United States Patent [19]

Johnson

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[54] **RACK FOR BIOLOGICAL TESTING TRAYS**

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[73] Assignee: **Baxter Laboratories, Inc.,** Morton Grove, Ill.

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[52] **U.S. Cl.** **211/71,** 211/41, 211/50

[51] **Int. Cl.** **A47g 29/00**

[58] **Field of Search** 211/73, 79, 72, 71, 211/50, 126, 41; 220/23.4, 23.83

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Primary Examiner—Roy D. Frazier
Assistant Examiner—Richard L. Stroup
Attorney—Scott J. Meyer

[57] **ABSTRACT**

A rack is disclosed for containing a plurality of biological testing trays wherein the trays are held in an open type rack having a number of bays each designed to contain one of the trays. The rack preferably is constructed of plastic material and does not have a bottom so that the tray which is usually constructed of transparent material may be viewed from either side. The trays are held in the rack by a combination of a relatively small shelf around the bay and by the side walls, either only by frictional engagement or by protrusions.

3 Claims, 11 Drawing Figures

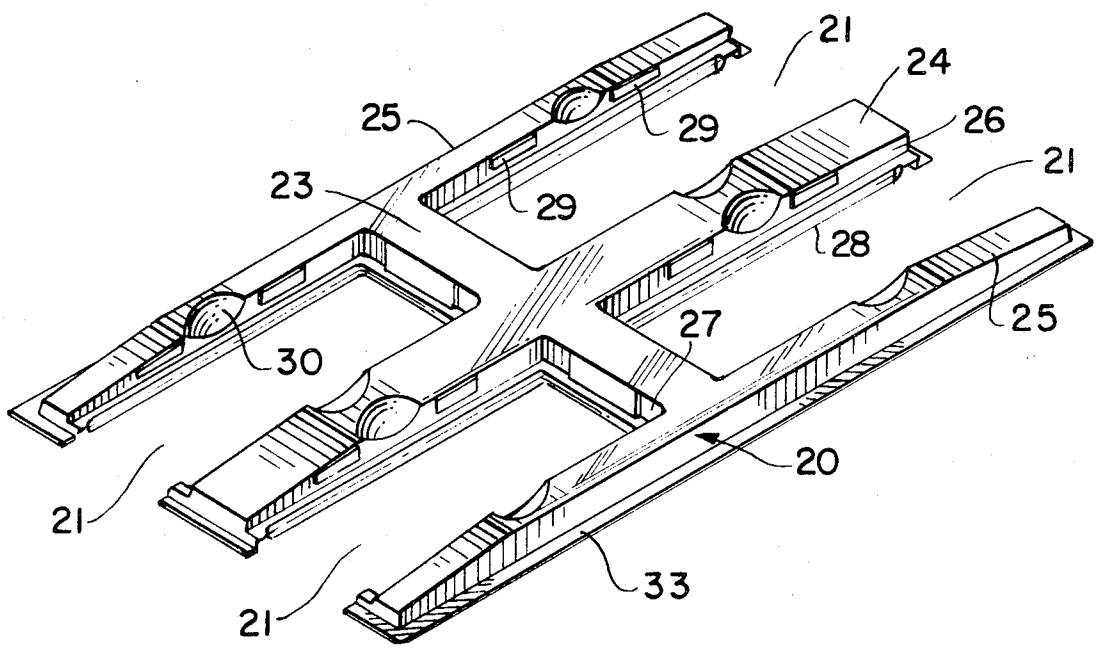


FIG. 1.

