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Fischer, Jr.

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[45] **July 10, 1973**

[54] **TAMPERPROOF CONTAINER FOR VIALS OR THE LIKE**

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[73] Assignee: **Ciba-Geigy,** Ardsley, N.Y.

[22] Filed: **June 11, 1971**

[21] Appl. No.: **152,126**

[52] **U.S. Cl.** ..... **220/21,** 220/27, 206/65 A, 206/63.2 R, 206/DIG. 10

[51] **Int. Cl.** **B65d 1/24**

[58] **Field of Search** ..... 220/12, 22, 27, 23 A; 206/65 A, 46 FR, 3, 63.2 R, DIG. 10

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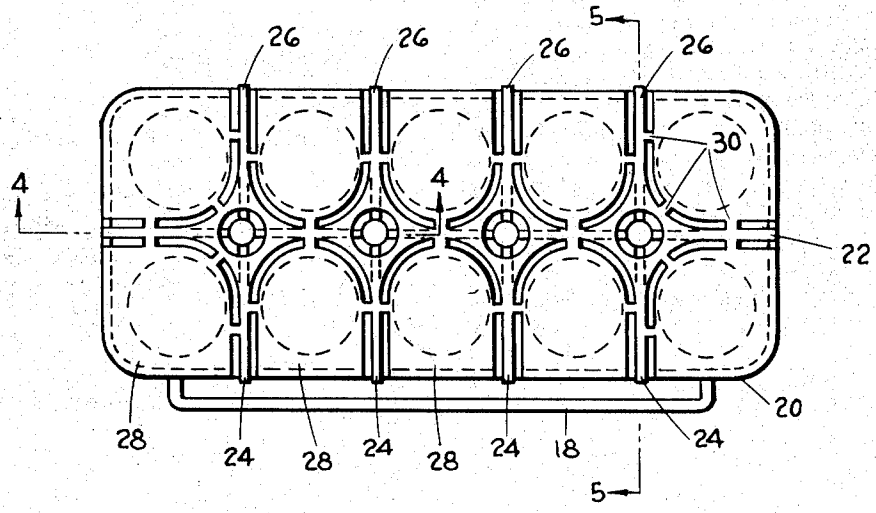
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[57] **ABSTRACT**

A tamperproof container for vials and the like formed from a receptacle base member and a lid which are adapted to be connected to each other by means of an interfitting structure of pins and columns extending from the lid and the base. The interfitting structure can be mechanically joined, chemically bonded, or ultrasonically welded, as is adapted to permanently join the lid to the base and to separate the assembled container into several sections. The lid is formed with frangible zones which are positioned to align with each of the sections of the assembled container so that access to each of the sections of the assembled container can be obtained only by removing the frangible zone directly above that section.

