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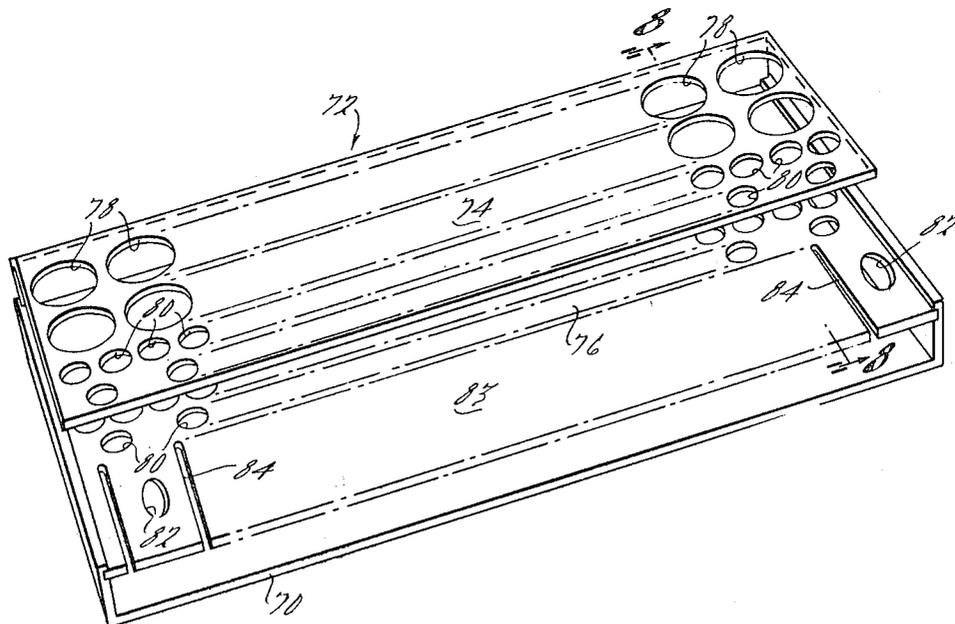
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