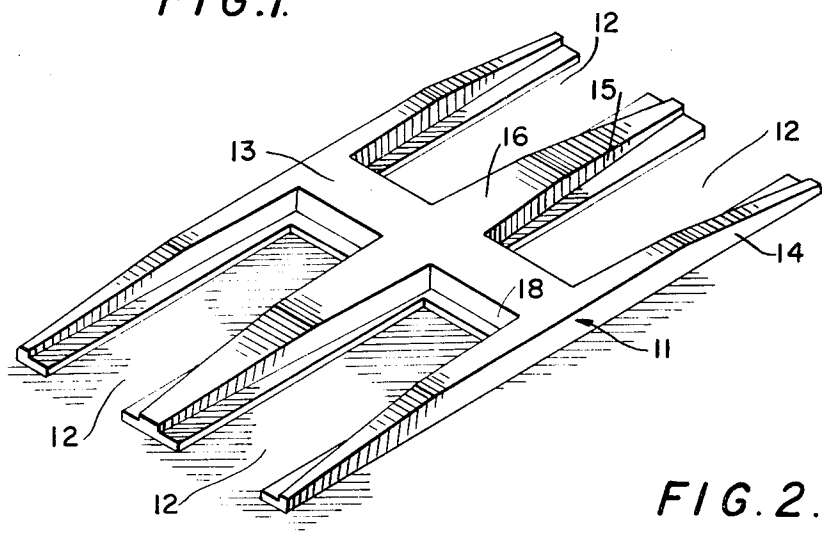


FIG. 2.

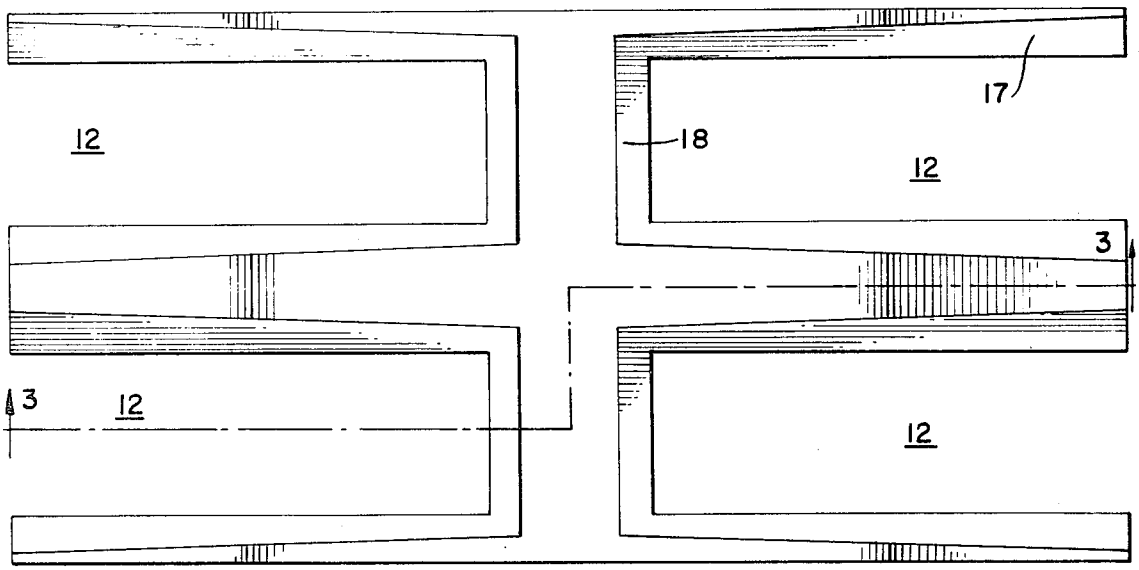
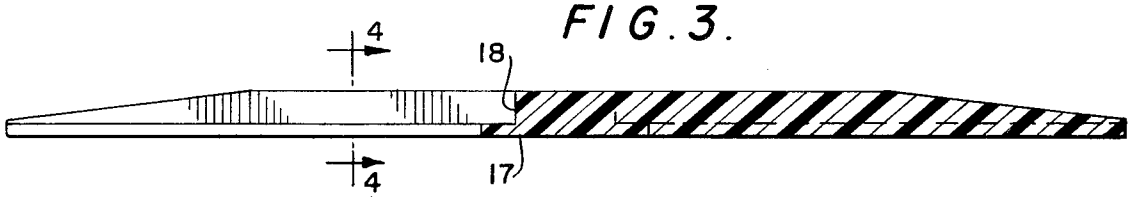


FIG. 3.