17 Claims, 9 Drawing Figures



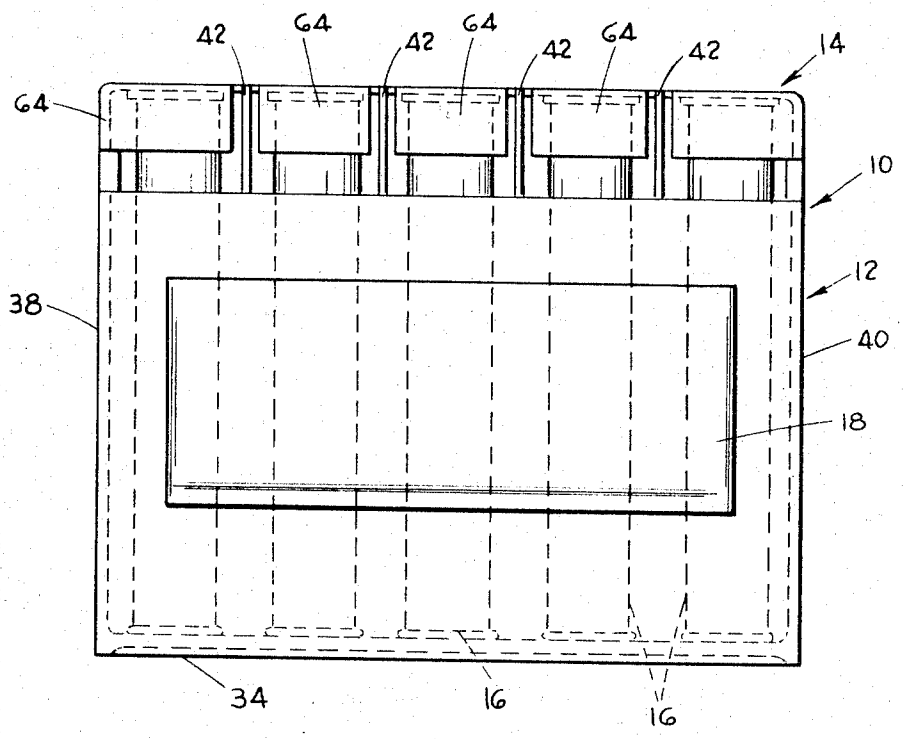


FIG. 1

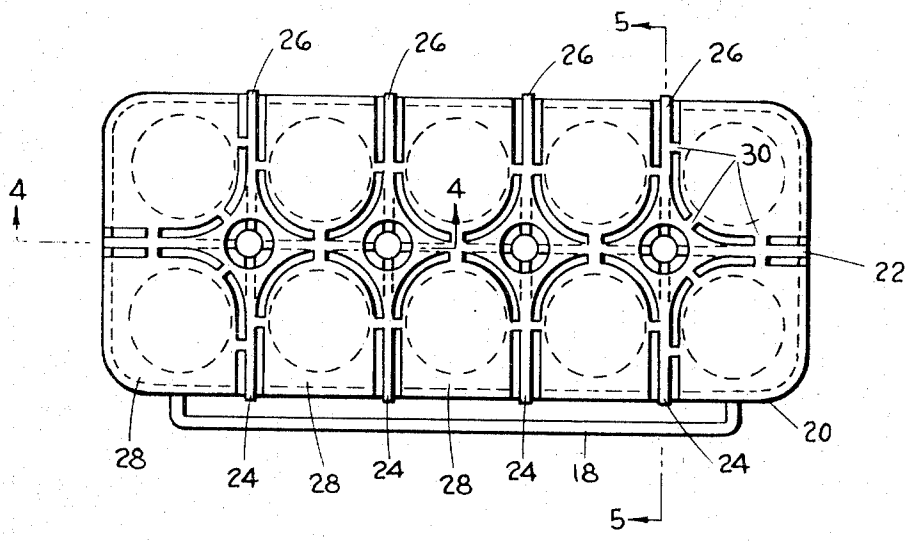


FIG. 2

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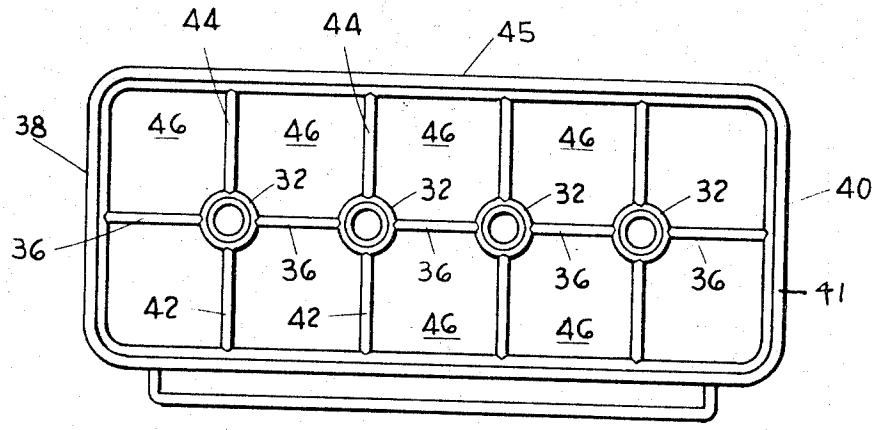


