Nov. 5, 1963 F. LANGE 3,109,574

FOLDABLE CONTAINER

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Fig. 1

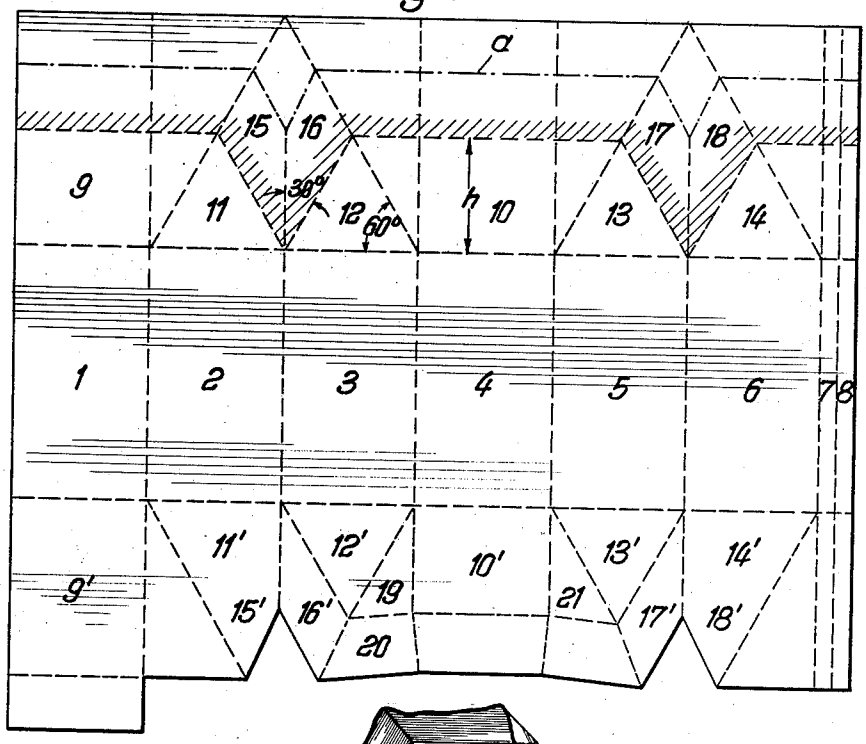


Fig. 2

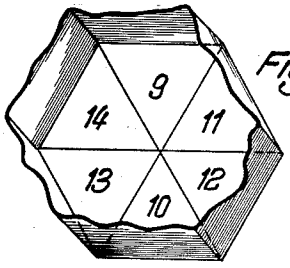


Fig. 3

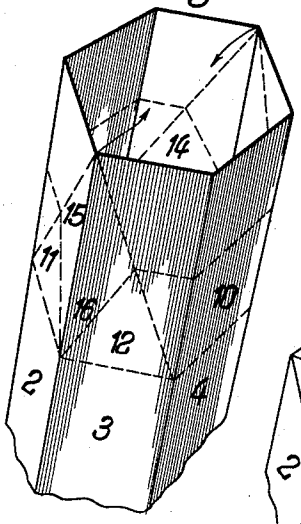


Fig. 4

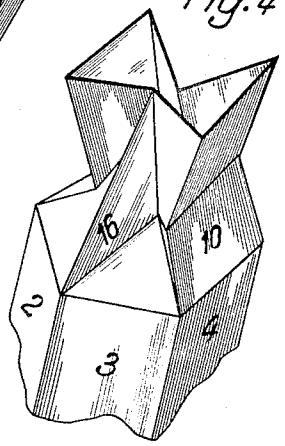
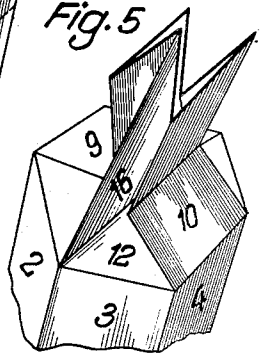


Fig. 5



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agt.

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FOLDABLE CONTAINER

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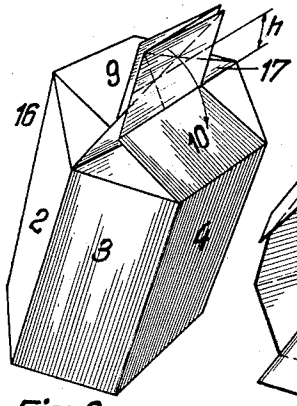


