Oct. 6, 1964 TAKEHIKO NAKATA 3,151,767

CONTAINER SEAM

Filed Sept. 4, 1962

FIG. 1

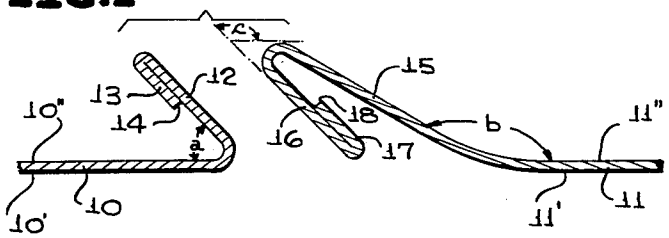


FIG. 2

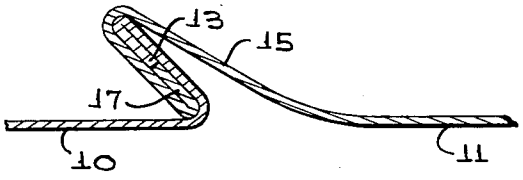


FIG. 3

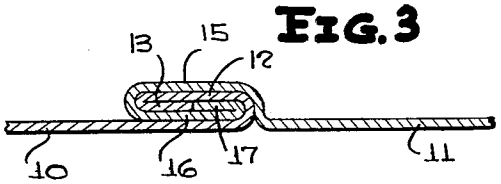


FIG. 4

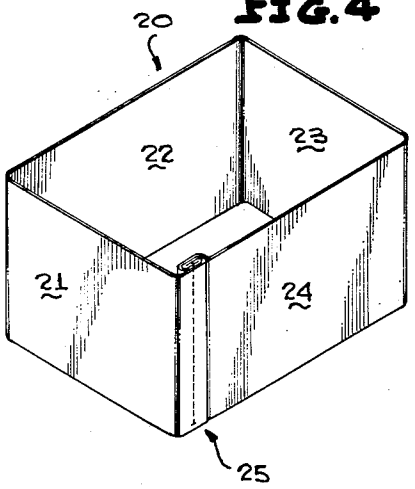


FIG. 5

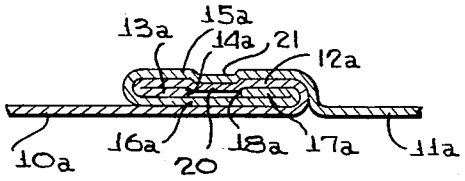


FIG. 6

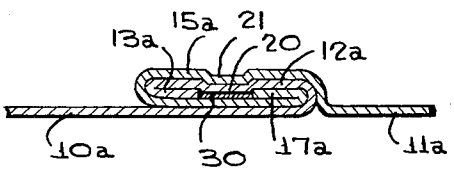
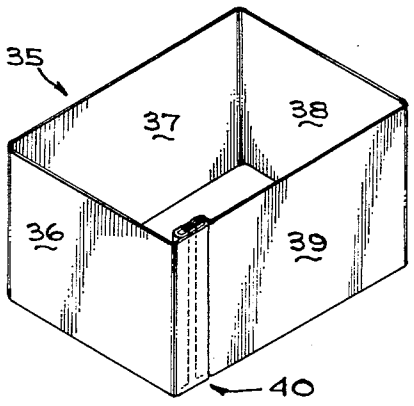


FIG. 7



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CONTAINER SEAM

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The present invention relates to a new and novel container seam and method of making same and more particularly to seams as provided in metallic cans and the like.

Seams as conventionally employed in containers such as metallic cans and the like are generally provided by permanently interlocking adjacent wall edge portions. Seams as provided in prior art have, however, proved to have insufficient strength when pressure is applied from the left or right side of the seam or at an oblique angle thereto and the interlocked wall edge portions are liable to bulge under pressure applied either from the inside or outside of the container.

In addition, there is the danger that the interlocked wall edge portions may be broken apart when the container is subjected to impact forces. As a result, it has been a common practice to provide convex or concave portions at one or several points along the interlocked wall edge portions to prevent the same from breaking away. This practice as followed in the prior art is, however, not desirable since it is difficult to form these convex or concave portions in the middle of an interlocked portion, and such operations after making a container are too expensive and time consuming.