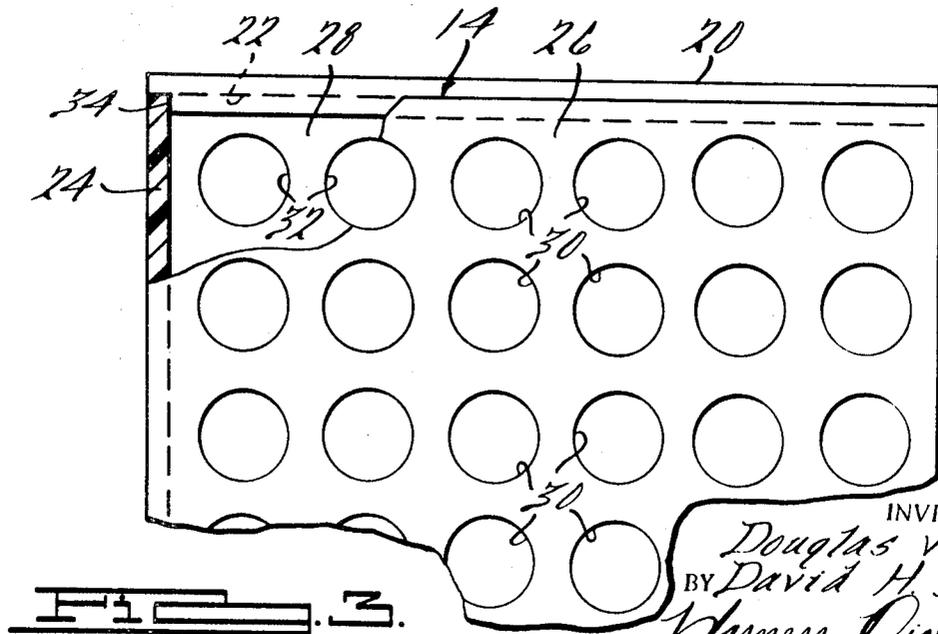
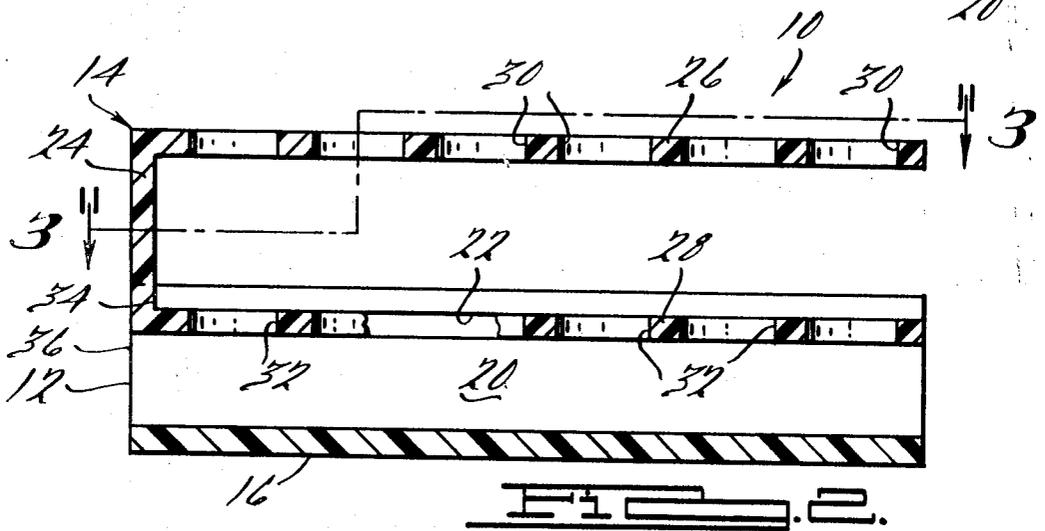
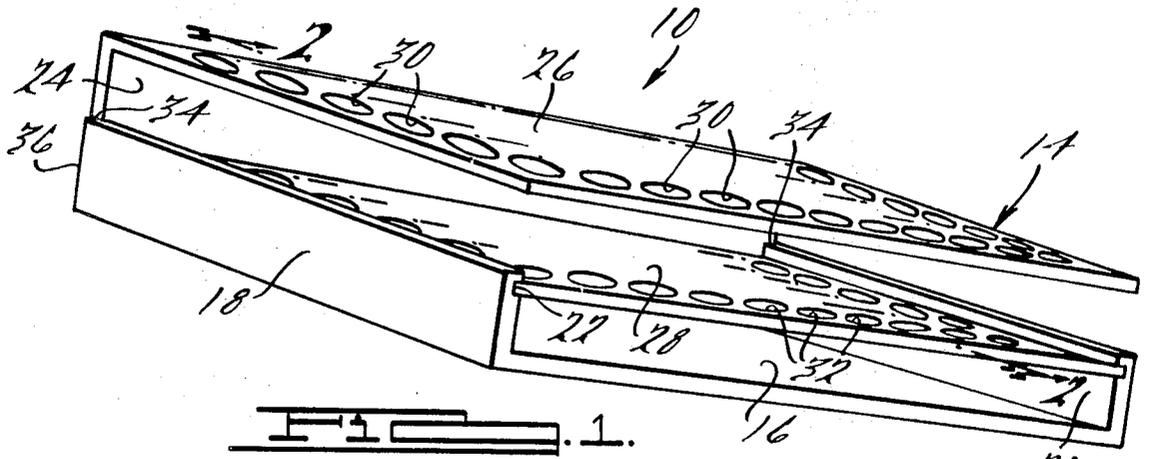
[54] **TEST TUBE HOLDER**
 10 Claims, 11 Drawing Figs.

