on the other hand, is similarly hingedly connected to side wall 120 along the line 138. In order to prevent undesirable displacement of an article which rests upon the upper face of the longer panel 130, a tongue 140 is cut out of the panel 130, thereby presenting an extension of side wall 122. Thus, by having bottom edges of an article in engagement with surfaces of tongue 140, substantially any undesirable displacement or sliding movement of an article along the upper face of top panel 130 will be prevented while still displaying such an article on an inclined mounting panel.

In order to provide an inexpensive, readily foldable and collapsible structure for the embodiment illustrated in FIG. 9, the necessary components may be formed simply by scoring and cutting sheet material. Thus, in FIG. 10 a sheet of material may include side walls 120 and 122 hingedly connected to one another by means of scoring 124. Cut portions 126 and 128 are provided substantially normal to the centrally-located scoring 124 and preferably extend into side walls 122 for a greater distance than they extend into side wall 120. These cut portions cooperate to define panels 130 and 132 which are hingedly connected to one another by means of scoring 134. Panel 130 is hingedly connected to side wall 122 through scoring 136. Scoring 138 provides the desired hinged connection between 132 and side wall 120. The tongue 140 is cut out of panel 130 and forms an extension of side wall 122 substantially as shown. Scoring 134, 136 and 138 are preferably so located with respect to the central scoring 124 to enable the long panel 130 to be disposed at an incline with respect to the plane defined by the bottom edges of the side walls 120 and 122 when the latter are folded about their hinged connection 124 to ultimately define the selected apex angle. Additionally, when the structure is in an assembled state, the top panel 130 is preferably resting upon the hinged connection 138 to relieve stress from hinged connection 134 when a load is encountered by the upper face of panel 130.

The structure illustrated in FIG. 11 is particularly suited for the display of cylindrical articles such as conventional bottles or receptacles. Triangularly-shaped side walls 150 and 152 are preferably hingedly connected at 154 with corresponding edges adapted to rest upon a substantially flat mounting surface such that the hinged connection 154 will be inclined with respect to the plane of this mounting surface. The side walls 150 and 152 are provided with common cut portions 156 and 158 extending into these side walls by substantially the same amounts. The cut portions 156 and 158 are enlarged adjacent the hinged connection 154 to present cut-out openings 157 and 159, respectively. Panels 160 and 162 are located between cut portions 156 and 158 and are connected to one another preferably in a hinged manner along the line 164. Panel 160 is preferably hingedly connected to side wall 152 at their connection 166, while panel 162 is similarly hingedly connected to side wall 150 at 168. Thus, it will be seen that a cylindrical bottle can rest against the upper panel 160 and have the nozzle or next portion thereof adjacent or disposed within either one of the openings 157 or 159, depending upon which leg of the triangle, as defined by the side walls, is located adjacent the selected mounting surface.

In this connection, depending upon the relation of the support structure with respect to the mounting surface, it may be desirable to have the bottom edges of a bottle in engagement with the outer closed end of cut-out portion 157 or 159 instead of in engagement with those surfaces

of cut portions 156 or 158 which are adjacent the open end of cut-out portions 157 and 159.

In FIG. 12, cut and scored sheet material is illustrated which is adapted to be folded to form the structure illustrated in FIG. 11. The side walls 150 and 152 are hingedly connected by means of the interrupted scoring 154. The cut portions 156 and 158 extend into the side walls 150 and 152 by equal amounts and communicate with cut-out portions 157 and 159, respectively. As shown, the area of the respective cut-out portions need not be equal, in order to facilitate the effective display of the selected bottle.

Panel 160 is hinged to panel 162 by means of scoring 164. The hinged connections of the panels to the associated side walls are provided by scoring 166 and 168. When the sheet material of FIG. 12 is folded along scoring 154, with panels 160 and 162 pivoting about scoring 164, the structure of FIG. 11 is ultimately formed.

