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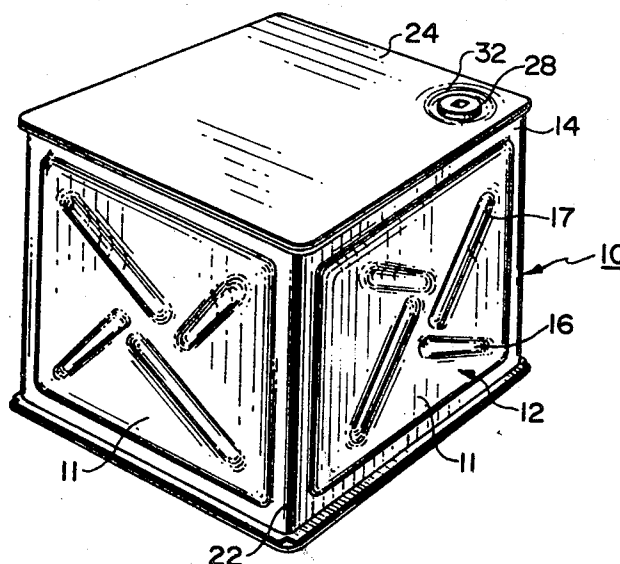
[54] **STORAGE CONTAINER FOR FLUIDS**
12 Claims, 10 Drawing Figs.

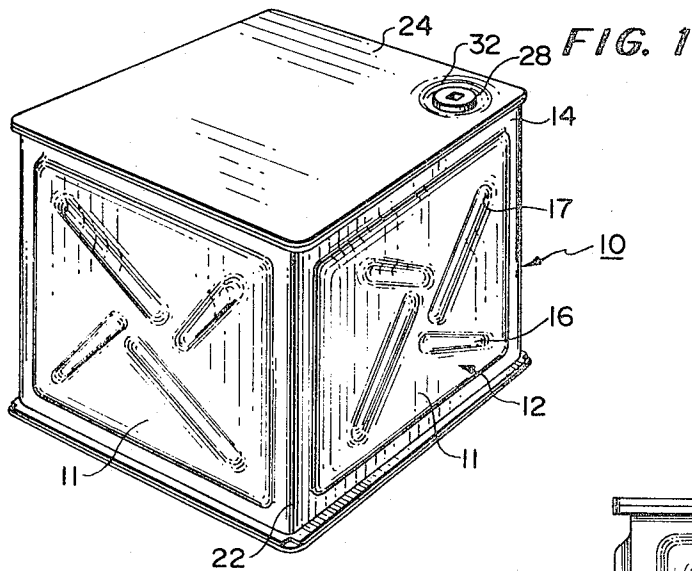
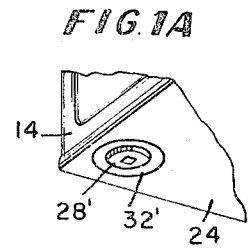
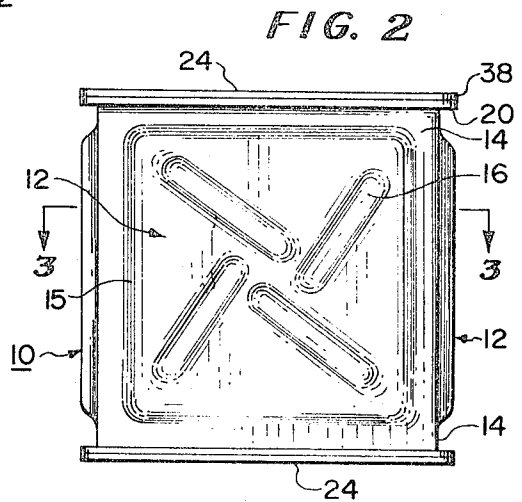
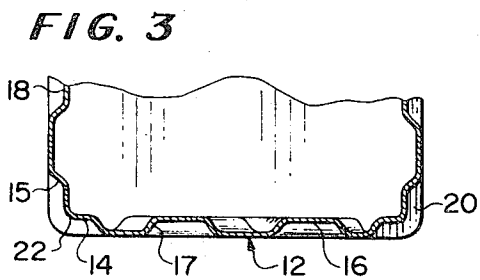
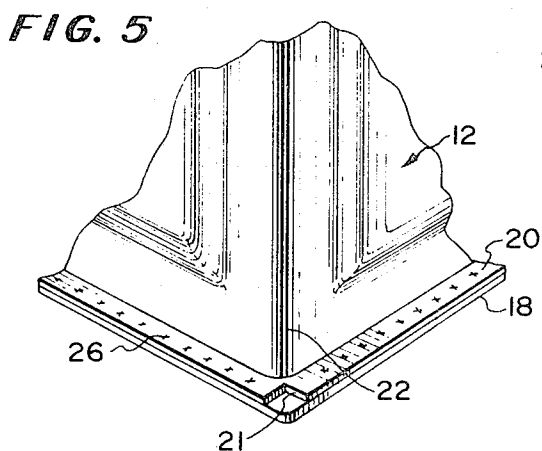
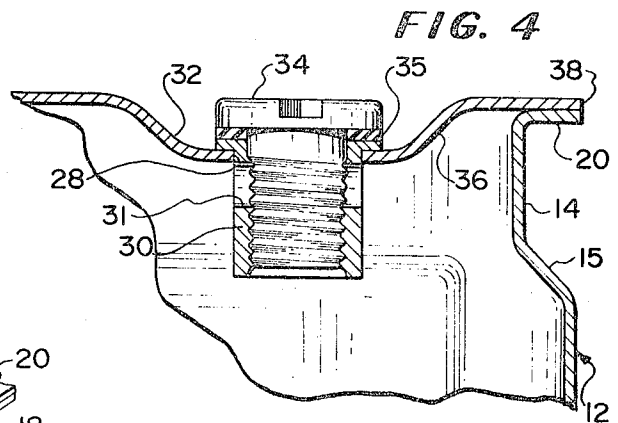
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 23.6, 23.83; 294/67.4-A