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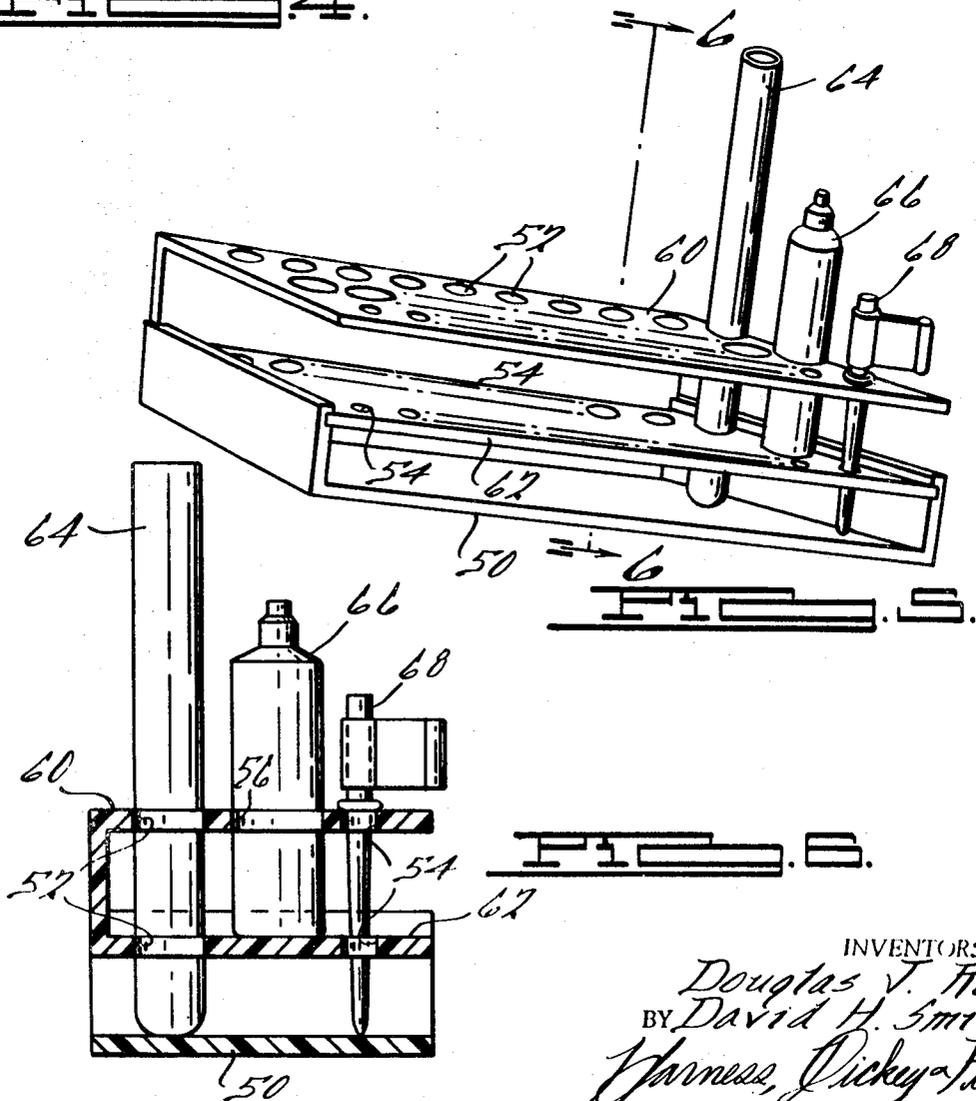
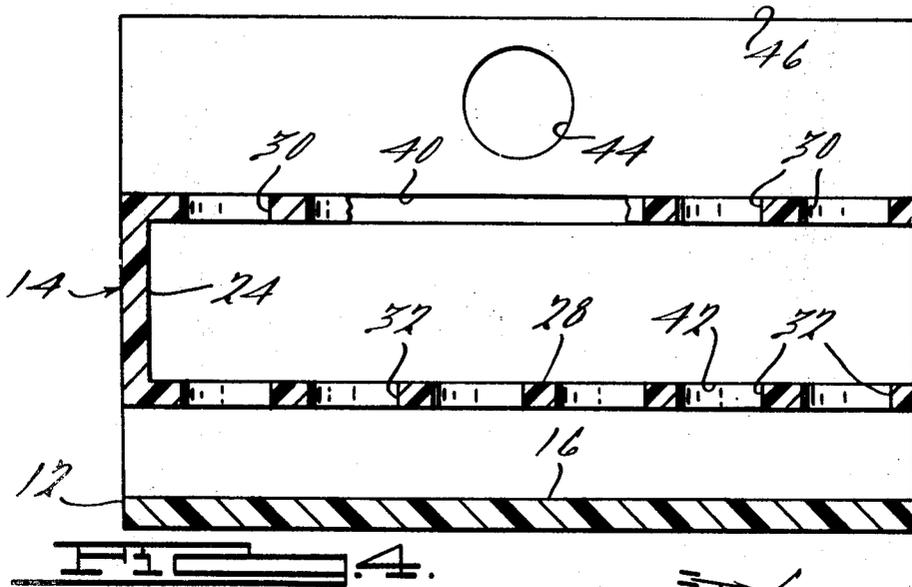
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ABSTRACT: There is herein disclosed a tube-carrying rack comprising an elongated, color-coded, U-shaped base with at least two upstanding sidewalls, track means disposed along the inner surface of the sidewalls, a tube-carrying support member, a plurality of apertures disposed within the support member and locking means associated with the base member and the support member to releasably retain the support member in a desired assembled relationship with the base member.