A particular problem arises in connection with non-circular containers which may be of any polygonal configuration since the seam in such cases is generally adjacent one of the corners of the container. With this type of container, the drawing work is so difficult that the container can not be economically produced on a commercial scale. It has been found that breaking away of the seam due to pressure, impact and similar condtions can not be prevented with prior art arrangements.

In the present invention, these disadvantages are overcome in a novel and unique manner by providing hook-shaped end portions which extend inwardly from the inner surfaces of adjacent wall portions. The outermost portion of each of said wall edge portions is doubled back on itself to provide a double thickness portion and the hook-like wall edge portions are nested together with the double thickness portions disposed adjacent one another and in substantially parallel relationship with the double thickness portion of each wall edge portion being sandwiched between portions of the other wall edge portion.

The arrangement according to the present invention as described above overcomes the disadvantages of the prior art by providing a seam which provides good strength and resistance to pressure from the left or right of the seam or in an oblique direction thereto since the doubled back outermost edge portions of the two wall portions are disposed adjacent one another and prevent the interlocking arrangement from being broken away. In addition, these doubled back outer edge portions provide effectively a double wall vertically extending support which provides additional strength for absorbing pressures applied vertically to the container and increases the strength of the seam against lateral pressure applied either from the inside or outside of the container.

A particular advantage of the present invention is the fact that the improved pressure and impact qualities of the seam can be obtained in a most simple and effective manner since the method of making this seam is

relatively simple and is adaptable for use in mass production techniques.

An object of the present invention is to provide a new and novel seam for containers which has improved strength and resistance to forces acting in all directions both lateral and oblique thereto.

Another object is to provide a seam for containers which provides a secure interlock which substantially eliminates the danger of the wall edge portions being broken away due to impact.

A still further object of the invention is to provide a seam for containers which is substantially fluid-tight.

Yet another object of the invention is to provide a new and novel method of forming seams in containers which is quite simple and further which is readily adaptable for use in mass-production operations.

Other objects and many attendant advantages of the invention will become more apparent when considered in connection with the specification and accompanying drawings, wherein:

FIG. 1 is a cross-sectional view of adjacent wall edge portions of a container which are adapted to be interlocked with one another and illustrating the initial steps of the method;

FIG. 2 is a cross-sectional view illustrating the wall edge portions of FIG. 1 after having been assembled in nested relationship with one another;

FIG. 3 is a cross-sectional view illustrating the finished interlocked seam;

FIG. 4 is a top perspective view illustrating a container incorporating the seam as shown in FIG. 3;

FIG. 5 is a cross-sectional view illustrating a modified form of the seam according to the present invention;

FIG. 6 is a cross-sectional view similar to FIG. 5 illustrating a further modified form of the seam according to the present invention; and

FIG. 7 is a top perspective view illustrating a container incorporating the seam as shown in FIG. 6.

Referring now to the drawings wherein like reference characters designate corresponding parts throughout the several views, there is shown in FIG. 1 a pair of wall portions indicated by reference numerals **10** and **11** which in the case of metallic containers will of course be formed of metal.

It will be understood that these wall portions may of course be formed of different sheets of material or may comprise the opposite end portions of a single sheet of material as is the usual case.

Wall portion **10** includes an outer surface **10'** and an inner surface **10''** which are respectively adapted to face the outer portion of the container and the inner portion of the container in the finished product. In a similar manner, wall portion **11** is provided with an outer surface **11'** which is adapted to face toward the outside of the finished containers and an inner surface **11''** which is adapted to face the inside of the container.

The edge portion of wall portion **10** is bent back at an acute angle *a* with respect to the inner surface **10''** thereof to form a generally hook-like edge portion as defined by wall portion **10** and the leg **12**. The outermost portion **13** of leg **12** is in turn doubled back against itself to define a double thickness portion, portion **13** terminating in an end edge **14**.

The outer edge portion of wall portion **11** is firstly bent at an obtuse angle *b* inwardly of the inner wall **11''** thereof to define a leg **15**. Leg **15** is in turn bent back at an obtuse angle *c* with respect to the inner surface of wall portion **11** to define a leg **16**, the outermost portion **17** of which is doubled back upon itself to define a double thickness portion. Portion **17** terminates in an end edge **18**.

After the edge portions of the two wall portions have been formed in the manner shown in FIG. 1, they are then assembled in the nested position shown in FIG. 2, the arrangement being such as seen in this figure that the edge portions are adapted to be snugly nested together with the end edges **14** and **18** disposed in facing abutting relationship with one another.