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ABSTRACT: A durable, safe metal container for liquids characterized by seamless, integral sides having work-hardened marginal walls bordering and defining a panel of press-formed indentations or embossments, each indentation also having work-hardened marginal walls. The sides of the container are joined by integral work-hardened corners, and are combined with flange-welded top and bottom walls to provide structural rigidity along all axes of the container. The juncture of the sides with both the top and bottom walls is extended peripherally to form, end to end, a protective flange and all outer surfaces on any one side or wall are essentially planar for compact stacking of the containers upon and adjacent to each other in any orientation. At least two work-hardened marginal walls are provided in close proximity to each corner edge and the sides are characterized by having the work-hardened marginal walls of at least two embossments intersected by any major dimension thereof. In one embodiment any given point on a flat part of a side panel is bordered by work-hardened marginal walls of an embossment. A recessed opening is provided in the top wall with a radially slotted, threaded collar or a threaded spider to receive a mating stopper or bung in sealed relationship. Other embodiments are disclosed.

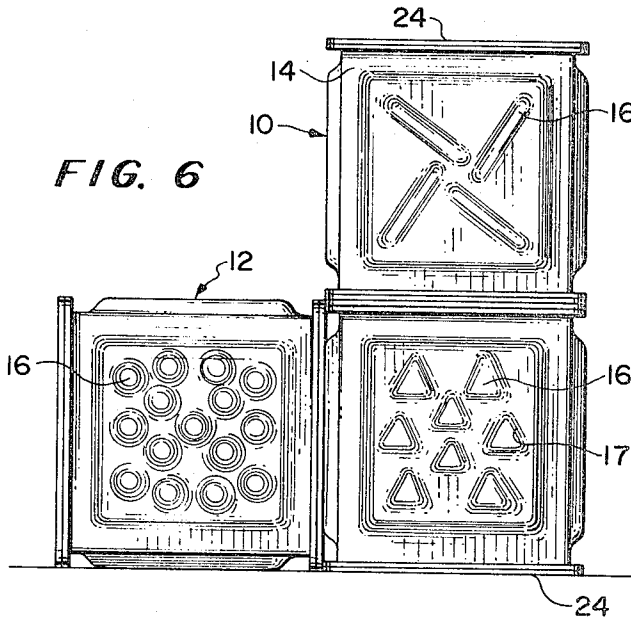
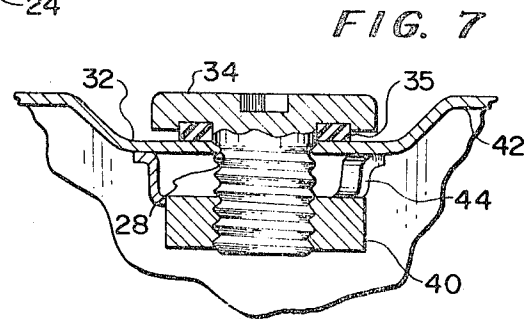
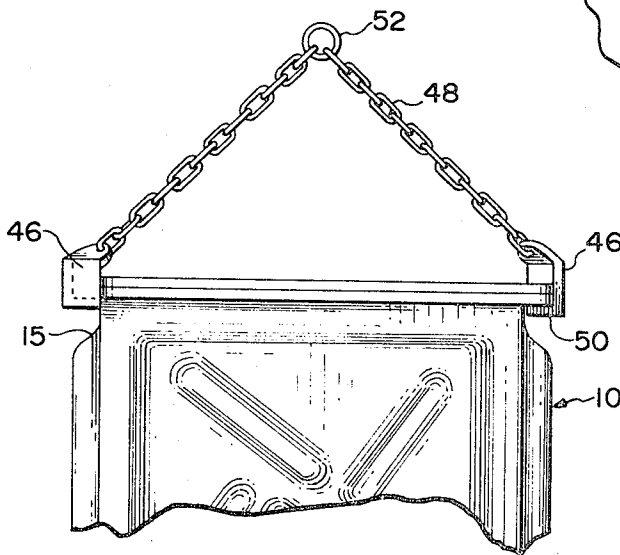
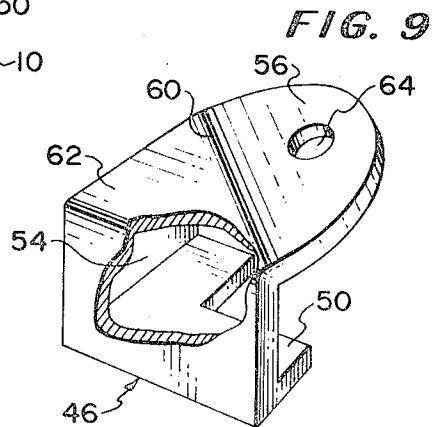




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STORAGE CONTAINER FOR FLUIDS

BACKGROUND OF THE INVENTION

The prior art relating to methods and apparatus for forming packages and containers is prolific. Metal containers are formed, plastic and glass containers are extruded, blown or molded, and paper containers are folded and glued in automatic machines at tremendous rates of speed. The primary considerations of the industry are to produce the largest quantity of a suitable container from a given amount of raw material at the lowest cost in the least time. Little or no attention is paid to wall thicknesses, rigidity, internal stresses and strains, abnormal usage and prolonged storage, except to meet certain minimum requirements consistent with costs and demand or in the case of gasoline containers and fuel storage tanks. As long as the container is capable of preserving its contents from producer to consumer, and withstands reasonable wear and tear, it is a success. Most mass-produced containers are intended for one-time use and are disposable.

In the early development of the metal can for the food and oil industries, the containers were satisfactory for certain commodities only and the development of the "tin can" as we know it today was the result of continuous research. The first tin cans produced for food packaging introduced the era of mass distribution but fell short of expectations for many commodities because of unexpected forces such as internal gas pressure, the corrosive nature of the contents, galvanic effects and changes in temperatures. Not the least difficulty was damage in transit and handling. Similarly, containers for petroleum products and chemicals are a continuing subject of research to overcome both structural failures, material compatibility problems, all aggravated by hard usage.