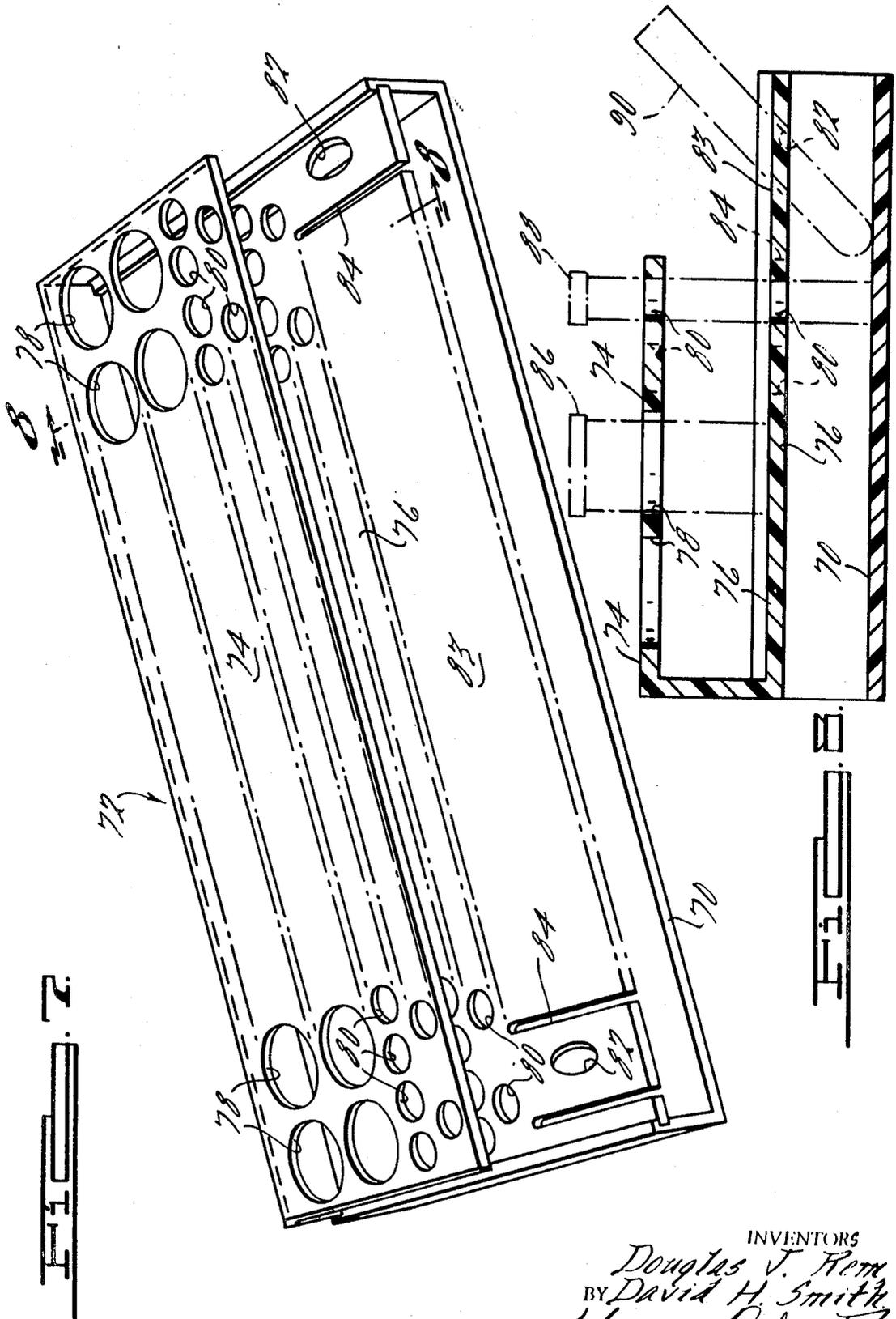




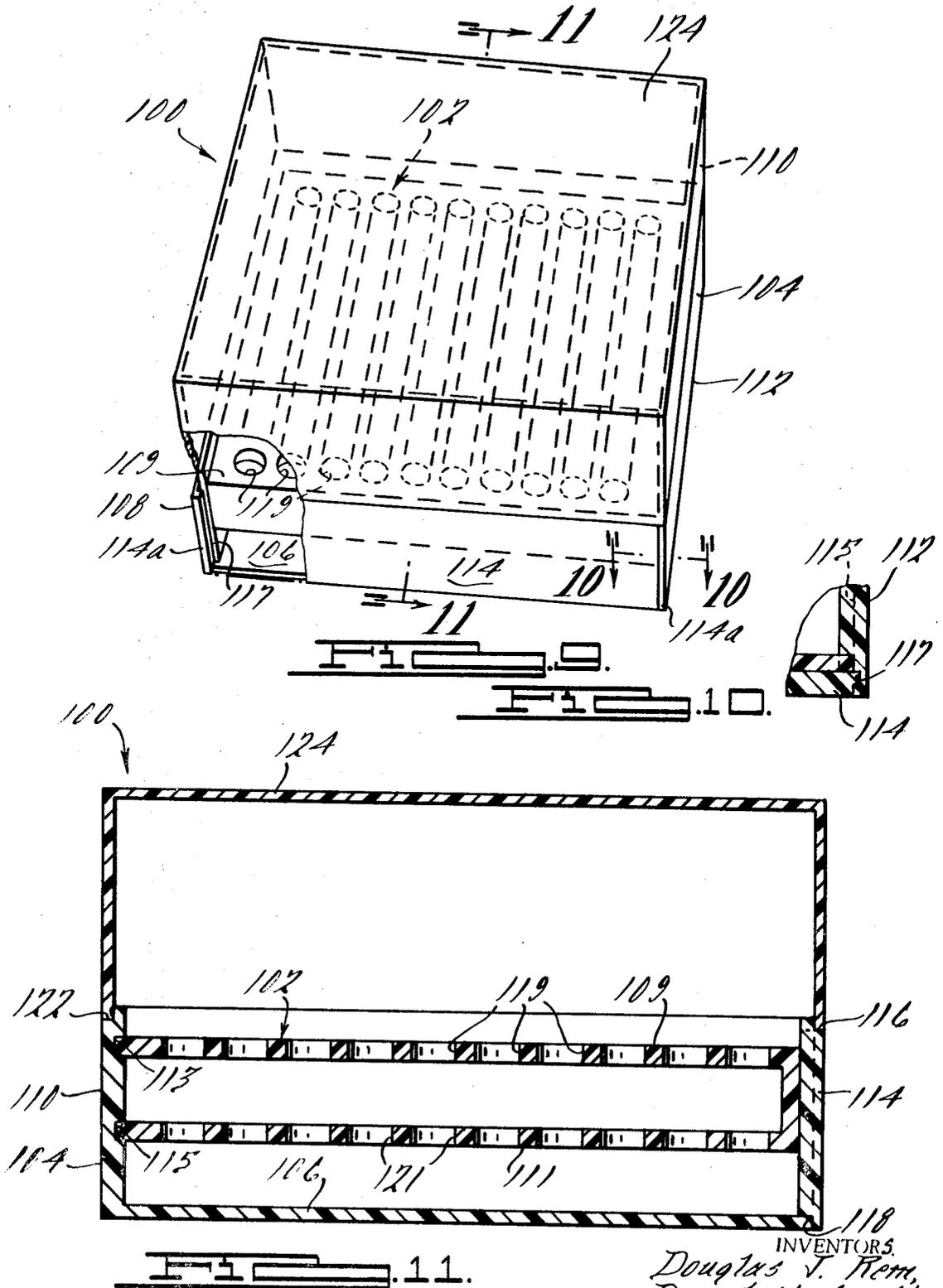
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TEST TUBE HOLDER

BACKGROUND OF THE INVENTION

In the past, a wide variety of devices have been proposed, many of which were, no doubt, designed to promote increased efficiency, versatility and usefulness required for laboratory equipment. A review of the industry, however, still shows a basic need for a device which combines the features of design simplicity, ease of manufacture, interchangeability of parts, ready cleanability, ease of identification, and a strong, scratch-stain-resistant quality.

In large hospitals and research laboratories, it is oftentimes difficult to maintain the maximum efficiency which is needed in clinical control of the various experiments, tests, samples, etc. The present invention is designed to fulfill the rigid requirement imposed for both general and specialized test procedures, as well as, all-around laboratory use. Its use of distinctive color coding will assist in identifying objects, tests or procedures at a glance; identifying equipment assigned to a specific technician; identifying tests as to their source (such as a specific physician or a particular wing in a hospital); maintaining control over progressive steps in a multistep procedure; and providing ready identification of individual work where mass procedures are employed.

As is well known, cleanliness is a key factor in all of the aforementioned activities. It has been observed that some devices have been unable to overcome the objectionable feature of corrosiveness due to their use at varying temperatures and, because of materials and design, have been unable to retain a scratch-stain-resistant quality thus providing for continuous ease in cleaning. This invention has surmounted these objections by providing a beautiful, yet sturdy, scratch-resistant, crystal and colorful, translucent parts which resist corrosion and can be cleaned in common laboratory detergents and many light solvents. The racks can be used in any environment, even one in which equipment must be subjected to extremes of temperature. The usage ranges from 56° C. to below freezing, thus increasing its versatility, generally.

Its interchangeability of parts and the ability to effectuate a change of elevation from shelf to shelf permits ready reading of labels and easy accessibility for tube clamps or fingers. Additionally, its cantilevered, clear crystal, single and double tray supports provide for ease of reciprocation within precision tracks disposed within the base element. Moreover, the supports easily snap into a locked position providing for rigidity of the unit while assembled, and yet can be unsnapped and easily disassembled, thus providing for easy accessibility to areas which complicate effective cleaning.