FIG. 3

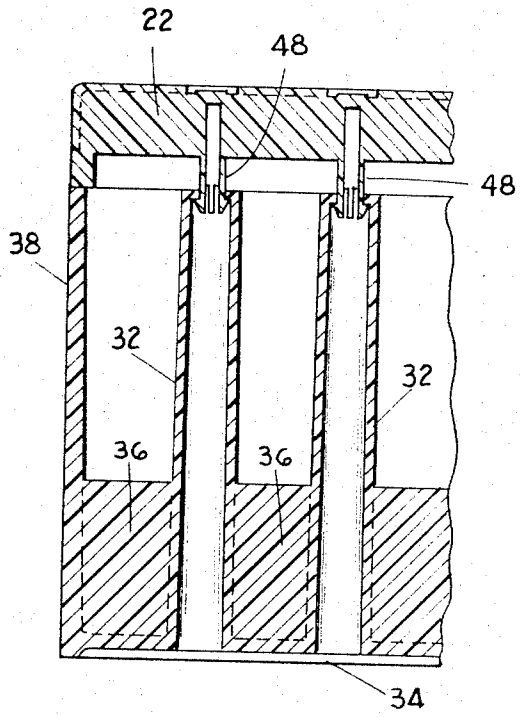


FIG. 4

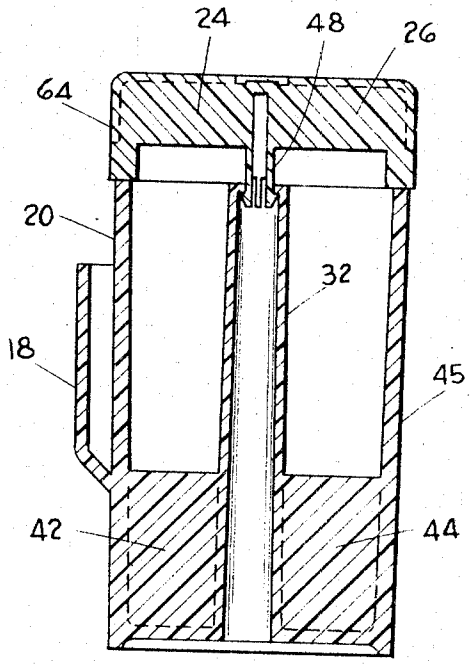


FIG. 5

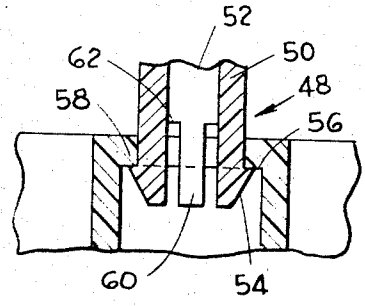


FIG. 6

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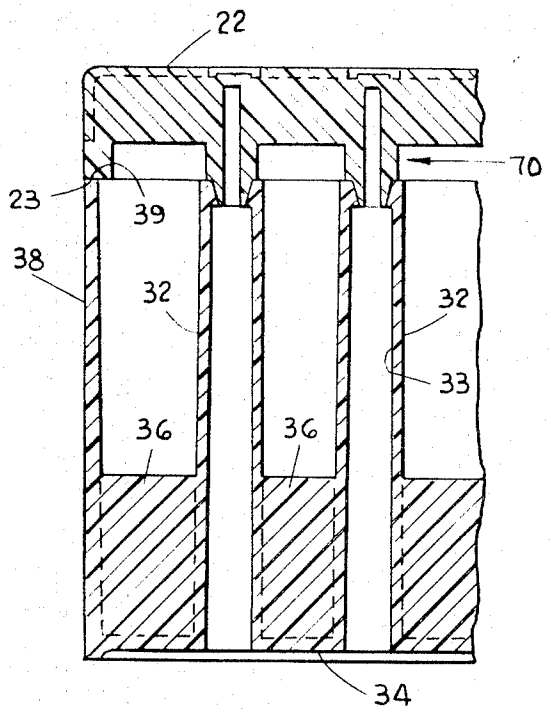