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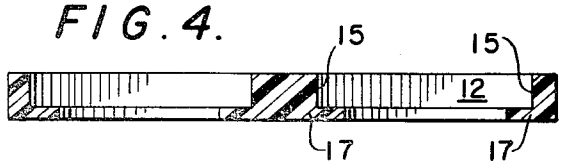

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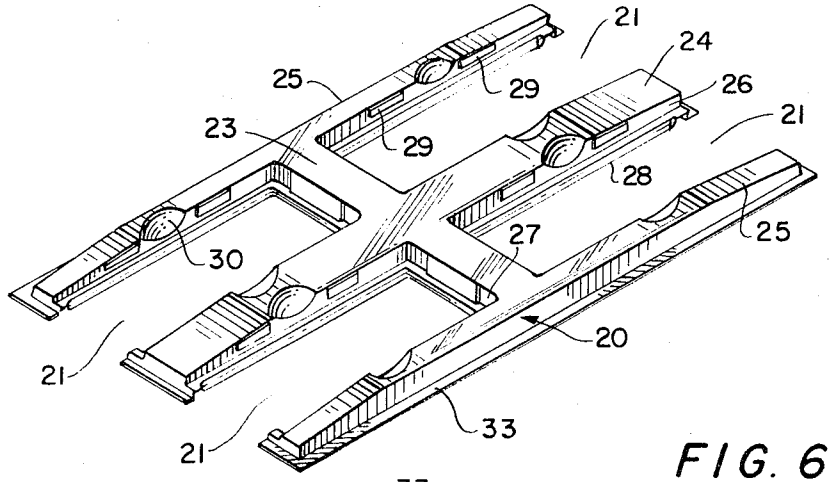
FIG. 5.



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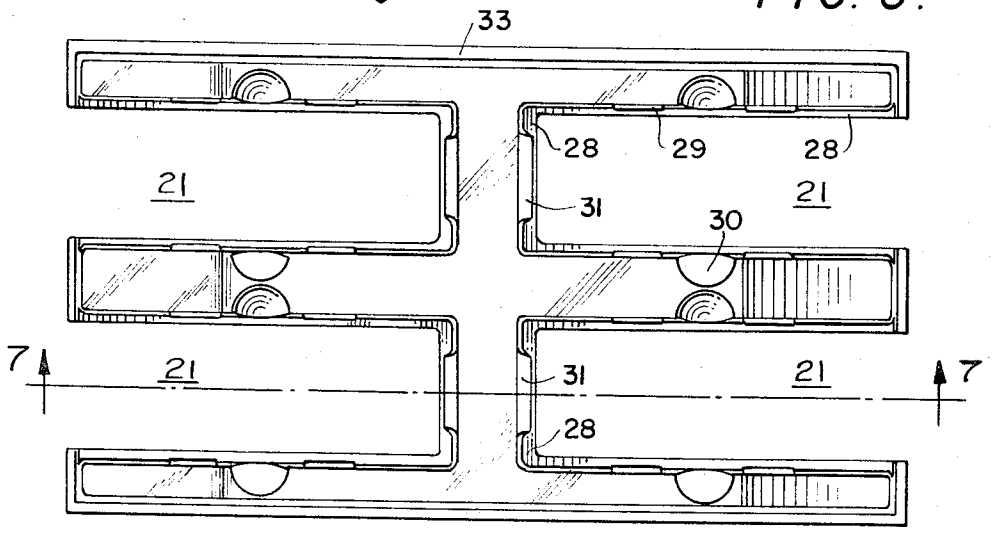

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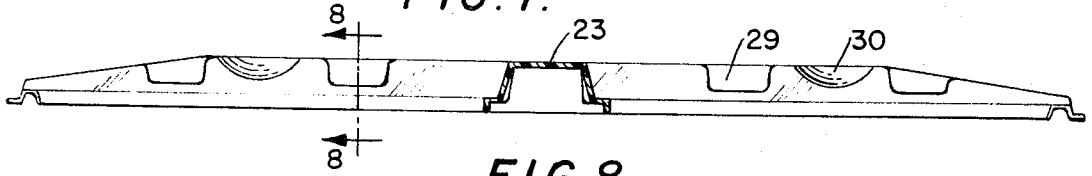
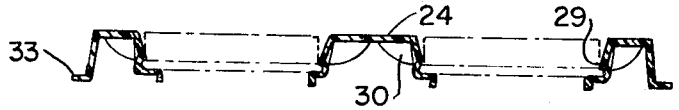


FIG. 8.