SUMMARY OF THE INVENTION

This invention relates, generally, to laboratory equipment and, more particularly, to a new and improved device for improving the portability and segregation of test tubes and the protection of their contents.

It is, accordingly, an important object of the present invention to provide a new and useful device which will effectuate convenience in improving clinical controls through more efficient organization of work and the simplification of procedures so as to eliminate the likelihood of human error.

These and other objects are accomplished by a construction which is so reduced in the number and character of its component parts as to approach the ultimate in structural simplicity and to thereby epitomize economy in its manufacture, assembly and maintenance. The structure comprises an elongated, generally U-shaped base member which has at least two upstanding sidewalls integrally formed therewith and projecting from the peripheral edges thereof. One or more grooves or tracks are disposed within the sidewalls and act to provide communication between the base and a tube-carrying support member. An indentation is disposed on one end of the track and provides the locking means with the support member.

The support comprises an upper and a lower wall joint therebetween and at one end thereof by a laterally extending sidewall. The upper and lower walls thereof are cantilevered and comprise a multiplicity of apertures, some of which are coaxially aligned so as to provide the depth required for insertion of various millimetrically sized tubes and containers, while other apertures protrude through one surface only.

The support is easily reciprocated into and out of the base member and is locked therein by the snug fit which exists when the end wall of the support member is inserted into the indentation disposed at one end of the track located in the sidewalls of the base member.

These and other objects, and the novel details of construction of numerous commercially practical embodiments of the invention, will become more apparent as this description proceeds, especially when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the test tube holder constructed in accordance with a preferred embodiment of the present invention.

FIG. 2 is a transverse cross-sectional view of the invention shown in FIG. 1;

FIG. 3 is a plan cross-sectional view, taken along the lines 3—3 of FIG. 2 and partially broken away so as to depict the coaxial alignment of the apertures;

FIG. 4 is a sectional view like FIG. 2 of a modification of the invention illustrated in FIGS. 1 and 3.

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

FIG. 6 is a transverse cross-sectional view of the invention shown in FIG. 5 taken substantially along the line 6—6 thereof;

FIG. 7 is a perspective view of yet another embodiment of the present invention;

FIG. 8 is a transverse cross-sectional view of the embodiment shown in FIG. 7, as taken substantially along the line 8—8 thereof;

FIG. 9 is another embodiment of the present invention;

FIG. 10 is a fragmentary cross-sectional view on an enlarged scale of the embodiment shown in FIG. 9 and taken substantially along the lines 10—10 thereof; and

FIG. 11 is a transverse cross-sectional view of the embodiment illustrated in FIG. 9 as taken substantially along the lines of 11—11 thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings, and in particular to FIGS. 1—3, a test tube holder 10 constructed in accordance with an exemplary embodiment of the present invention, is shown as comprising a generally U-shaped channeled base member 12 and a C-shaped tube-retaining support member 14.

The base member 12 comprises a rectangularly shaped web or bottom wall 16 and two upstanding sidewalls 18, 20 formed integrally therewith. The sidewalls 18, 20 extend upwardly from outer edges of the web 16 and lie in parallel relationship to each other. A pair of grooves or tracks 22 are disposed longitudinally of the walls 18, 20 and are designed to communicate with the tube carrying support member 14, to be hereinafter described in detail. The tracks 22 may be located at any point vertically of the walls 18, 20, but should be sufficiently elevated about the web 16 so as to allow for sufficient tube stability, when the device is fully assembled with the tubes contained therein. The thickness of the web 16 is substantially the same as that of the sidewalls 18, 20.

The tube carrying support member 14 is generally C-shaped and comprises an end wall 24 with top wall 26 and a bottom wall 28 cantilevered from the upper and lower edges thereof. The walls of the support member 14 are integrally formed and

the thickness of all three walls are substantially equal. The member 14 also comprises a plurality of annular, axially aligned apertures 30, 32. The apertures 30 are formed perpendicularly of the top wall 26, while the apertures 32 are formed perpendicularly of the bottom wall 28.