Critical attention to the physical and chemical forces that contribute to container failure has led to the development of successful containers for many commodities, particularly where the unit size is no more than about a gallon. The problem continues in other areas in spite of the numerous new materials of construction available, and the present level of container technology and know-how. Furthermore, there are still serious problems in the storage and handling of liquids in larger quantities. As the size of the container increases, factors of cost and the forces working against adequate and safe containment of the liquid contents, multiply. These inadequacies are particularly acute in the art where dangerous or volatile liquids are handled and stored. Although pressed flanges and corners are used in many metal containers for both small and large unit quantities of liquids or solids, the curve radii and flange positions are such as to not accomplish the desired rigidity. Safe containers of this type are still so expensive to manufacture and replace, that it is common practice to provide outer expendable protective covers or crates for them and to recondition such containers for reuse.

SUMMARY OF THE INVENTION

The instant invention concerns a metal container body of noncircular section which is characterized by certain patterns of work-hardened edges, bends or stretched walls in the sides, cooperating with essentially flat top and bottom walls through welded flanged edges to produce structural rigidity in any orientation or along any axis sufficient for the safe storage of large unit quantities of liquid and also suitable to withstand the rough handling of such containers, filled or empty. The invention embodies the use of stretched work-hardened corners and intermediate walls in the container body wherein the crystal lattice structure of the flat has been rearranged by stretching or sliding compression from two sides of the metal blank, thereby enhancing the rigidity of the overall structure without additional weight. The parts are combined in such a relationship that a container of maximum strength can be fabricated from the least amount of metal while at the same time providing corners and other exposed parts which have increased resistance to wear because of the increased hardness of these worked metal surfaces, edges and corners. The

generally flat sides of the container are united at stretched work-hardened corners formed by the intersection of the planes of contiguous exterior surfaces of the flat sides and the corners are thereby adapted to resist wear due to bumping and vibration in transit, or when grouped in a stack with other containers during storage. The sides are composed of embossed panels having their stretched work-hardened marginal subwalls spaced inwardly from the work-hardened corners to form an integral lattice of rigid bracing. The panels are also provided with a pattern of embossments or press-formed indentations which present work-hardened subwalls intersected by any major dimension of the panel. This network of hardened metal structures ties the container together as a rigid unit particularly adapted for handling large quantities of liquids.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the container of this invention;

FIG. 1A is a fragmentary view of a bottom corner of the container shown in FIG. 1 to illustrate the recessed opening therein as an embodiment of the invention;

FIG. 2 is a side elevational view of the container;

FIG. 3 is a fragmentary sectional view through a wall of the container body taken along the line 3-3 of FIG. 2;

FIG. 4 is a fragmentary sectional enlarged view of the recessed area of an end plate of the container body showing an opening having an internally extended slotted nipple;

FIG. 5 is a fragmentary detailed view of a corner of the container body showing an end plate in apposition with a flange provided on the end of the container body;

FIG. 6 is an elevational view showing the container bodies grouped in a stack;

FIG. 7 is a cross-sectional view of a modified form of opening for the ends of the container;

FIG. 8 is a fragmentary perspective view of one end of the container showing the use of corner cleats and a chain bridle for lifting the container; and

FIG. 9 is a perspective view of the cleat of FIG. 8 partially cut away to show the flange structure.

THE PREFERRED EMBODIMENTS

In FIG. 1, the storage container body 10 is shown to include the generally flat sides 11 in a rectilinear orientation for purposes of illustration. The ends 11 have raised embossed panels 12 projecting outwardly from the plane of the outer margins 14. Each side 11 of the container 10 has an enlarged embossed main panel 12 and each such panel has a circumferential work-hardened subwall 15 at the margin 14 and inwardly spaced around the side. The panels 12 are reinforced by a plurality of embossments 16 which are recessed into the respective exterior surfaces of the panels. The embossments 16 are arranged within each panel in any configuration wherein a line drawn through a major dimension in the plane of a panel (i.e. side to opposite side) will intersect at least two such embossments. Each embossment 16 has a circumferential work-hardened wall 17, formed as a result of the compression of the sheet metal blank between male and female molds. The bottoms 18 of the embossments 16 preferably lie in the plane of the margins 14 of the sides 10 (see FIG. 3). The panel and embossment depths are substantially equal.