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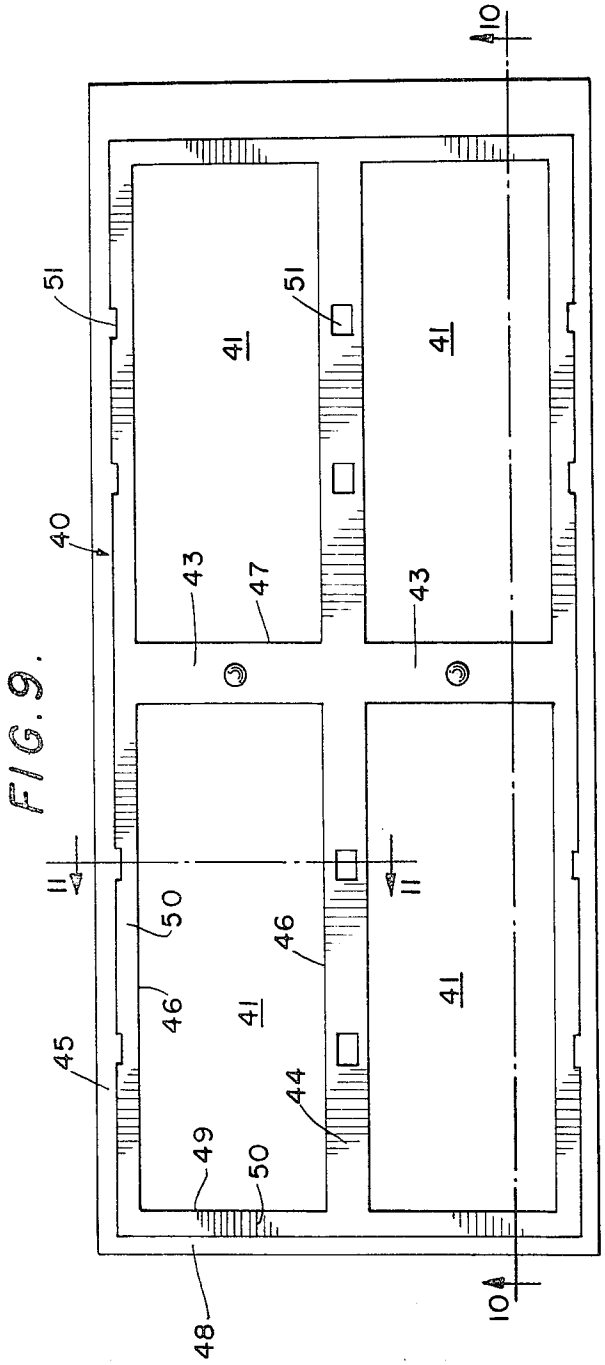

FIG. 9.

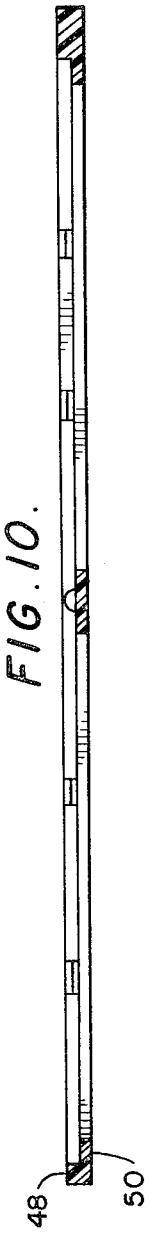

FIG. 10.