Fig. 6

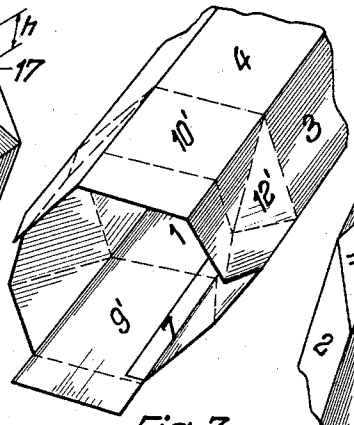


Fig. 7

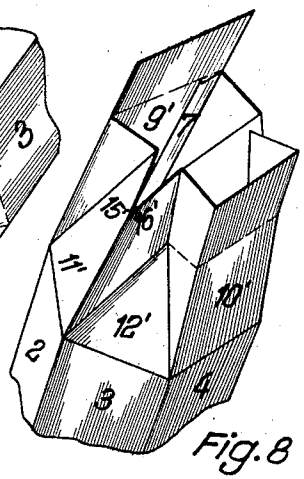


Fig. 8

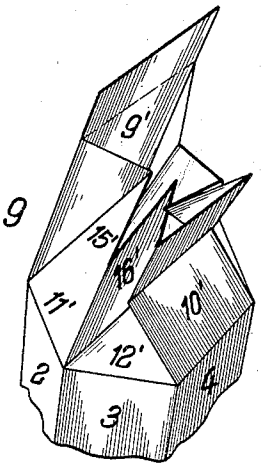


Fig. 9

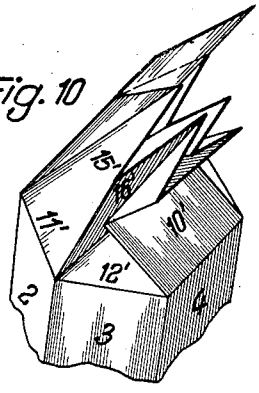


Fig. 10

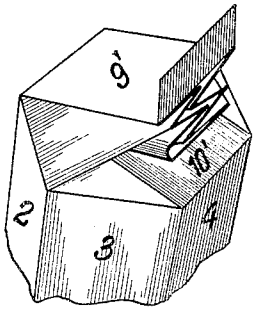


Fig. 11

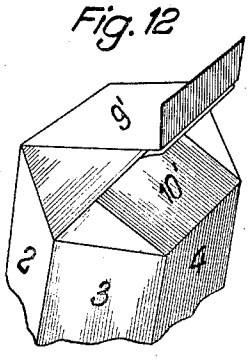


Fig. 12

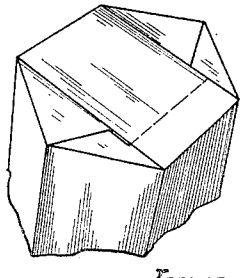


Fig. 13

Inventor:
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Fig. 14

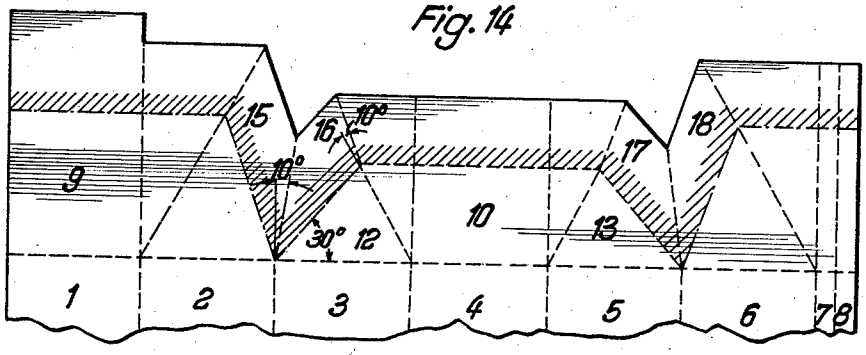


Fig. 15

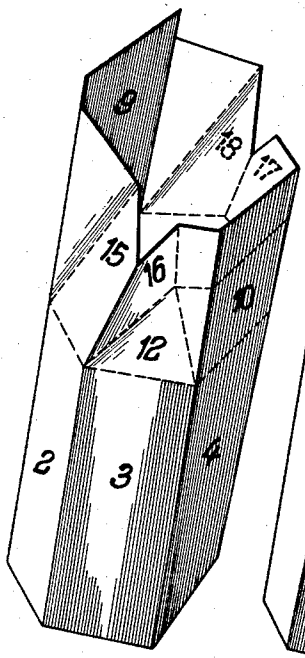


Fig. 16

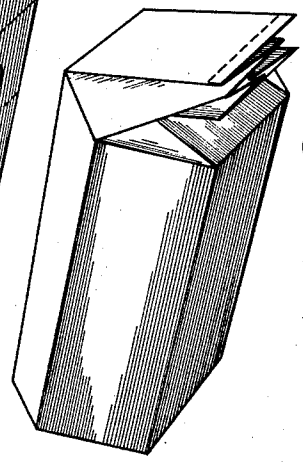
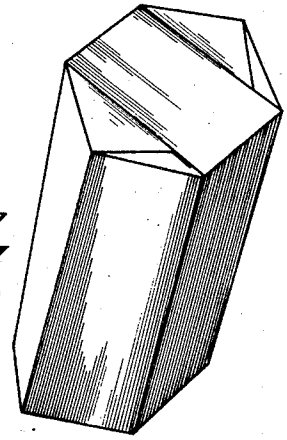


Fig. 17



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Fig. 18

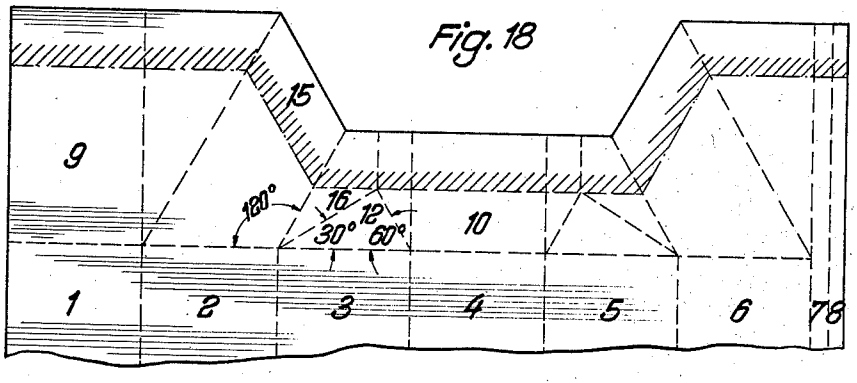


Fig. 19

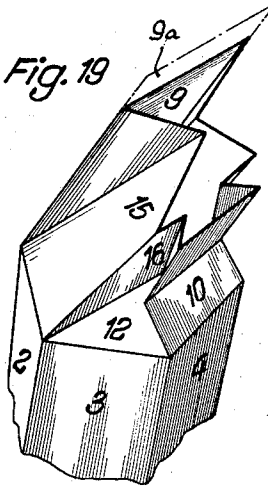


Fig. 20

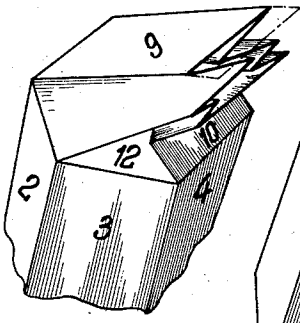


Fig. 21

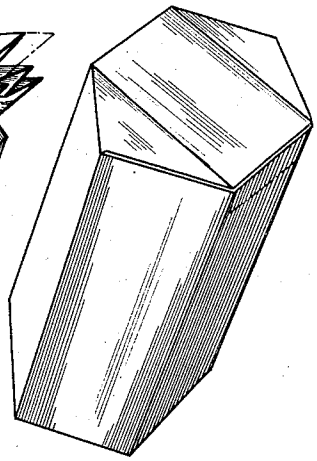
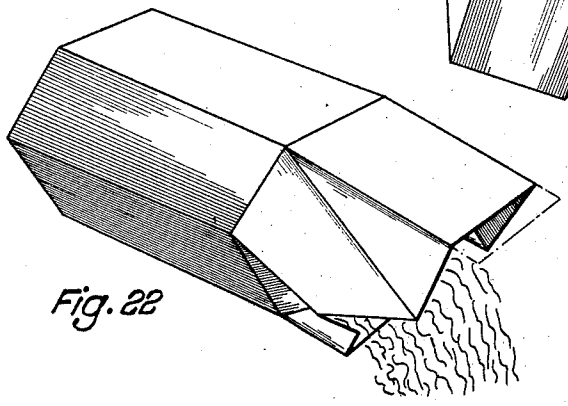


Fig. 22



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By: Michaels. Striker
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Fig. 23