The top and bottom ends of the sides of the container body 10 are press-formed to provide outwardly projecting circumferential flanges 20 and an appropriate corner notch 21 is placed in the blank to prevent tearing of the metal at the corners during formation. In the press-forming of the blank the illustrated container is formed with the sidewalls integral with each other and joined in a rectangular configuration at the pressed corners 22. Both the outwardly projecting circumferential flanges 20 and the outwardly projecting panels 12 of the respective sides of the container contribute to the general inaccessibility of the stretch work-hardened corners 22 (FIG.

3), thereby shielding the corners 22 from otherwise damaging blows which may result in handling.

As shown in FIGS. 2 and 3, the panels 12 of the sides 11 of the container project outwardly to lie substantially in the plane of the outer edges of the flanges 20. This is desirable for purposes of handling and storage since the containers thereby assume in effect the shape of a hexahedron which shape readily functions to permit the containers to be manipulated by a suitable lifting means such as a lift truck, to be easily palletized, or to be stacked one upon the other either in their upright positions or on their sides as shown in FIG. 6. Furthermore, with no tendency to roll this self-stacking feature advanced by this embodiment offers an important economic advantage, that of efficient utilization of storage space. A cylindrical drum having a capacity substantially equivalent to that of a container of the instant design would take up approximately 13 percent more space; while the container of this invention, stacked in any multiples, will fill this wasted space.

As shown in FIGS. 1 and 2, the top and bottom ends of the container body are closed by end plates 24. Each of the end plates 24 is bonded, as by seam welding 26 (FIG. 5), to the respective flanges 20 of the sides, and each containing a generally circular opening 28 located at a corner thereof. The opening 28 in FIG. 1 is shown with a plug member therein for purposes of illustration.

As indicated in FIG. 4, said opening 28 is defined by an internally threaded nipple 30 extending into the interior 31 of the container body and is located within a recessed area 32 of end plates 24. The plug member has a gasket 35 which seals the contact area between the plug member and the top of the nipple. The gasket can be of any resilient material adapted to effect a good seal and resist deterioration from contact with the liquid contents. The recessed area 32 is so designed that when a threaded plug 34 is inserted into the opening, the plug will not protrude above the exterior surface of the end plates. This further contributes to the self-stacking feature of the containers of this invention. The recess 32 has a work-hardened subwall 36 formed by pressing between matching molds. The outer edges 38 of the end plates 24 are contiguous with the flanges 20 of the sidewalls and form a double reinforced flange.

Referring to FIG. 7 a modified opening is shown within the recess 32 of a top or bottom member 24 of the container 10. In this instance the plug member 34 seals against the gasket 35 upon and around the opening 28 and its threaded shank extends into the interior of the container where it engages the internally threaded collar 40. The collar 40 is spaced from the underside 42 of the end plate 24 by means of the radial supports 44. The supports 44 are affixed to the end plate 24 by welding and can be made integral with the collar. Two supports 44 are shown in this instance spaced 120° from each other, the third support not being illustrated.

In FIG. 8, there is shown a container 10 being hoisted by a pair of corner cleats 46 linked to the chain harness 48. The corner cleats are positioned on diagonally opposite corners of the container and have a lower L-shaped flange 50 that fits under the corner of flange 20 of the container. The arrangement is lifted at the middle link 52. A detail of the cleat 46 is shown in FIG. 9 wherein the L-shaped flange 50 is seen in more detail. The wall 54 between the flange 50 and the ear 56 is high enough so that the space between clears over edge 20, 38 of the container. The ear 56 is bent upwardly along the bend 60 at an angle of about 45° from the top wall 62. The ear 56 has an aperture 64 to receive a link or hook of the chain 48.