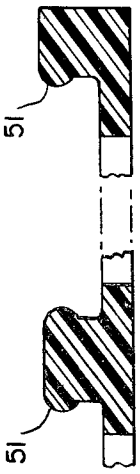

FIG. 11.

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RACK FOR BIOLOGICAL TESTING TRAYS

BACKGROUND OF THE INVENTION

Considerable activity has been undertaken in recent years to provide plastic trays or plates of transparent material which support a gel substance that contains material sensitive for immunoligical testing. In other words, the tray is preliminarily prepared with the gel material. It is then merely necessary to inoculate certain desired areas of the gel with a material to be tested. These trays are constructed, as stated, of a plastic material which is transparent. Essentially, the tray is a relatively thin, flat structure or shallow receptacle having a rectangular configuration. Oftentimes, the tray will have a flange along the lower portion thereof. The flat tray will also usually have a rectangular cover. The cover fits on the flat tray much like the well-known Petri dish. After the material to be tested has been applied to the gel material in the tray, the tray is usually positioned in an ambient situation conducive to producing the controlled reaction desired. Illustrative of these plates are the gel diffusion devices described in U. S. Pat. application Ser. No. 99,797, filed Dec. 21, 1970 and in the *Journal of the American Medical Association*, vol. 200, page 363 (1967).

It will be appreciated that in a large hospital or clinical laboratory, a considerable number of such trays will be employed in any given work day. Consequently, possibly hundreds of such trays will be inoculated. While the trays are of substantially diminutive size, the very nature of such a relatively small size also has proven to make it somewhat difficult to keep track of the trays and to move them about into the controlled atmosphere.

SUMMARY OF THE INVENTION

As stated in the foregoing, a considerable number of these trays are employed in a hospital or clinical laboratory. The present invention is designed to achieve monitoring of the trays and to conveniently move a plurality of them about in a single rack. The rack is designed to be manufactured inexpensively so that, if desired, it may be disposed of after one use. One form of the invention is to provide for a relatively hollow rack which has no bottom and is constructed initially from a single sheet of thermoformed transparent plastic such as by vacuum forming or injection molding. This type of construction facilitates nesting of a plurality of such racks. As these trays are extremely light, the structural material of the rack need not be exceptionally strong but need merely be substantially self-supporting so that it may sustain itself as well as a number of trays such as, for example, four in number. The racks of the present invention have a general configuration of a series of bays connected by narrow isthmuses of plastic material; the sides of the bays are formed from elongated projections from the isthmuses. The bays preferably do not have a plastic bottom or any bottom at all. The testing trays are positioned between marginal walls and within the purview of the bay. As the plastic material employed in fabricating the trays is generally transparent, the gel material can be viewed from the bottom as well as the top even though it may be positioned in the rack.

The trays are retained in the rack, primarily, by a shelf which extends around the border of the bay and is designed to accept a portion of the edge of the tray.

In those instances where the tray has a flange, the side walls of the bays are fitted with protuberances spaced from the shelf so that the flange of the tray can pass thereunder and be retained between the shelf and the said protuberance. In such an instance, the tray is loaded into the rack by approaching the mouth of the bay and sliding the tray along the length of the shelf portion in a direction towards the end of the bay, i.e., the isthmus, or by positioning from above the bay and frictionally snapping the tray into place between the shelf and the protuberance.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a top perspective view of one embodiment of the rack of the present invention.

FIG. **2** is a top elevational view of the rack of FIG. **1.**

FIG. **3** is a cross-sectional view taken along line 3—3 of FIG. **2.**

FIG. **4** is a cross-sectional view taken along line 4—4 of FIG. **3.**

FIG. **5** is a top perspective view of another embodiment of the present invention.

FIG. **6** is a top plan view of the embodiment of FIG. **5.**

FIG. **7** is a cross-sectional view taken along line 7—7 of FIG. **6.**

FIG. **8** is a cross-sectional view taken along line 8—8 of FIG. **7.**

FIG. **9** is a top elevational view of still another embodiment of the present invention.