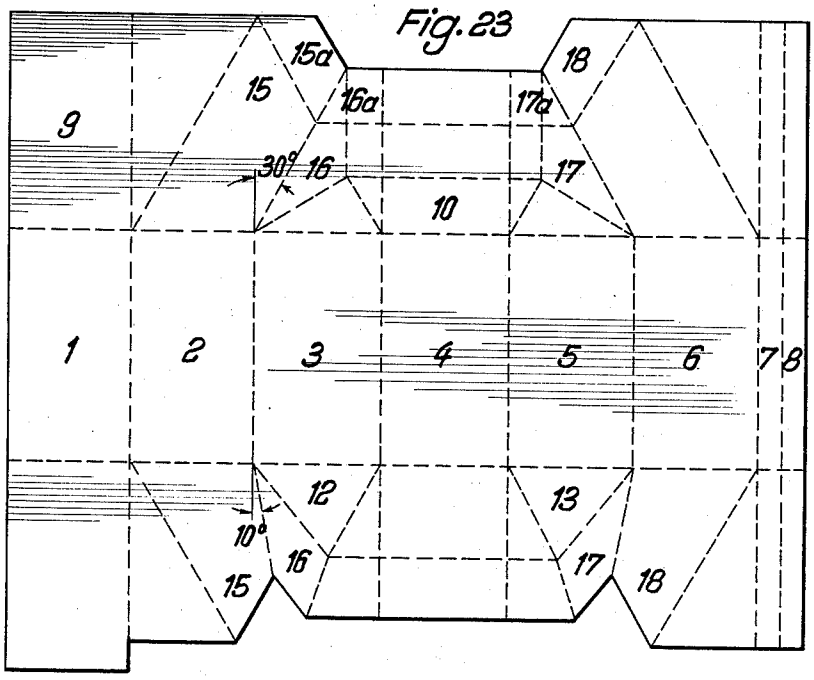


Fig. 25

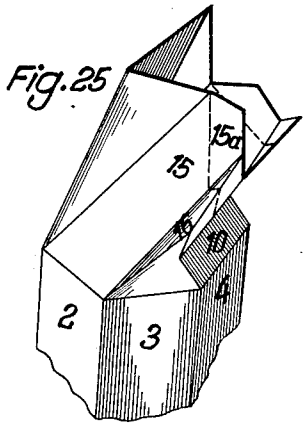


Fig. 26

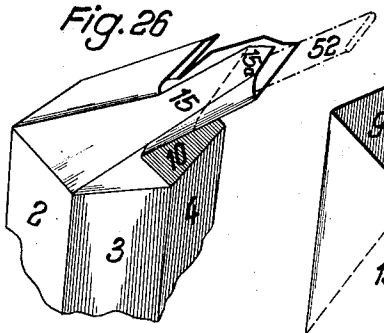


Fig. 24

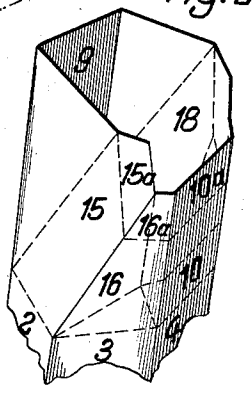


Fig. 29

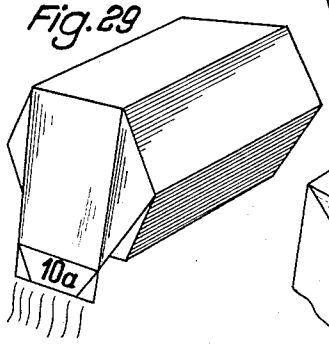


Fig. 28

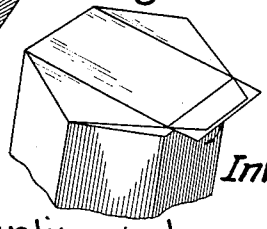
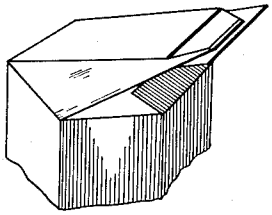


Fig. 27



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By: Michael S. Striker

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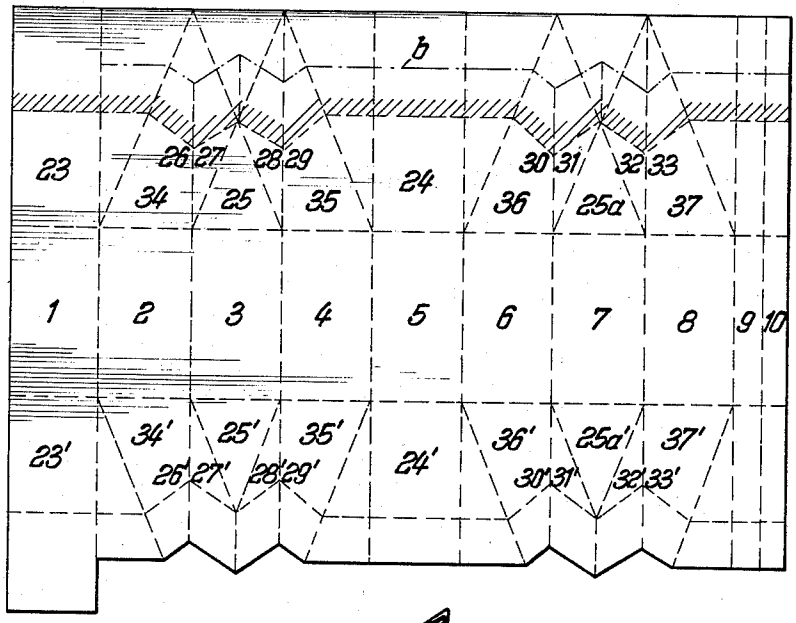


Fig. 30

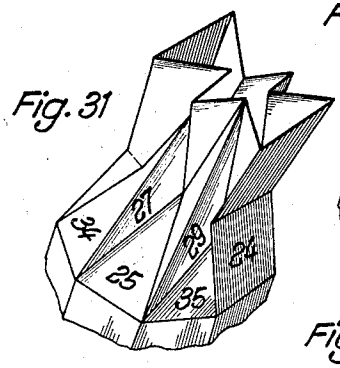


Fig. 31

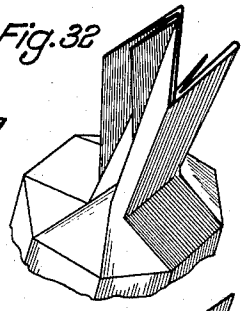


Fig. 32

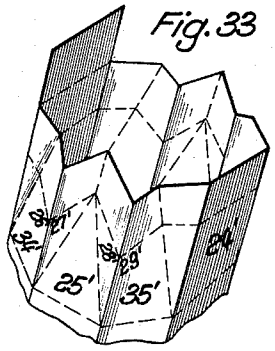


Fig. 33

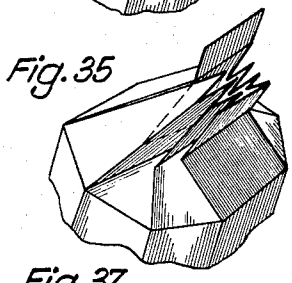


Fig. 35

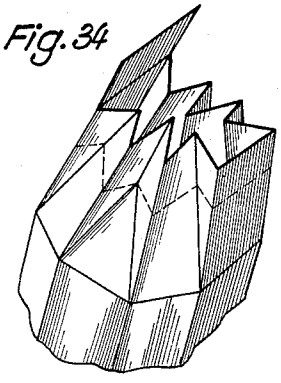


Fig. 34

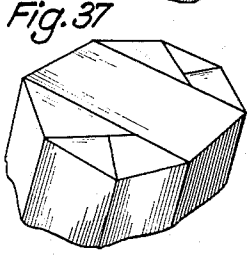


Fig. 37

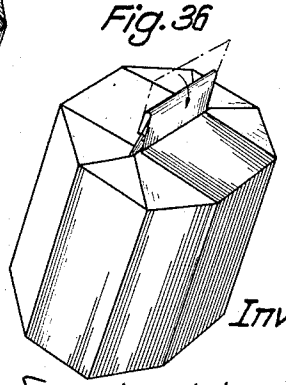


Fig. 36

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By: Michael S. Striker agt.