FIG. 7

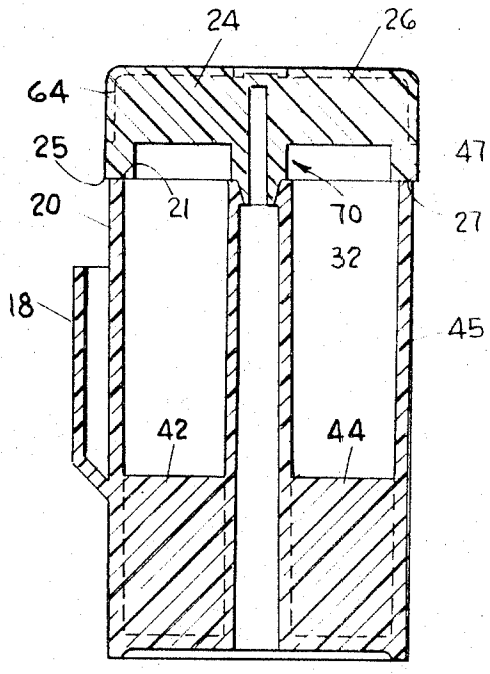


FIG. 8

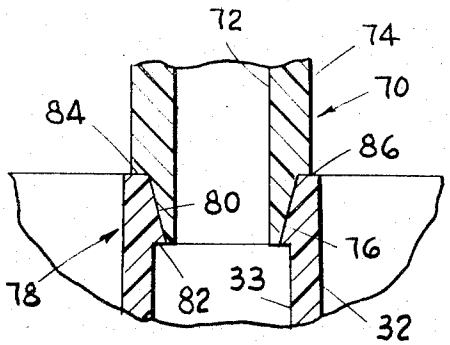


FIG. 9

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TAMPERPROOF CONTAINER FOR VIALS OR THE LIKE

This invention relates to special receptacles and packages and, more particularly, to pilferproof containers.

BACKGROUND OF THE INVENTION

Pilfering and tampering with goods have long been a problem in commerce in general and, particularly, in the conduct of medical services. Extensive efforts have been made to develop tamperproof containers to hold vials of medicinal products and small items which are normally prey to theft so that these items cannot be taken without the knowledge of appropriate authorities.

To be effective, a tamperproof container should be constructed so that items cannot be removed from the container without having the container indicate the exact number of times the container had been opened and the quantity of items which had been removed. For example, previous attempts to develop tamperproof containers provided sealed, single compartment containers to hold a plurality of items. These containers had to be ruptured, or altered in some other way, to remove one single item. However, after the container was altered or ruptured to obtain the first of the several items therein, it would be possible to easily remove the remaining contents of the container without anyone knowing exactly how many were taken or by whom. An example of such a device is the U.S. Patent to E. J. Meierhoefer, No. 3,494,458, which is used to hold a plurality of syringes. Once the container is opened, access can be had to the syringes remaining in the container.

Tamperproof containers should also be constructed so that the contents of a partially opened container cannot be manipulated within the container and withdrawn through an opening that was previously used to withdraw material from the container. To avoid this problem, many containers were designed with fairly elaborate structures, having numerous layers and safety devices to prevent manipulating of the contents within the structure. For example, the U.S. patent to Meierhoefer, No. 3,489,268, issued Jan. 13, 1970, shows such a device which requires numerous separate parts with individual safety devices to prevent removal of the contents through openings which have been made previously in the container.

SUMMARY OF THE INVENTION

To overcome the problems set forth in the prior art, the present invention sets forth a tamperproof container, having a receptacle base and a lid which are adapted to be permanently fixed to each other by means of interfitting columns and pins projecting from the lid and receptacle base. The interfitting columns and pins separate the assembled container into a plurality of sections which hold the items to be dispensed. Frangible zones formed in the lid of the container are aligned with each of the sections formed within the container. The items kept in each of the sections of the container can only be removed by removing the frangible zone in alignment with the particular section in which those items are kept. The construction of the interfitting structure can be varied to make the lid and base suitable for fastening means by mechanical joining, chemical bonding, or ultrasonic welding.

Accordingly, it is an object of the present invention to provide the components of a tamperproof container which container is constructed so that it must be deformed each time access is gained to a separate section of the container.

Another object of the present invention is to provide the components of a tamperproof container which container cannot be temporarily deformed to allow surreptitious removal of items from the container.

It is a further object of the present invention to provide the components of a rugged and durably constructed tamperproof container, which components include structural members to fasten together the components of the container and, at the same time, to separate the container into separate sections.

Yet another object of the present invention is to provide the components of a tamperproof container which components include simplified interfitting means to permanently join the lid and the base of the container.

Another object of the present invention is to provide the components of a tamperproof container which components are relatively inexpensive to fabricate.

It is still another object of the present invention to provide the components of a tamperproof container, which container, when assembled, has several sections, and access to each section can be obtained only by deforming a portion of the container directly proximate to that individual section of the container.

A further object of the present invention is to provide the components of a tamperproof container which components are relatively easy to fabricate and assemble.

These and other objects and advantages of the invention will be apparent from the following detailed description taken in conjunction with the drawings illustrating a preferred embodiment of the invention.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation of a tamperproof container built in accordance with the teachings of the present invention.