The support member 14 is manually, slidably reciprocable within the tracks 22 in the sidewalls 18, 20. An indentation 34 is formed on one end of the track 22 and is of a thickness such that when the support member 14 is introduced into registration with the track 22, and moved to its forwardmost limit therealong, the thickness of the wall 24 will be such that it will fit snugly and evenly into the indentation 34 such that the edges of the base member 12 and the tube-carrying support member 14 are evenly aligned. The support member 14 will move into meshing and coordinately locking engagement with the base member 12 in a unidirectional plane only. Should the support member be accidentally or inadvertently inserted into the base member 12 from the wrong direction, the wall 24 will not enter the indentation 34, thus protruding beyond the edge 36 of the base 12. It can be seen, that the width of the tracks 22 and the indentation 34 is substantially the same as the walls 24, 26, 28 of the tube carrying member 14, thus providing for a releasably retainable fit between the support member 14 and the base member 12 such that should the device be tipped, the support will not freely travel along the track 22, resulting in possible spillage of the contents thereof.

FIG. 4 depicts an alternative embodiment of the base member 12 which is distinguishable in that two tracks 40, 42 lie in parallel relationship to each other, thus providing a track for each one of the walls 26, 28 of the support member 14. Additionally, the height of the walls 18, 29 of the base 12 have been increased so as to accommodate a pair of apertures 44 placed below the top of the wall 46 and intermediate the edges thereof to facilitate ease of handling.

FIGS. 5 and 6 depict another embodiment of the present invention wherein the base member 50 is shown to be substantially the same as that depicted in FIGS. 1 and 2. The tube carrying member, on the contrary, although being of C-shape differs from the other embodiments in that the apertures are of notably varying sizes wherein the apertures 52, 54 are axially aligned, while the apertures 56 extend only through the top wall 60 and do not extend into the bottom wall 62. The apertures are formed perpendicular of the walls 60, 62 with each aperture varying in size in reference to the others. This embodiment allows the laboratory to keep cuvettes 64, unopettes 66 and pipettes 68 together in one rack. The arrangement has proven beneficial for such tests as Osmotic Fragility, RBC's, WBC's, Reticulocyte incubation and Platelet and Eosinophil count systems. Moreover, this holder has proven capable of organizing the Ames Systems for faster, more efficient testing.

Referring now to FIGS. 7 and 8, the base member 70 is substantially the same as described hereinabove, however, the support member 72 is different in that it consists of two stepped levels 74, 76 with the level 74 being elevated and above the bottom tube-carrying level 76. A multiplicity of apertures 78 extend perpendicularly through the upper wall 74, while a plurality of apertures 80 are axially aligned within both the walls 74, 76. The apertures 82 are disposed angularly through the front deck 83 of the bottom wall 76 and slots 84 are disposed therein to provide for the reception of any appropriate type of requisition order or identifying indicia. The rack permits easier handling of pipetted tubes (not shown) and is designed for faster processing of CBC's. The rack has been specifically used for holding a plurality of 5- or 7-dram vials 86, a multiplicity of 12- or 13-millimeter cuvettes 88 plus a plurality of individual microhemotocrit tubes 90 which are disposed angularly at a convenient work angle.

FIGS. 9 through 11 disclose yet another embodiment of the present invention wherein a transparent boxlike structure 100 is used for containing and preserving blood or serum. The C-shaped tube-carrying member 102 is substantially as described hereinabove with apertures 119, 121 disposed axially therein. The base member 104 is box-shaped and contains a floor 106

with three upstanding integrally formed sidewalls 108, 110, 112. The fourth wall consists of a slidably removable door or gate member 114. Walls 108, 110, 112 comprise a superposed double-layered pair of tracks 113, 115 which receive the edges 109, 111 of the C-shaped support member 102. When the gate member 114 is removed, a pair of protrusions 114a are visible and extend beyond the walls 108, 112, and contain a pair of slots 117 disposed longitudinally of the protrusions 114a and perpendicularly of the tracks 113, 115. The gate 114 consists of a pair of ledges 116, 118. The lower ledge 118 meshes with the floor 106 of the container 100, while the upper ledge 116 meshes with a second ledge 122 which extends laterally and circumferentially of the box 100 forming the upper and outward portion of the walls 108, 110, 112. The ledges 116, 122 receive a cover member 124, the edges of which fit snugly onto the ledges and is designed, specifically, to cover and prevent evaporation and contamination of the blood or serum contained therein.

The ingenious design permits the aforementionedly described racks to be disassembled quickly and easily for cleaning, as well as, to be adapted to meet specialized needs. The interchangeability of the various elements provides for increased efficiency and versatility.

The material found to be most suitable for this invention consists of acrylic or polymethylmethacrylate or any other suitable molded polymeric material. The material is advantageous in that it not only maintains a pleasant appearance but is also scratch and stain resistant. The tube-carrying members are usually crystal, while the bases are translucent which may be color coded to provide for increased efficiency in controlling clinical or laboratory activities.