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Fig. 38

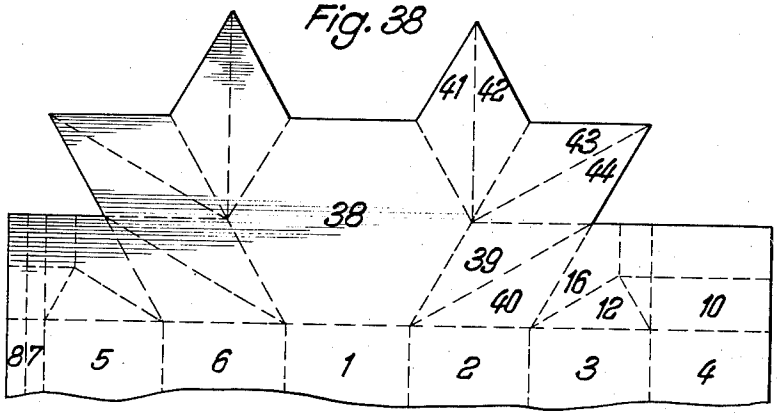


Fig. 39

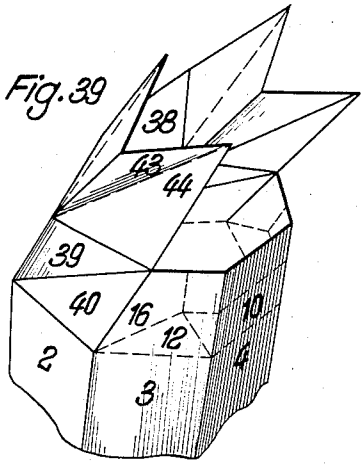


Fig. 40

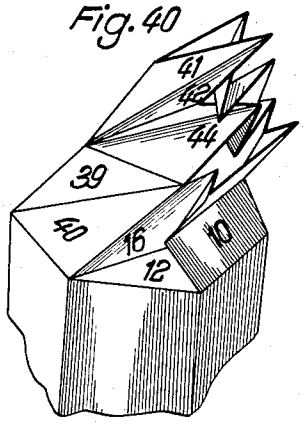


Fig. 41

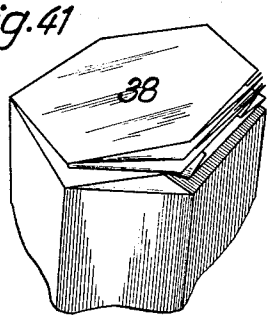
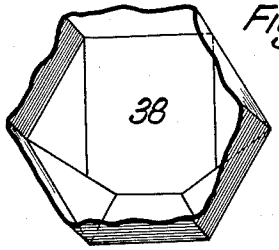


Fig. 42



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Fig. 43

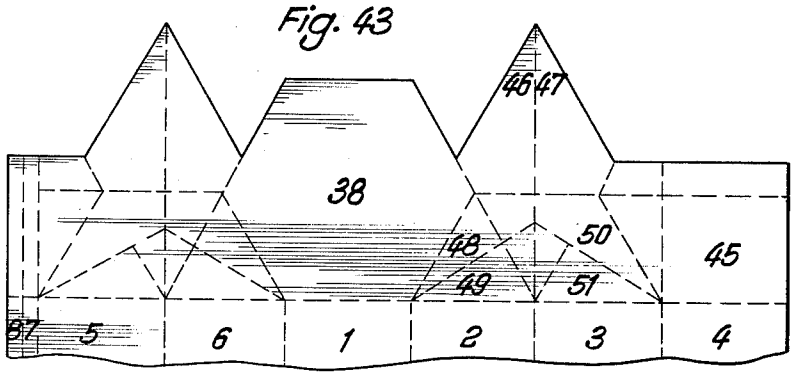


Fig. 44

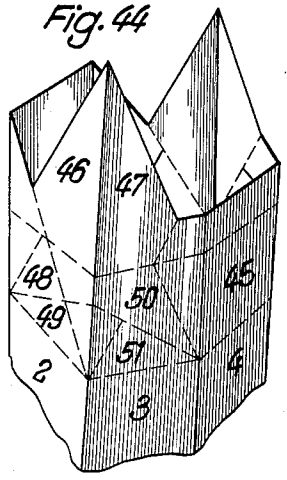


Fig. 45

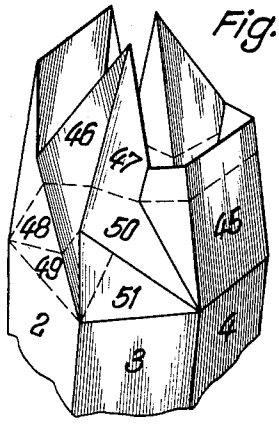


Fig. 46

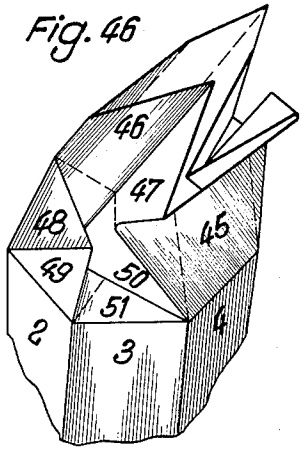


Fig. 47

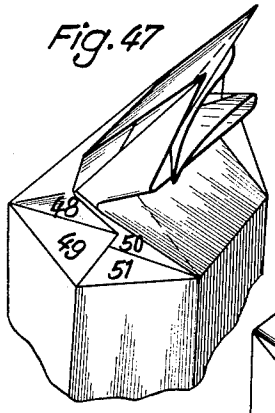
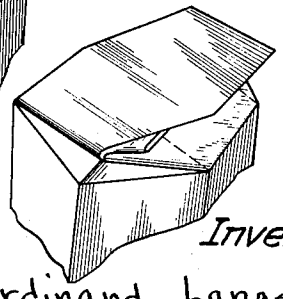


Fig. 48



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United States Patent Office

3,109,574
Patented Nov. 5, 1963

3,109,574

FOLDABLE CONTAINER

Ferdinand Lange, Marienstrasse 33, Minden, Germany

Filed May 24, 1956, Ser. No. 586,991
Claims priority, application Germany July 14, 1955
4 Claims. (Cl. 229—37)

The present invention relates to containers.

More particularly, the present invention relates to containers made of foldable sheet material and capable of being folded from a blank.

Containers having a number of sides other than four, such as hexagonal or octagonal containers are very desirable because less sheet material is required to make a hexagonal container, for example, than a container having four sides and being of rectangular cross section. Furthermore, containers of hexagonal cross section, for example, are very desirable because they can be stored in honeycomb fashion without leaving any free spaces between the containers so that the most economical use is made of a given space.

One of the objects of the present invention is to provide a container of other than rectangular cross section from a foldable sheet material and in a manner which renders the container both impermeable to humidity and capable of retaining aromatic odors in its interior.

Another object of the present invention is to provide an extremely simple and inexpensive process for making such containers.

A further object of the present invention is to provide a container which, when it is closed, has absolutely no passages providing communication between the interior and exterior of the container so that the container of the invention can be used for storing food stuffs.

An additional object of the present invention is to provide a container of other than rectangular cross section which is capable of being easily opened as well as closed.

It is also an object of the present invention to provide a container which makes very economical use of the sheet material from which it is formed, which is folded in such a way that the container can be very tightly closed in an extremely convenient manner, and which can conveniently be made of relatively stiff sheet materials as well as relatively flexible sheet materials.

With the above objects in view the present invention mainly consists of a process for manufacturing a container from a foldable sheet material and including the steps of forming from the sheet material a tubular member of a polygonal cross section having a number of sides other than four, and folding together the ends of the tubular member in a manner forming end walls for the container and forming endless closure strips integral with and extending from the end walls.