The structure illustrated in FIG. 13 is presented in order to disclose the applicability of the principles of the present invention to a plurality of similar or otherwise interdependent support structures, as well as showing a structural formation particularly suitable for receiving cylindrical articles. The pair of support structures 170 and 172, which for purposes of illustration are shown to be substantially identical, are preferably hingedly connected along the line 174. Each support structure includes side walls 180 and 182 preferably hingedly connected along the line 184. Enlarged cut portions 186 and 188 extend into these side walls and the terminal ends thereof are equi-distant from the hinged connection 184. By providing the outer face of each of the cut portions 186 and 188 with an arcuate configuration, cylindrically-shaped articles may be conveniently disposed within the confines thereof. The usual panels 190 and 192 are hingedly connected to one another at 194. Panel 190, in turn, is hingedly connected to side wall 180 by means of connection 196, while panel 192 is hingedly connected to side wall 182 by connection 198.

Obviously similar or different support structures may be employed or connected together and the number of variations possible are infinite in number.

In FIG. 14 sheet material may be used to form the multiple support arrangement illustrated in FIG. 13. Accordingly, support structures 170 and 172 are hingedly connected to one another by means of scoring 174. The support structures 170 and 172 are provided with scoring 184 to provide the desired hinged connection between side walls 180 and 182. The somewhat enlarged arcuately shaped cut portions 186 and 188 are formed in each of the side walls 180 and 182, with the inner edge thereof substantially normal to the scoring 184. Scoring 194, 196 and 198 are provided to define the panels 190 and 192 as well as to present the desired hinged connections for these panels. The sheet material is initially folded along scoring 174 to arrive at the selected support structures 170 and 172. Each of these support structures are then folded along scoring 184 as well as scoring 194, to arrive at the assembled multiple support arrangement.

Relatively simple and inexpensive stamping and scoring operations are preferably employed in fabricating the sheet material utilized for the various support structures previously described. The sheet material usable with the present invention is infinitely variable; however, the essential requirements are that this material encompass any relatively firm material capable of being scored and cut to provide the necessary slits and hinged connections. In this connection, such materials as fibreboard, corrugated chipboard and certain sheet metals and plastics are usable. These materials are comparatively light in weight, but nevertheless are capable of supporting an unusually heavy load when employed in forming the support structures of this invention. Additionally, these materials facilitate the employment of extremely simple manufacturing techniques which include simple die-cutting, stamping and scoring operations which are appreciably inexpensive and which are advantageous since no significant finishing operations are necessary.

Thus, the many objects and advantages herein defined, as well as others, are most effectively attained. Obviously many changes may be made without departing from the spirit of the present invention. Accordingly, the various structural embodiments disclosed herein are not intended to be limiting and consequently the scope of the invention will be defined by the appended claims.

I claim:

1. A supporting structure for articles formed from sheet material, said structure comprising a pair of substantially flat members hingedly connected to one another and defining an angle less than 180°, a pair of opposed cut portions transverse of the hinged connection and extending into each of the members and defining an opening between peripheral edge portions thereof, a supporting panel having a surface on which the articles to be supported are adapted to rest and being hingedly connected to one member of said pair transversely of the opposed cut portions at a location spaced from the connection of said pair of members and having portions thereof disposed in said opening, said pair of members being cooperable to support said panel in said opening, a second panel hingedly connected to the other member of said pair transversely of the opposed cut portions at a location spaced from the connection of said pair of members, and said second panel being hingedly connected to said supporting panel at a location more removed from one of said pair of members than the other of this pair and being cooperable with said pair of members to support said supporting panel in said opening.

2. The invention in accordance with claim 1, wherein more than one supporting panel and second panel are substantially identically constructed and arranged to be substantially identically hingedly connected to one another and to said pair of members.

3. The invention in accordance with claim 1, wherein at least one more pair of hingedly connected members are connected to the first defined pair of members and have a substantially identical supporting panel and second panel constructed and arranged to be substantially identically hingedly connected to one another and to the associated pair of members.

4. The invention in accordance with claim 1, wherein said opposed cut portions are enlarged in a direction parallel to the hinged connection of said pair of members for providing said opening with correspondingly increased dimensions.

5. The invention in accordance with claim 1, wherein a third panel projects from said supporting panel to provide a supporting surface for said supporting panel.

6. The invention in accordance with claim 1, wherein the connection of said supporting panel and said second panel includes a panel member itself hingedly connected to each of the panels for cooperating to support said supporting panel in said opening.

7. The invention in accordance with claim 1, wherein retaining means are presented by said supporting panel and said other member of said pair of members for cooperating to maintain said support structure in an assembled state.

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