FIG. 2 is a top view of FIG. 1.

FIG. 3 is a top view of the base of the tamperproof container shown in FIG. 1.

FIG. 4 is a view along lines 4—4 of FIG. 2.

FIG. 5 is a view along lines 5—5 of FIG. 2.

FIG. 6 is an enlarged section of the interfitting members shown in FIGS. 4 and 5, which connect the lid of the container to the base of the container.

FIG. 7 is a sectioned view, similar to FIG. 4, showing another embodiment of the invention.

FIG. 8 is a sectioned view, similar to FIG. 5, of the embodiment of the invention shown in FIG. 7.

FIG. 9 is an enlarged section of the interfitting members shown in FIGS. 7 and 8, which connect the lid of the container to the base of the container.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a tamperproof container, generally indicated at 10, having a receptacle base portion 12 and a lid portion 14 which container holds a plurality of vials 16. A pocket 18 formed on front wall 20 of the base can be used to hold either a sign-out sheet for

items taken from the container or literature regarding items which are kept in the container.

As seen in FIGS. 2 and 3, lid portion 14 and base portion 12 are designed to be fabricated in single molding operations from many of the widely used commercial plastics. The container base 12 is separated into a plurality of sections by several hollow columns 32 extending upwardly from the floor 34 of the base. The lid 14 is formed with a lateral rib 22 and a plurality of front and rear ribs 24 and 26 respectively which intersect the lateral rib. A plurality of breakaway tabs 28 are connected to the lateral and front and rear ribs by means of relatively thin ligaments 30 of the fabricating material, to form frangible zones in the lid.

As shown in FIGS. 4, 5 and 6 of the drawings, the lid of the container is connected to the base by means of interfitting projections which extend from the container base and the lid. connecting pins generally indicated at 48 are formed at the intersections of the lateral rib with the front and rear ribs of the lid and extend downward into the container to interfit with the columns 32 extending upward from the base container.

The interfitting pins and columns separate the volume of the assembled container into several sections, each of which could securely hold an appropriately shaped object such as a cylindrical vial, having a diameter large enough to prevent passage of the vial between adjacent columns 32 or the columns and the adjacent walls of the base. To facilitate holding smaller objects, each separate section of the base is partitioned off into a receptacle 46 by a series of webs. As shown in FIG. 3, lateral webs 36 connect the upright hollow columns with the left and right side walls of the base 38 and 40 respectively and with the other hollow columns. Front and rear webs 42 and 44 respectively connect the hollow columns to front wall 20 and the rear wall 45 of the container base.

As seen in FIG. 6, each connecting pin 48 comprises one or more fingers 50 which coact with the corresponding hollow column and with each other to mechanically join or interlock the pins to the columns. Each finger has an engagement protrusion in the form of a tapered nib 54 with a shoulder 56 on the upper surface of each nib. The fingers in each connecting pin are radially spaced about a central axis 52 of the pin with the nibs facing outward. The end portion 60 of each finger is narrowed by shoulders 62 in the sides of the fingers to insure that there is enough spacing between the nibs to allow sufficient movement of the nibs when they engage the corresponding hollow column as explained below.

In order to interlock connecting pins 48 with the corresponding hollow columns 32, the tapered nibs 54 on the fingers 48 are forced downward into hollow column 32 until the shoulders 56 of the nibs pass through the aperture of the annular flange 58 at the top of the column. As the tapered nibs are forced downward through the aperture, the walls of the flange coact with the nibs to press the nibs radially inward and, therefore, resiliently bend the fingers into a relatively compact position. After the shoulders of the nibs have passed through the paerture of the flange the natural resilience of the material from which the fingers are fabricated will cause the nibs to move radially outward, thereby engaging the shoulders 56 of the nibs against the underside of the annular flange. It will then be impossible to remove the connecting pin from the hollow column without breaking the annular flange 58 of column 32 or the nib 54 of the finger 50.