Also, with the above objects in view, the present invention mainly consists of a container including a tubular member made of foldable sheet material and having a number of sides other than four, and end walls closing the tubular member and composed of overlapping folded portions of the sheet material interconnected with each other and having polygonal configurations, the container including an endless closure strip integral with the folded portions of the end walls and extending therefrom so that this closure strip may be closed and remain either in a position extending from the end walls or in a position folded down against the end walls.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific

embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 shows the configuration of a blank according to one embodiment of the invention from which a container according to the present invention may be formed, FIG. 1 showing in dotted lines the places where the blank is folded in order to form a container;

FIG. 2 is a fragmentary perspective view showing how an end wall of the container appears as viewed from the interior of the container;

FIGS. 3–5 respectively illustrate various stages in the folding of an end wall of a container formed from the blank of FIG. 1;

FIG. 6 is a fragmentary perspective view of a container formed from the blank of FIG. 1 showing a closure strip extending from an end wall of the container, FIG. 6 furthermore illustrating how a portion of the closure strip may be cut away to enable the end wall to be folded in a manner different from the folding thereof illustrated in FIGS. 4 and 5;

FIGS. 7–13 illustrate the manner in which the bottom portion of the blank of FIG. 1 may be folded together to form an end wall of the container;

FIG. 14 shows a different embodiment of an edge portion of a blank;

FIGS. 15–17 illustrate the manner in which the blank of FIG. 14 is folded to form a closed end for the container;

FIG. 18 shows another embodiment of an edge portion of a blank according to the present invention;

FIGS. 19–21 illustrate the manner in which the blank of FIG. 18 is folded to form an end wall;

FIG. 22 illustrates the manner in which the container of FIG. 21 may have its end wall opened to allow material within the container to flow therefrom;

FIG. 23 illustrates still another embodiment of a blank according to the present invention;

FIGS. 24–28 illustrate the manner in which the blank of FIG. 23 is folded and sealed to form a closed container;

FIG. 29 shows the manner in which the container of FIGS. 23–28 may be opened to provide an outlet through which material in the container may be poured therefrom;

FIG. 30 shows a blank from which an octagonal container may be formed;

FIGS. 31–36 illustrate the manner in which the blank of FIG. 30 is folded to form a closed container;

FIG. 38 shows an elongated edge portion of another form of a blank adapted to provide a container having at the outer face of its end walls a sheet material portion which completely covers the end wall;

FIGS. 39–41 illustrate the manner in which the blank of FIG. 38 is folded;

FIG. 42 illustrates in a fragmentary perspective view how the end wall of FIG. 41 appears from the interior of the container;

FIG. 43 shows an elongated portion of a blank similar to FIG. 38;

FIGS. 44–48 illustrate the manner in which the blank of FIG. 43 is folded to form the container.

Referring now to FIG. 1, the blank illustrated therein is used to form a container having a tubular portion of hexagonal cross section. Thus, the blank is provided with portions 1—6 separated by fold lines which extend vertically, as viewed in FIG. 1, so that the blank may be folded along these fold lines to form a tubular portion of hexagonal cross section, as is evident from FIGS. 2–6. In order to form the hexagonal tubular portion, the blank is provided with a lateral flap 7 which is suitably joined to the side 1 of the blank either by gluing or heat sealing or the like, and in this way the blank forms an

elongated tubular portion of hexagonal cross section. The manner in which the flap 7 is fixed to the opposite side of the blank is indicated in FIGS. 7 and 8. Where it is desired to have a container which is impervious to moisture, it is advisable to provide an additional sealing strip, and FIG. 1 shows an additional flap 8 next to the flap 7 and capable of forming such an additional sealing strip. Thus, the flap 8 is folded upon the flap 7, and then the flaps are joined to the opposite side edge of the blank in a manner which locates the side edges of the blank in a position where they are directed outwardly of the container, the flaps 7 and 8 being joined to each other and to the opposite side of the container either by gluing, heat sealing, or the like. As is apparent from FIG. 1, the flaps 7 and 8 are joined to the side 1 which is connected to end walls having the least number of folds, as may be seen from a comparison of portions 9 and 9' of FIG. 1 with the adjoining portions of the blank, so that the joining of the flaps to the opposite side of the container interferes with the folding thereof to an absolute minimum.

Considering the upper portion of the blank of FIG. 1, it will be seen that the sides 1 and 4 of the blank of FIG. 1 are connected to sheet material portions 9 and 10, respectively, of rectangular configuration, while the sides 2, 3, 5, and 6 are connected to sheet material portions 11, 12, 13, and 14, respectively, which have the configuration of equilateral triangles. The triangles 11 and 12 are joined together by a pair of additional triangular sheet material portions 15 and 16, while similar triangular sheet material portions 17 and 18 interconnect the triangles 13 and 14. After the blank of FIG. 1 is folded in the above described manner to form a tubular member, as shown in FIG. 3, the triangular portions 11—14 are first folded inwardly, as indicated in FIG. 4, so that the triangular portions 15 and 16 become located beside each other and extend outwardly from the triangular portions 11 and 12. In the same way the triangular portions 17 and 18 become located beside each other and extend outwardly from the triangular portions 13 and 14. Folding of the blank in this manner causes the rectangular portions 9 and 10 to become located over the triangular portions 11—14. Thus, the rectangular portion 10 overlaps the triangular portions 12 and 13 while the rectangular portion 9 overlaps the triangular portions 11 and 14. When viewed from the interior of the container, as shown in FIG. 2, portions of the parts 9 and 10 which are not in overlapping relation with the triangular portions 11—14 have the shape of equilateral triangles. The edges of the portions 9 and 10 which are distant from the sides 1 and 4, respectively, and which are located intermediate the sides 1 and 4 and the upper edge of the blank, as viewed in FIG. 1, become located next to each other. The triangular portions 17 and 18 become located between the sheet material portion which extends upwardly from the rectangular portion 10, and the sheet material portion connected to the left edge thereof, as viewed in FIG. 5, while the triangular portions 15 and 16 are located between the sheet material portion extending upwardly from the part 9 and the sheet material portion connected to the right edge thereof, as viewed in FIG. 5. When the sheet material portions 9—14, all of which are of polygonal configuration, are located in a plane normal to the side walls 1—6 to form the end wall of the container, the latter has the configuration indicated in FIG. 6. As is evident from FIG. 1, the edge joining the triangular portions 15 and 16 extends upwardly at an angle of 30° from the triangular portions 11 and 12, and in the same way the edge connecting the triangular portions 17 and 18 extend upwardly at an angle of 30° from the triangular areas 13 and 14, these connecting edges being inclined in opposite directions, as is evident from FIG. 6.

The uppermost portion of the blank of FIG. 1 which thus extends upwardly from the end wall of the container, as viewed in FIG. 6, forms an elongated endless closure strip. It will be noted that the entire upper edge of the blank of FIG. 1 is directed outwardly in the folded container, and in fact the free edges of the folded portions of the blank at the closure strip shown in FIG. 6 are all coextensive with each other. Thus, it is an exceedingly simple matter to glue together or seal the outer edge of the closure strip shown in FIG. 6 in a manner which absolutely closes the interior of the container from the exterior. There are no passages formed between folded portions of the blank which provide communication between the interior of the container and the exterior thereof. Furthermore, since the closure strip is endless and since the entire upper edge of the blank of FIG. 1 forms the upper free edge of this closure strip, as viewed in FIG. 6, it is an exceedingly simple matter to cover this edge with a film which thus seals the container in an exceedingly simple manner. The closure strip integral with and extending from the end wall of the container, as shown in FIG. 6, may be left in the position of FIG. 6 so that the container can be conveniently carried by this closure strip, or, as is shown by the arrow in FIG. 6, this closure strip may be folded down against the end wall of the container and joined thereto in any suitable manner. The lower portion of the blank of FIG. 1 may, if desired, be formed in the same way as the upper portion thereof and form an end wall identical with that shown in FIG. 6 and folded together in the same way as is indicated in FIGS. 3–5.