It has been found that the device can be cleaned in common laboratory detergents and many light solvents. It should not be washed in concentrated acids or with highly volatile solvents as these will attack the surfaces and blemish the appearance. It is additionally advantageous in that it will withstand temperatures of up to 56° C. and temperatures below freezing. It should be cautioned, however, that at extremely low temperatures, the material tends to become brittle, as do most materials of this kind.

It will additionally be seen, that the cantilevered trays are easily displaceable into and out of the precision tracks contained within the base units. When the trays are snapped into locking position, they provide rigidity for the unit, and yet, can be unsnapped and reciprocally removed with the minimum of ease. The disassembled units present no inaccessible areas to complicate cleaning thereof and the tray elements are fully interchangeable between the various colored bases within the same series.

The locking feature of this invention, which has been illustrated and described hereinabove, consists essentially in the close fit of the walls of the C-shaped tube-carrying support member within the track and its contiguous indentation at the extremity thereof. Experiments have shown that this arrangement can be varied by increasing (slightly) the thickness of one of the cantilevered walls thus providing for a slight resistance when that layer is inserted into the track element. When fully inserted, the tray will not slip out should the entire unit be inadvertently tipped in a backwards direction. Moreover, a slight rib or protrusion can be placed on the inside of the track, thus providing for an alternative feature in the locking arrangement. These specific alternatives, however, are not as advantageous because of the lack of maximum versatility and usefulness, and the ever present possibility of wear upon the surfaces described, rendering, in time, a device which will not lock securely within the base member.

In addition, a type of locking (such as a ball detent arrangement) may be employed in connection with the tracks and support members to releasably retain the support members in their desired position relative to the base member. It is contemplated that the size of the various units, the number and diameter of the apertures contained therein will vary so as to accommodate the various needs and demands of a widely dis-

tributed audience. The particular usages discussed and the various instruments depicted with the various embodiments are illustrative only and they are not intended to limit the use to which any of the aforementionedly described units may be put.

It will, of course, be understood that various additional changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of this invention, which, generally stated, consists in the matter shown and described herein and set forth in the appended claims.

1. A test tube holder comprising,

a U-shaped base member fabricated of a molded polymeric material and having a horizontal bottom wall and a pair of upstanding sidewalls formed integrally of said bottom wall,

a multileveled, C-shaped tube-retaining support member fabricated of a molded polymeric material and having one vertical wall and a pair of horizontal walls,

a plurality of axially aligned apertures in said support member horizontal walls,

track means recessed within said sidewalls of said base member and serving to slidably support the lower horizontal wall of said support member, and

means associated with said base member sidewalls and operatively associated with both said bottom wall and said vertical wall to releasably retain said support member in a desired assembled relationship with said base member.

2. The invention as set forth in claim 1 wherein said base member is color coded.

3. The invention as set forth in claim 1 wherein a portion of said apertures in both levels are circular in shape, axially aligned and extend vertically through both levels of said multileveled tube retaining support member, and a portion of said apertures are circular in shape and extend vertically through only one level of said multileveled tube-retaining support member.

4. The invention as set forth in claim 3 wherein the portion of said apertures which extend vertically through only one level of said multileveled tube-retaining support member are

of a larger diameter than the portion of said apertures extending vertically through both levels of said multileveled tube-retaining support member.

5. The invention as set forth in claim 3 wherein yet another portion of said apertures extend angularly through one level of said multileveled tube-retaining support member.

6. The invention as set forth in claim 1 wherein said multileveled tube-retaining support member is stepped and includes in addition to said apertures a plurality of slots in the bottom level of said support member which extend inwardly from one longitudinal edge thereof adjacent said angularly extending apertures.

7. The invention as set forth in claim 1, wherein said upwardly displaceable wall is a reciprocally displaceable gate member which fits into sliding engagement within a pair of protrusions.

8. The invention as set forth in claim 2 wherein a ledge is circumferentially disposed about the outer edge of said upstanding walls and oriented to receive said cover member.

9. The invention as set forth in claim 2 wherein said track means comprises a pair of grooves disposed longitudinally of the upstanding sidewalls.

10. A test tube holder comprising, a U-shaped base member having a horizontal bottom wall and a pair of upstanding sidewalls affixed to said bottom wall, wherein at least one of said walls displaces upwardly allowing the egress of a multileveled tube-retaining support member,

a multileveled, C-shaped tube-retaining support member having one vertical wall and a pair of horizontal walls, a plurality of axially aligned apertures in said support member horizontal walls,

track means in said base member sidewalls, slidably supporting at least one of said support member horizontal walls,

means associated with said base member sidewalls to releasably retain said support member in a desired assembled relationship with said base member, and

a cover member disposed atop the upstanding sidewalls of said base member to cover the tubes contained in said support member.

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