The structure of the container lid coacts with the structure of the container base to provide an absolutely tamperproof container. As shown in FIG. 2, each of the breakaway tabs effectively covers the space between the adjacent ribs of the lid structure. As can be seen from FIGS. 2 and 4, the ribs on the lid intersect at positions which coincide with the location of the upright hollow columns 32 of the base so that the breakaway tabs of the lid are in alignment with each section formed by the connecting pins and hollow columns, as previously mentioned. Further, as shown in FIGS. 4 and 5, each breakaway tab 28 has a vertical skirt section 64 which extends sufficiently close to the base of the container to prevent the removal of items from the container base by extracting them from the space between the lid and the base. Because of the relative thinness of the ligaments 30 holding the breakaway tabs to the ribs in comparison to the size of the ribs, it is impossible to bend or substantially deform the rib structure of the lid to raise the lid without fracturing the ligaments and thereby permanently removing one of the breakaway tabs. Therefore, the only way to obtain access to each section formed within the container is to remove the breakaway tab directly above that section to which access is desired by breaking the ligaments connecting the breakaway tab to the rib structure of the lid.

As shown in FIG. 5, the front and rear ribs 24 and 26 of the lid and the breakaway tabs attached to each rib extend beyond the front and rear walls 20 and 45 of the container base. Also, the vertical skirts 64 of each breakaway tab 28 are raised above the walls of the container base. Therefore, the bottom ends of breakaway tabs 28 are readily available to be pushed or lifted by a finger or any convenient pry, so that easy removal of each tab is assured.

If desired, the position of the columns and pins can be reversed, so that the pins extend from the container base and the columns extend from the lid. Also, it is not essential that the columns be completely hollow, as illustrated. Further, the orientation of the nibs and the flange in FIGS. 1 through 6 may be reversed. The flange in the column need not have an aperture but, instead, could extend beyond the width of the column to coact with inwardly facing finger nibs, to force the fingers apart during installation and prior to engagement of the shoulders with the flange.

Another embodiment of the invention is shown in FIGS. 7 through 9, in which the lid of the container is adapted to be fastened to the base either by chemical bonding or ultrasonic welding. Those elements appearing both in FIGS. 1 through 6 and FIGS. 7 through 9 are identified by the same reference numbers.

As shown in FIG. 9, connecting pins 70, extending from lid 14, are cylindrically shaped tubular projections having inner surfaces 72 and outer surfaces 74 with tapered outer end portions 76, which are adapted to coact with the upper ends of the hollow columns 32, generally indicated at 78. An inner tapered section 80 in the upper end 78 of each hollow column 32 corresponds with and is adapted to receive and mate with the tapered section 76 of the connecting pins 70. A step 82 connects inner tapered section 80 to the inner wall 33 of hollow columns 32.

A small shoulder **84** on the tapered section **76** of connecting pin **70** is adapted to abut with a flat end section **86** at the end of hollow column **32** to position the connecting pin with respect to the hollow column. Additionally, the end surfaces **23** of lateral rib **22** are adapted to contact the upper surfaces **29** and **41** (see FIG. 3) of side walls **28** and **40** respectively. Further, bottom surfaces **25** and **27** of front rib **24** and rear rib **26** respectively are adapted to contact the top surfaces **21** and **47** of the front and rear walls **20** and **45** of the container base.

The abutting surfaces just described are fastened to each other either by chemical bonding or by means of ultrasonic welding. When chemical bonding is used to fasten the lid to the base, a bonding agent is applied to the mating surfaces to be bonded, as dictated by standard bonding procedure. When ultrasonic welding is used for fastening the components of the device, the components are assembled and a commercially available ultrasonic welding horn is connected to the lid **14** or the base **12.** The energy from the welding horn in the form of ultrasonic vibrations is transmitted to all the abutting surfaces of the lid and the base. The heat produced by the ultrasonic vibrations quickly fuses the abutting surfaces to form a rigidly fastened structure which cannot be disassembled.

If desired, the connecting pin **70** may be made as a solid, bullet-shaped member instead of a hollow member, as illustrated. Also, the tapers may be reversed so that the connecting pin itself has a recessed socket-type tapered top, while the hollow column ends in a conical projecting taper.

Although the containers described show only two rows of separate sections holding five vials each, the container structure is suitable for expansion to any number of rows of any quantity.

The container is relatively easy to fabricate in any of the convenient mass production commercial plastics. The containers in accordance with the invention are made clear or opaque. They can be made in varying sizes and can be made to have individual sections of varying sizes to hold a wide variety of vials or other items.

It is believed that the advantages and improved results of the invention will be apparent from the foregoing description of a preferred embodiment of the invention. It will be apparent that various changes and modifications may be made without departing from the spirit and scope of the invention as sought to be defined in the following claims.