For some purposes it may be desirable to lessen the extent to which the closure strip shown in FIG. 6 extends from the end wall, and for this purpose it is only necessary to cut away a portion of this closure strip distant from the end wall shown in FIG. 6. FIG. 1 illustrates in shaded lines the portion of the blank which must be sealed in order to close the container, and as long as the blank extends beyond this shaded portion of the sheet material indicated in FIG. 1, there will still be an endless closure strip which can be sealed to tightly close the container. As may be seen from FIGS. 4 and 5, all of the folded sheet material portions which extend between the right edges of the closure strip portions extending from the portions 9 and 10 are located between the closure strip portions extending from the part 10 and the closure strip portion connected to the left edge thereof, as viewed in FIGS. 4 and 5, while all of the folded together sheet material portions extending between the left edges of the closure strip portions respectively extending from the parts 9 and 10 are located between the part of the closure strip which extends from the sheet material portion 9 and the sheet material portion connected to the right edge thereof, as viewed in FIGS. 4 and 5. It may be desired to fold the portions of the closure strip together in such a way that the polygonal sheet material portions extending between the right edges of the closure strip portions extending from parts 9 and 10, as viewed in FIGS. 4 and 5, alternate with the polygonal sheet material portions extending between the left edges of the closure strip portions extending from parts 9 and 10. In order to accomplish this result the part of the closure strip which is cut away must be cut along the line which is below the elevation where the inclined edge interconnecting parts 15 and 16 crosses over the inclined edge interconnecting parts 17 and 18. Thus, FIG. 6 shows a horizontal dotted line located at a distance *h* from the end wall of FIG. 6, and it will be noted that this horizontal line is below the intersection of the inclined fold edges interconnecting parts 15 and 16 on the one hand and parts 17 and 18 on the other hand. In the blank, such a line along which the blank is cut to shorten the closure strip is indicated in dot-dash lines at *a* at the upper portion of FIG. 1. As long as the edge *a* is below the intersection of the edges interconnecting parts 15 and 16 on the one hand and parts 17 and 18 on the other

hand, it will be possible to fold the portions of the closure strip between the parts thereof extending upwardly from portions 9 and 10 in an alternating fashion, as is indicated in FIGS. 8–10. If the blank were cut away at a part thereof located above this intersection, then it would not be possible to fold the portions of the closure strip together in an alternating manner as shown most clearly in FIG. 10 because then the fold lines interconnecting parts 15 and 16 would interfere with the fold line interconnecting parts 17 and 18. The lower portion of the blank of FIG. 1 is shown as having a configuration permitting such a shorter closure strip as to be formed. The lower part of the blank of FIG. 1 has a configuration corresponding to the dot-dash line *a* except that the part 9' has not been made shorter and thus has a flap extending downwardly therefrom and except that the horizontal bottom edge of the blank interconnecting parts 16' and 17' shown in FIG. 1 is not straight, for a purpose described below. The polygonal folded portions at the lower part of the blank of FIG. 1 which correspond to those of the upper part are indicated with the same reference characters primed.

It is also possible to eliminate transverse fold lines from one-half of the sheet material portions which form the closure strip, and thus, it will be noted that in FIG. 1 the portion 9' does not have a transverse fold line and furthermore there are no transverse fold lines between the portions 11' and 15' or between the portions 14' and 18'. These are the portions which are located next to the portion 9' and which in the embodiment of FIG. 6 are folded along transverse lines so as to extend upwardly. As is shown in FIGS. 8–11, the portions 9', 11', 14', 15' and 18' are simply folded downwardly against the top wall and do not extend upwardly therefrom, so that these transverse fold lines are unnecessary. Of course, the part 10' still has a transverse fold line, and the same is true of the parts 12', 16' and 13', 17' located next to the part 10'. These parts are folded downwardly against each other and require the transverse fold line. As is evident from FIG. 12, even though the parts 9' and the parts 11', 15' and 14', 18' have no transverse fold lines, it is still possible to maintain the free edge of the closure strip distant from the end wall while sealing the closure strip. When the part 9' is folded down against the end wall the flap extending from the part 9' can be joined to the upper face of part 10' adjacent the wall 4, as shown in FIG. 3, so as to provide an end wall having an exceedingly simple outer appearance.

The elimination of fold lines as shown at the lower portion of FIG. 1 is particularly desirable where thicker sheet materials are used. Also, where thicker sheet materials are used, it is preferred to make the part 10' shorter and to provide the portion which extends from the part 10' to form part of the closure strip of a trapezoidal rather than a rectangular configuration, so that the thicker sheet material portions can be folded against each other much more easily. Where this change is made, as indicated at the lower portion of FIG. 1, the triangles 12' and 13' remain unchanged and straight fold lines interconnect the polygonal sheet material portions 19 and 20 on the one hand and 21 and 22 on the other hand.

The blank which is shown in FIG. 14 has a configuration similar to that of the lower portion of FIG. 1 except that the outer edge of the blank at the part 10 and the adjoining parts thereof is straight and this portion of the blank is considerably shorter than the other portions of the blank. According to the embodiment of FIG. 14, the fold lines which form extensions of the intersection between the sides 2 and 3 and the intersection between the sides 5 and 6 are turned through an angle of 10°, as indicated in FIG. 14, and in the same way the fold lines at the right and left edges of portions 16 and 17 are shifted through 10°, as

indicated in FIG. 14. As a result of this arrangement, when the end wall portions are folded in, the inclination of the shifted fold lines shown in FIG. 14 causes the portions of the end wall to very easily fold down in the desired direction. In other words, because of this inclination of the fold lines the sheet material portions such as parts 15 and 16 and 17 and 18 will start to fold down in the desired direction when the triangular portions 11—14 are folded down. Of course, if the fold lines were shifted in the opposite direction, the folding would be more difficult. However by shifting the fold lines as shown in FIG. 14 in the proper direction the folding down of the blank portions to provide the end wall and the closure strip is greatly facilitated, and thus there is no possibility that during the closing of the container a pressure great enough to push the end wall into the container will be exerted, and thus with the embodiment of FIG. 14 the container can be very easily closed without any undesirable pressure. The manner in which the sheet material portions of FIG. 14 are folded together to form the end wall and closure strip are indicated in FIGS. 15–17. As is evident from FIG. 16, the folding takes place in exactly the same way as described above and shown in FIGS. 8–11, and the various sheet material portions on one side of the parts 9 and 10 alternate with the sheet material portions on the other side thereof. When the free edge of the closure strip is sealed the container with the part 9 fully folded down against the end wall has the configuration shown in FIG. 17.

Instead of shifting the folding lines through only 10°, as described above in connection with FIGS. 14–17, these fold lines may be shifted so as to provide the portions 16 and 17 with angles of 30° next to the triangular portions 12 and 13, respectively, and the left edge portion 16 and the right edge of portion 17 will then make an angle of 120° with the upper edge of side 2 and the upper edge of side 6 of the container, as viewed in FIG. 18. The result of this arrangement is that a blank of exceedingly simple configuration is provided, as is clearly shown in FIG. 18. As is evident from FIGS. 19–21, the blank of FIG. 18 is folded in exactly the same way as the blank of FIG. 14. Furthermore, it will be noted from FIG. 21 that with this embodiment there are no fold lines extending across the outer face of the end wall except the two fold lines defining the outer side edges of the portion 9. Since with this embodiment the free edge of the closure strip is located in its entirety at one of the sides of the container, the side 4 in the embodiment of FIGS. 18–21, this form of container is very suitable for use as a container from which a material is to be poured, as indicated in FIG. 22. If desired a flap 9*a*, as shown in dot-dash lines in FIG. 19, may extend from the part 9 and be folded down against the upper outer face portion of the side 4, as shown in dot-dash lines in FIG. 21, and this flap may be glued or otherwise joined to the outer face of the side 4. Such a flap may be torn from the closed container in order to facilitate the opening thereof.