FIG. **10** is a cross-sectional view taken along line **10—10** of FIG. **9.**

FIG. **11** is a cross-sectional view taken along line **11—11** of FIG. **9.**

DETAILED DESCRIPTION OF THE INVENTION

It will be appreciated that the present invention has several embodiments. In each instance, however, the rack is of a construction providing for a plurality of rectangular bays. In the embodiments shown in FIGS. **1** and **9,** the rack is of a more solid nature as opposed to the rack of FIG. **5,** which illustrates another embodiment.

Now, turning to FIG. **1,** the rack shown generally by reference numeral **11** in this figure has four bays **12.** It will be seen that two bays face with open mouths thereof in one direction and two bays face with open mouths thereof in the opposite direction. The two bays facing in one direction are separated by a relatively narrow isthmus **13** from the bays facing in the opposite direction. Each of the bays has a general U-shaped configuration of essentially rectangular proportions to accommodate a tray, not shown. Each bay has a finger portion **14** with side walls **15.** The central finger **16** serves two bays as can be readily seen from FIGS. **1** and **2.** The side walls **15** of each bay decrease in thickness towards the mouth of the bay as can be easily seen from FIGS. **1** and **3.** At the same time, the relative thickness of the fingers **14** and **16** in another dimension also decreases in thickness as can be more readily seen from FIG. **2.** It will be seen that a shelf **17** extends from the lower portion of the side walls **15** and from the end walls **18.** With a decrease in the thickness of the said fingers as mentioned, it will be seen from FIG. **2** that the bay has a wedge-type configuration. The wedge configuration is useful in inserting a tray which is not only held by the shelf **17** but also by the frictional en-

gagement afforded by the side walls 15 as they converge in the direction towards the end wall 18. The tray has a slightly larger cross-sectional dimension than the cross section of the end of the bay. Essentially, each of the bays is constructed in the same manner so that the configurations are repetitive.

FIG. 3 being a cross-sectional view taken along line 3—3 illustrates the shelf 17 projecting perpendicularly to end wall 18. At the same time, a view of FIG. 4 will show the shelf 17 on each side of a bay 12 wherein it projects perpendicularly to the side walls 15 of the fingers. Additionally, it will be seen from FIGS. 3 and 4 that the construction material is such that the rack is fabricated of solid material, generally plastic. Illustrative of such plastic materials are polyethylene, polypropylene, polystyrene, polycarbonate, methyl methacrylate and the like synthetic resins. However, other substantial construction materials can be employed, if desired.

FIG. 5 is another embodiment of the present invention. The general configuration as shown is similar to that of FIG. 1. FIG. 5, then, shows a rack 20 having a series of bays 21. The bays have a rectangular U-shaped configuration as before. In the embodiment shown in FIG. 5, two bays extend with open mouths in one direction and two bays extend with open mouths in the opposite direction. The bays facing in one direction are separated by an isthmus 23 from the bays extending in the opposite direction. Each of the bays extending in the same direction are separated by fingers 24. Fingers 25 constitute the other sides of the bays. The fingers 24 and 25 have side walls 26. The isthmuses 23 comprise the end of the bays and have end walls 27. The side walls 26 and the end walls 27 have shelves 28 extending perpendicularly therefrom into the bay. A clearer view of this can be obtained from FIG. 6 which is a top view. The side walls 26 are seen to have a plurality of protuberances 29 which are spaced from the shelves 28. The flange of a tray having an outwardly extending flange is designed to slide between said protuberances and the shelves.

The fingers along the top thereof and the side walls 26 have depressions 30. The function of the depressions is to provide for ease of removing the covers of trays when the trays are positioned in the rack. In other words, they provide for the thumb and index finger to obtain ready access along the major longitudinal sides of the tray's cover.

The end walls 27 have a protruding portion 31 which inclines upwardly from the shelf along the said end wall in a direction towards the isthmus 23. This protrusion 31 acts as an abutment for the tray when it is in position and also assists in more readily removing and replacing the cover and for more readily positioning and removing the tray itself from its position in the rack.

The side walls 26 after the location of the finger depressions 30 slope so that the side walls are of decreasing height as one proceeds towards the mouth of the bays 21.