I claim:

1. A tamperproof container comprising a container base, a lid adapted to cover the container base, a plurality of columns extending from at least one of the container base and the lid, a corresponding plurality of connecting pins extending from the other of the container base and the lid, the connecting pins being adapted to engage with the columns to separate the container into a plurality of sections, frangible zones formed on the lid of the container in alignment with the outline of each section to allow access to each section by removal of said frangible zones; and cooperable interfitting means on the columns and connecting pins for the permanent connection of the lid to the base so that access to each of the sections formed in the container can be obtained only by removing the frangible zone aligned with that section.

2. A tamperproof container according to claim **1** wherein said interfitting means include a flange on at least one of the columns, and an engagement protrusion formed on the corresponding connecting pin, the engagement protrusion being constructed to engage the flange upon elastic deformation of the connecting pin to permanently fix the connecting pin to the column.

3. A tamperproof container according to claim **2** wherein the connecting pins comprise a plurality of spaced fingers, a tapered nib engagement protrusion on each finger to engage the flange on the column upon elastic deformation of the finger.

4. A tamperproof container according to claim **3** wherein the flange on the column has an aperture and the tapered nibs are adapted to pass through the aperture upon elastic deformation of the fingers, and to engage the flange upon at least a partial return of the fingers to their undeformed position.

5. A tamperproof container according to claim **1** wherein each frangible zone includes a breakaway tab, and a plurality of ligaments connecting the breakaway tab to the remainder of the lid, the strength of the ligaments being substantially less than the strength of the breakaway tab and the remainder of the lid so that forces exerted on the breakaway tab will rupture the ligaments before fracturing the remainder of the lid and the breakaway tabs.

6. A tamperproof container according to claim **5** wherein the lid includes a lateral rib and ribs intersecting the lateral rib, and the ligaments from the breakaway tabs are connected to the lateral rib and the adjacent ribs intersecting the lateral rib.

7. A tamperproof container according to claim **6** wherein the lateral rib and ribs intersecting the lateral rib extend vertically above the base of the container so that the breakaway tabs are disposed above the base of the container.

8. A tamperproof container according to claim **6** further comprising webs in the base of the container interconnecting the columns extending from the bottom of the base and connecting the columns to the walls of the container to partition the base of the container into separate receptacles.

9. A tamperproof container according to claim **8** wherein the columns extending from the bottom of the base are hollow.

10. A tamperproof container according to claim **9** wherein the lateral and intersecting ribs of the lid are in alignment with the webs interconnecting the columns of the base and connecting the columns to the walls of the base so that each breakaway tab is aligned with a separate partitioned receptacle formed in the base.

11. A tamperproof container according to claim **1** wherein the interfitting means includes a tapered section on at least one of the columns, and a tapered section on the corresponding connecting pin adapted to mate with the tapered section on the column for permanent fixing of the connecting pin to the column.

12. A tamperproof container according to claim **11** wherein the interfitting means further includes a shoulder on the taper section of one of the column and the connecting pin, and a flat end surface on the other of the column and the connecting pin adapted to abut the shoulder on the other of the column and the connecting pin.

13. A tamperproof container according to claim 12 wherein each frangible zone includes a breakaway tab, and a plurality of ligaments connecting the breakaway tab to the remainder of the lid, the strength of the ligaments being substantially less than the strength of the breakaway tab and the remainder of the lid so that forces exerted on the breakaway tab will rupture the ligaments before fracturing the remainder of the lid and the breakaway tabs.

14. A tamperproof container according to claim 13 wherein the lid includes a lateral rib and ribs intersecting the lateral rib, and at least a portion of one of the ribs is adapted to abut a surface on the container base and be fastened to the abutting surface.

15. A tamperproof container according to claim 13 wherein the column includes a tapered section adapted to receive the tapered section on the corresponding connecting pin, the shoulder is disposed on the tapered section of the connecting pin, and the lid includes a lateral rib and ribs intersecting the lateral rib, and at least a portion of each rib is adapted to abut a surface of the container base and be fastened to the abutting surface.

16. A tamperproof container according to claim 15 wherein the matingly tapered interfitting means and the abutting surfaces of the ribs and the container base are adhered to each other.

17. A tamperproof container according to claim 16 wherein the matingly tapered interfitting means and the abutting surfaces of the ribs and the container base are ultrasonically welded.

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