FIG. 23 shows a particularly advantageous form of blank which may be used to make a container according to the present invention. As is evident from FIG. 23, the lower portion of the blank is identical with the blank shown in FIG. 14, and this lower portion of the blank is folded in the same way as indicated in FIGS. 15–17 in order to form the bottom wall of the container.

The upper portion of the blank of FIG. 23 is similar to the blank shown in FIG. 18. It will be noted that this upper portion of the blank of FIG. 23 differs from that of FIG. 18 only in that the portions 15, 16, 10, 17, and 18 have extensions 15*a*, 16*a*, 10*a*, 17*a*, and 18*a* extending therefrom. The upper portion of the blank of FIG. 23 is folded in the manner indicated in FIGS. 19–21 in order to form the end wall and closure strip of the container. However, the extensions 10*a* and 15—18*a* will form an additional closure strip portion which extends outwardly beyond the upper edge of the side 4 of the container.

When the container of FIGS. 23–28 is closed, a member 52 made of silicon or any other material which is incapable of being joined to the sheet material of the container by gluing, heat sealing, or the like is inserted into the opening formed by the extensions 10*a* and 15*a*—18*a*. The container is then sealed in the same way as the container of FIG. 18, and because the member 52 is located in this opening, there will remain an opening into the container after the closure strip thereof is sealed in the same way as the embodiment of FIGS. 18–21 with the member 52 extending through the opening formed by the extensions. Then the member 52 is removed and the extended closure strip portion is sealed by gluing, heat sealing, or the like. As a result the container is then completely closed. However, it is possible for the extension which is closed as the last step of the closure process to be torn away so as to provide an opening into the container through which the material therein may conveniently be poured, as indicated in FIG. 29. As is apparent from FIGS. 27 and 28, the extensions which form the additional closure strip portion extend beyond the upper edge of the side 4 of the container, and these extensions may then be folded downwardly, as indicated in FIG. 28, and be joined to the outer face of the side 4 of the container. It is of course possible to close a container having a pair of endless closure strips in the same way.

In the manner described as shown above, containers of octagonal rather than hexagonal configuration may be provided. FIG. 30 shows a blank used to form an octagonal container. In the blank of FIG. 30 the parts 23 and 24 correspond to the parts 9 and 10 of the blank of FIG. 1. However, instead of two pairs of equilateral triangles located between the parts 9 and 10, the octagonal container formed from the blank of FIG. 30 has a pair of isosceles triangles 25 and 25*a* respectively extending from the sides 3 and 7 and a pair of quadrangular areas 34 and 35 located on opposite sides of the triangular sheet material portion 25 and a quadrangular pair of sheet material portions 36 and 37 located on opposite sides of the isosceles triangular portion 25*a*. The manner in which these parts are folded is indicated in FIGS. 31 and 32. The parts 23 and 24 as well as the parts 25, 25*a*, and 34—37 are folded down to form the end wall of the container. The parts 34 and 25 are interconnected by portions 26 and 27 while the parts 25 and 35 are interconnected by portions 28 and 29. Thus the portions 26—29 correspond to the portions 15 and 16 of the above described embodiments of the invention, and it will be noted that the triangular sheet material portion 25 is symmetrically arranged with respect to the sheet material portions 26—29. In the same way the sheet material portions 36 and 25*a* which form part of the end wall of the container are interconnected by a pair of sheet material portions 30 and 31 and the portions 25*a* and 37 are interconnected by the sheet material portions 32 and 33. Thus the sheet material portions 30—33 correspond to the sheet material portions 17 and 18 of the above described embodiments of the invention, and it will be noted from FIG. 30 that the isosceles triangular sheet material portion 25*a* is symmetrically arranged with respect to the sheet material portions 30—33. The angular relationship between the several polygonal sheet material portions which form the end wall and closure strip of the container formed from the blank of FIG. 30 is illustrated in FIG. 30. Because of the great number of the folded sheet material portions located next to each other to form the closure strip from the blank of FIG. 30, this closure strip can not extend conveniently upwardly from the end wall in the manner shown in FIG. 6, and for this reason fold lines between portions 26 and 34, 29 and 35, 30 and 36, and 33 and 37 are omitted and these portions are simply folded down to form both parts of the end wall and part of the closure strip. The manner of folding is shown in FIGS. 31 and 32. Furthermore, as is indicated by the shaded area extending across the upper portion of FIG. 30, the lower limit of the part of the blank which may be cut away to shorten the closure strip is spaced more distant from the upper edge of the sides 1—8 than is the case with the above described embodiments of the invention.

In the embodiment of FIG. 1 the parts 9 and 10 which form part of the end wall of the container have a length *h* and the closure strip has an equal length where the blank is not cut away along the line *a* of FIG. 1. The same relationship holds in the embodiment of FIG. 30 where the length of parts 23 and 24 in a vertical direction as viewed in FIG. 30 is equal to the length of the closure strip. However, with this embodiment also it is possible to cut away part of the blank along the line *b* indicated at the upper portion of FIG. 30, and the lower portion of the blank of FIG. 30 has the configuration which results from cutting the blank away along such line, the polygonal sheet material portions at the lower part of FIG. 30 which correspond to those of the upper part being indicated with the same reference characters primed. The part 23′ is not cut away, however, so as to leave a flap extending therefrom which may be joined to the top face of the container, as indicated in FIG. 37. The manner in which the lower portion of the blank of FIG. 30 is folded is indicated in FIGS. 33–37. As is evident from a comparison of FIGS. 33–35 with FIGS. 31–32, the blank which has the configuration at the lower portion of FIG. 30 may have the sheet material portions which form the closure strip alternating with each other, while with the blank according to the upper portion of FIG. 30 it is not possible to have this alternating relationship. Of course, instead of folding the closure strip down against the container as indicated in FIG. 37, it is possible to leave this closure strip extending upwardly, as indicated in FIG. 36, and in this event the flap extending from part 23′ may simply be folded over the edge of the closure strip as indicated in FIG. 36. Furthermore, such an upwardly extending closure strip may be provided with openings for making it convenient to hang the container or to carry the same. Of course, when the closure strip extends upwardly as indicated in FIG. 36, the parts 34′ 26′, 35′ 29′, 36′ 30′, and 37′ 33′ have transverse fold lines extending across the same.

In all of the above described embodiments of the invention the outermost part of the end wall of the container is formed by a sheet material portion of rectangular cross section which extends across the end wall to form part of the end wall and part of the closure strip. It is also possible to provide containers where the outermost sheet material portion at each end wall has a configuration corresponding to the cross section of the container. Thus, with a hexagonal container the outermost sheet material portion at each end wall may have a corresponding hexagonal configuration. A blank which may be used to form such a container is indicated in FIG. 38. In the embodiment of FIG. 38 the sheet material portions which extend from walls 3—5 to form part of the end wall and closure strip are identical with the embodiment of FIG. 18 and are indicated with the same reference characters. These sheet material portions which extend from the walls 3—5 are folded together with the embodiment of FIG. 38 in the same way as with the embodiment of FIG. 18, as is evident from FIGS. 39–41. However, the part 9 of the embodiment of FIG. 18 is replaced by a part 38 of a hexagonal configuration corresponding to the cross sectional configuration of the container. The part 38 is connected at its lower right side, as viewed in FIG. 38 to the sheet material portions extending from the wall 3 by a pair of triangular sheet material portions 39 and 40, and the sheet material portion 39 is connected to the upper right edge of part 38 by four triangular sheet material portions 41—44 having the configuration indicated in FIG. 38. The sheet mterial portions extending along the left sides of part 38 are identical with those extending along the right sides.