The next step after that shown in FIG. 2 is illustrated in FIG. 3, wherein the wall portions have been bent into their final interlocked position.

It will be seen that in this final interlocked position, the double thickness portions of each wall portion are disposed adjacent one another and substantially parallel with one another with the double thickness portion of each wall edge portion sandwiched between portions of the other wall edge portion. The end edges **14** and **18** are positioned in facing abutting relationship.

FIG. 4 illustrates a container indicated generally by reference numeral **20** which is of non-circular configuration and includes four side walls **21, 22, 23** and **24**. The seam as shown in cross-section in FIG. 3 is indicated generally by reference numeral **25** and is disposed adjacent the corner formed by the intersection of side walls **21** and **24** of the container.

Referring now to FIG. 5, a modification is illustrated. Wall portions **10***a* and **11***a* correspond to wall portions **10** and **11** as shown in FIG. 3. These wall portions are manufactured in the same manner as illustrated in FIGS. 1, 2 and 3 so as to bend the edge portions into the interlocked relationship shown in FIG. 5 wherein portions **12***a*, **13***a*, **15***a*, **16***a* and **17***a* correspond with portions **12, 13, 15, 16** and **17** respectively of the modification shown in FIG. 3.

It will be noted in this modifications, however, that the end edges **14***a* and **18***a* of this modification are in facing spaced relationship rather than being in facing abutting relationship as in the previous modifications. When these end edges are so spaced, indentations indicated by reference numerals **20** and **21** are provided in leg portions **12***a* and **15***a* respectively throughout the longitudinal extent of the seam, these indentations extending toward the space defined between end edges **14***a* and **18***a*.

It will be noted in this latter modification that the double thickness portions still provide two double wall vertical supports for the seam, both ends of the material being pressed into firm position after they are interlocked.

The resistance to pressure and impact from all directions is enhanced with this arrangement, and should forces be applied which tend to pull apart the interlocking connection, the space between the end edges **14***a* and **18***a* is reduced such that these end edges eventually engage one another to prevent the interlocking connection from coming apart.

FIG. 6 illustrates a further modification identical with that shown in FIG. 5 with the exception that the space between the end faces **14***a* and **18***a* is filled with a suitable waterproof substance **30** such as plastic of the synthetic resin type and the like, this plastic filler serving to form a fluid-tight joint such that no fluid can leak by. Accordingly, this seam construction provides an interlocked, waterproof and fluid-tight arrangement.

FIG. 7 illustrates a container indicated generally by reference numeral **35** having four side walls **36, 37, 38** and **39**, this container being similar to that shown in FIG. 4, container **35** incorporating a seam as shown in FIG. 6 and being indicated generaly by reference numeral **40** in FIG. 7. It will be noted that seam **40** is disposed adjacent the corner formed by the intersection of side walls **36** and **39**. In this container as well as in the container illustrated in FIG. 4, the seam of the invention is formed along the inner surface of the container as will be apparent.

It will be noted that in each modification, any pressure or impact forces applied to the seam of the container will cause the end edges of the wall portions at the double thickness portions to be engaged with one another so as to prevent the seam from pulling apart. The seam according to the present invention has improved strength and resistance to forces acting in all directions both lateral and oblique. The same provides an arrangement which is securely interlocked and which substantially eliminates danger of the wall portions of the seam from pulling away from each other due to impact forces and additionally one form of the invention incorporates an arrangement of a seam for containers which is substantially fluid-tight.

The method of the present invention is quite simple and furthermore is readily adaptable for use in mass-production operations.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiment is therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that form their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims.

I claim:

1. A seam for connecting wall edge portions of a container comprising a pair of wall edge portions each of which defines a hook-like cross-sectional configuration, the outermost portion of each of said wall edge portions being doubled back on itself to define a double thickness portion, said hook-like wall edge portions being nested together in contacting relationship such that the double thickness portion of each wall edge portion is sandwiched between portions of the other wall edge portion with the end edges of said wall edge portions disposed in facing relationship, said end edges being spaced from one another and each of said wall edge portions being provided with an indentation extending toward the space between said end edges.

2. Apparatus as defined in claim 1 including a waterproof substance disposed within said space.

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