The recessed openings 28 are located adjacent a corner of the container to provide for complete drainage of the liquid contents and also positioned so that the side flange or corner at the juncture of the side flanges provides a convenient pouring spout.

Although the invention has been described in relation to several embodiments these are illustrative and various modifications can be made in the structures shown without departing from the spirit of the invention.

Any type of sheet metal can be used to form the container of this invention. The sheet may vary in thickness in accordance with the strength, weight and cost requirements to be met. As an example, the metal walls of all of the parts of the container can be the same or different thicknesses, ranging from, but not limited by 16 to 22 gauge stock. Any of a wide variety of types of metal sheet can be used, as illustrated by cold rolled steel, hot rolled steel, stainless steel and the like. The metal sheet should be of hygienic quality where food stuffs such as edible liquid fats and vegetable oils are to be contained, stored and dispensed using the container of this invention. An advantage of the invention is that special corrosion-resistant containers for liquid chemicals, such as acids, can be fabricated at one-third to one-half of their present costs.

I claim:

1. A rigid metal container of noncircular cross section comprising:

- integral seamless generally flat sidewalls and flat end walls joined together to form peripheral side flanges;
- said sidewalls having stressed work-hardened corners extending between said flanges;
- said sidewalls being press-formed to provide a flat margin at said flanges bordering an outwardly projecting panel;
- said panel having press-formed rigidifying embossments therein, the bottom walls of which are substantially coplanar with said flat margin; and
- a recessed opening in one of said flat end walls.

2. A rigid metal container in accordance with claim 1 in which: said embossments in said panel are arranged in space configuration such that any major dimension of a sidewall intersects at least two of said embossments.

3. A rigid metal container in accordance with claim 2 in which: said embossments are generally circular in form.

4. A rigid metal container in accordance with claim 2 in which said embossments are triangular in form.

5. A rigid metal container in accordance with claim 2 in which: said embossments are elongated.

6. A rigid metal container in accordance with claim 5 in which: said elongated embossments are arranged in a pattern with each embossments having its longitudinal axis substantially perpendicular to a neighboring embossment.

7. A rigid metal container in accordance with claim 1 in which:

- said recessed opening is provided with an internally threaded collar extending into the interior of said container;
- a plug member for said collar; and
- openings are provided in the side of said collar between the inner wall of said end wall and the end of said collar.

8. A rigid metal container in accordance with claim 7 in which: said collar is affixed to and spaced from the inside of said end wall by means of radial supports.

9. A rigid container in accordance with claim 1 including in combination:

- a corner cleat adapted to engage a corner of said container for lifting same; and
- said cleat having an L-shaped vertical wall encompassing said flange at a corner thereof.

10. A rigid metal container of noncircular cross section having:

- integral seamless sidewalls with stressed work-hardened corners and outwardly depending peripheral flanged edges at the ends;
- said walls each having outwardly projecting panels each bordered by stressed work-hardened subwalls spaced inwardly from said flanged edges and said corners to define a peripheral flat margin;
- a plurality of inwardly projecting flat-bottomed embossments in said panels bordered by stressed work-hardened subwalls, said embossments being spaced from each other and from the peripheral subwalls of said panel in a configuration such that any major dimension of a wall intersects at least two of said embossments;

- d. the flat bottoms of said embossments and said peripheral margins being in substantially the same plane; and
- e. flat ends affixed to said sidewalls with their marginal edges contiguous to the flanged edges of said sidewalls.

11. A rigid metal container in accordance with claim 1 in which:

- a. a recessed opening is provided in each of the side end walls; and
- b. said openings are adjacent the corner of said container whereby said side flange adjacent thereto provides a

pouring spout.

12. A rigid metal container in accordance with claim 10 in which:

- a. a recessed opening is provided in each of the side end walls; and
- b. said openings are adjacent the corner of said container whereby said side flange adjacent thereto provides a pouring spout.

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