When the blank of FIG. 38 has the upper portions thereof folded together to form the end wall and closure strip of the container, the parts connected to the walls 3—5 are folded in the same way as with the embodiment of FIGS. 18–20, while the parts 39 and 40 are folded on each side of part 38 so that the part 39 becomes folded over the part 40 and located beneath the sheet material portion 38. The part 44 is folded against the part 39 with the part 43 located against the part 44, and of course parts 41 and 42 are folded so as to be located next to each other with part 41 directly next to the underside of the sheet material portion 38 and with part 42 overlying the part 43. As is evident particularly from FIG. 40, in the finally folded condition of the container the sheet material portions 41 and 42 are located directly next to each other while the corresponding sheet material portions on the opposite side of part 38 are located between the sheet material portions 42 and 43 indicated in FIG. 38. In the same way, the parts 43 and 44 are located directly next to each other and the corresponding sheet material portions at the opposite side of the blank are located between the part 44 and the part 39. With this arrangement, when the sheet material portions are folded down against the container in the manner indicated in FIG. 41, a closure strip is provided which is of endless configuration and which has its outer free edge directed outwardly of the container and in fact located along the upper edge of the side wall 4, as viewed in FIG. 41. Thus, this embodiment of the invention presents all of the advantages of the above described embodiment in that the closure strip may be very conveniently sealed so as to provide a very tight closing of the container, and it will be noted that with this embodiment the part 38 completely covers the remaining portions of sheet material so that the end wall of the container has a continuous appearance. As is evident from FIG. 42 which shows the container of FIG. 41 as seen from the interior thereof, the wall portion 38 in itself forms a considerable part of the end wall, so that a considerable portion of this end wall is formed by one layer of the sheet material. The same is of course true of the embodiment of FIG. 18 where the part 9 forms a considerable portion of the end wall.

FIGS. 43–48 illustrate a modification of the embodiment of FIGS. 38–42 according to which the part 10 of the embodiment of FIG. 8 is replaced by a part 45 which forms part of a hexagon of the same cross sectional shape as the container so that the end wall is formed by sheet material portions which include the portion 45 forming part of a hexagon and the portion 38 forming a complete hexagon. The upper portions of the partly hexagonal member 45 and the hexagonal portion 38 are interconnected by a pair of sheet material portions 47 which are joined together by a fold line which forms an extension of the side walls 2 and 3, while the portion 45 is joined to the edge of the wall 3 by a pair of sheet material portions 50 and 51 on one side and a similar pair of sheet material portions interconnect the portion 45 with the wall 5 on the opposite side. A pair of sheet material portions 48 and 49 of triangular configuration interconnect the lower side of part 38 with the edge of the wall 2, and a similar pair of sheet material portions interconnect the left lower side of the portion 38, as viewed in FIG. 43 with the edge of the wall 6. In folding together the end wall and closure strip of the embodiment of FIG. 43, the portions 46 and 47 and the opposite portions corresponding thereto are first folded inwardly to be located next to each other and between the portions 38 and 45, and then the triangular areas 48—51 are folded inwardly, so that the sheet material portions between parts 46 and 47 on the one hand and on parts 48—51 on the other hand become folded inwardly, and as a result the structure shown in FIGS. 47 and 48 is obtained. The folding process is indicated in successive stages in FIGS. 44–47, respectively. The result is that an endless closure strip is formed which may be maintained in a position raised slightly from the end wall so that the closure strip may be conveniently sealed as by gluing, heat sealing or the like. The entire free edge of this closure strip is directed outwardly as with the above described embodiments, and after the endless closure strip is sealed the entire folded and sealed portion may be placed downwardly against the top wall which is completely covered by the outer sheet material portion 38 so that the resulting container has the same outer appearance as the embodiment of FIGS. 38–42. It will be noted that with the embodiment of FIGS. 43–48, as is shown particularly in FIG. 48, the part of the closure strip which overlaps the side 45 terminates short of the wall 4 so that next to the wall 4 the container is closed at its end wall only by two layers of sheet material composed of the outer layer 38 and the portion of the inner layer 45 which is located next to the wall 4. This arrangement is very convenient, because the portion of the layer 45 located next to the wall 4 may be provided with a suitable opening which is covered and completely sealed by the outer layer 38. Such a container may conveniently be used to contain a liquid such as milk, for example, and the portion of layer 38 located over such an opening of member 45 may be broken away or lifted out so as to provide a convenient opening in the container from which the liquid may be poured or the liquid in the container may be drunk from such an opening. If desired the opening may simply be preformed in the sheet material so that the latter does not have an opening passing therethrough until the sheet material is broken through at the preformed portion thereof by the eventual user.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of containers differing from the types described above.

While the invention has been illustrated and described as embodied in containers folded from sheet material blanks, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A container comprising, in combination, a tubular sheet material portion composed of a single thickness of said sheet material and having a polygonal cross section provided with an even number of sides other than four; a plurality of triangular portions of the sheet material forming part of an end wall for the container; a plurality of sheet material portions interconnecting said triangular portions and including rectangular portions which also form part of said end wall one of said triangular and rectangular portions being connected in folded relationship to each of said sides; an endless strip integral with and extending from said triangular and rectangular portions for closing the container; and an extension integral with and extending from one of said rectangular portions and located over said closure strip.

2. A container comprising, in combination, a tubular sheet material portion composed of a single thickness of said sheet material and having a polygonal configuration provided with an even number of sides other than four; an end wall forming part of the container and composed of a plurality of polygonal portions extending normally to said tubular portion; and a closure strip integral with and extending from the end wall at a point inward of the

outer periphery thereof, said closure strip having a pair of opposed sheet material portions and a pair of additional sheet material portions interconnecting the opposed sheet material portions and formed from a plurality of folded sheet material portions which are nested together.

3. A container comprising, in combination, a tubular sheet material portion composed of a single thickness of said sheet material and having a polygonal configuration provided with an even number of sides other than four; an end wall forming part of the container and composed of a plurality of polygonal portions extending normally to said tubular portion; and a closure strip integral with and extending from the end wall at a point inward of the outer periphery thereof, said closure strip having a pair of opposed sheet material portions and a pair of additional sheet material portions interconnecting the opposed sheet material portions and formed from a plurality of folded sheet material portions which are nested together, the sheet material portions which are nested together at one side of the closure strip alternating with the sheet material portions which are nested together at the other side of the closure strip.

4. A container comprising, in combination, a tubular portion made of sheet material and having a configuration of a polygon provided with an even number of sides other than four; and a plurality of folded sheet material portions interconnected with each other and forming an end wall for the container, said folded sheet material portions including an inner sheet material portion which conforms at least partly to the configuration of the cross section of the end wall and an outer sheet material portion identical with the configuration of the cross section of the tubular portion and covering all of the other portions of the end wall.

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