The material of fabrication for this embodiment is of a relatively thin plastic material so that as can be seen from FIGS. 7 and 8, after it is formed by, for instance, vacuum thermoforming it has a general hollow shape whereby a plurality of the racks of this embodiment can be nested together thereby taking up far less space. This type of construction also provides for an inexpensively constructed rack.

Additionally, in this embodiment it has been found efficacious in view of the hollow structure to have the mouth of the bay of a slightly smaller cross-sectional dimension than that proximate the end wall thereof. In this way, the tray is held in position by a slight compression and is retained therein more easily so that it will not slip out.

Also, in view of the thin material employed, it has been found useful to provide a flange around the outer portion of the rack shown by reference numeral 33. This flange will assist in preventing twisting of the fingers 24 and 25.

It will be appreciated that the depressions 30 are optional features which can be incorporated in either of the embodiments shown in FIGS. 1 or 5, as desired.

FIG. 9 illustrates still another embodiment of the present invention. The general configuration as shown is substantially similar to that of FIGS. 1 and 5. FIG. 9, then, shows a rack 40 having a series of bays 41. The bays have a general rectangular configuration in which two bays extend in one direction from isthmuses 43 and two bays extend in the opposite direction from isthmuses 43. In this embodiment, the bays are completely enclosed with walls around their perimeters to form a frame-like structure and, thereby do not have the open mouth feature found in the embodiments illustrated by FIGS. 1 and 5. Each of the bays extending in the same direction are separated by partition members 44. Marginal members 45 constitute the other sides of the bays. Members 44 and 45 have side walls 46. The isthmuses 43 comprise one end of the bays and have end walls 47. At the opposite end of the bays are marginal members 48 having end walls 49. The side walls 46 and end walls 47 and 49 have shelves 50 extending perpendicularly therefrom into the bay. The side walls 46 are seen to have a plurality of protuberances 51 which are spaced from the shelves 50. In this embodiment, the flange of a tray having an outwardly extending flange is adapted to frictionally snap between said protuberances and the shelves by the slight forces of manual compression. The plastic construction of the rack is of sufficient flexibility to permit such a snap engagement of the shelf of the tray in the rack.

The embodiment shown in FIG. 9 can be modified to provide the slide-in tray loading advantage of the embodiments of FIGS. 1 and 5. Thus, the marginal members 48 and the corresponding end walls 49 can be decreased in height or thickness across the width of the bays 41 between members 44 and 45 in an amount sufficient to allow the tray to slide into the bay between the protuberances 51 and the shelves 50. This slide-in feature is particularly advantageous to provide a more gentle loading of the tray where the substances carried in the tray are sensitive to abrupt movements.

Various other examples of the invention will be apparent to those skilled in the art after reading the foregoing specification and the appended claims without departing from the spirit and scope of the invention. All such further examples are included within the scope of the appended claims.

What is claimed is:

1. A rack for a plurality of biological testing trays comprising a relatively flat member having a relatively small height, said member having at least two bays extending in opposite directions, each of said two bays being separated by an isthmus portion of said flat member, each of said bays having a general rectangular con-

figuration, each of said bays having upstanding side walls and an upstanding end wall, said side walls and said end wall having inwardly extending shelves at substantially the bottom portion thereof, said shelves being adapted to retain said trays, said side walls having protrusions spaced above said shelf whereby an outwardly extending flange on said tray is retained between said shelf and said protrusions, said end wall having a protrusion with an upstanding wall inclined inwardly from substantially the bottom to substantially the top of said rack for abutment of said outwardly extending flange on said tray, said side walls having depressions in the upper edge portions for finger tip insertion, said rack being thermoformed whereby the top edge of the walls of each bay is connected to the top edge of the walls of each bay adjacent thereto by relatively thin plastic material and the remainder of the walls are spaced apart to form a general hollow shape for nesting together of a plurality of said racks.

2. The rack of claim **1** wherein the end walls of said bays are longitudinally less in dimension than the side walls.

3. The rack of claim **1** wherein the synthetic resin is transparent.

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