

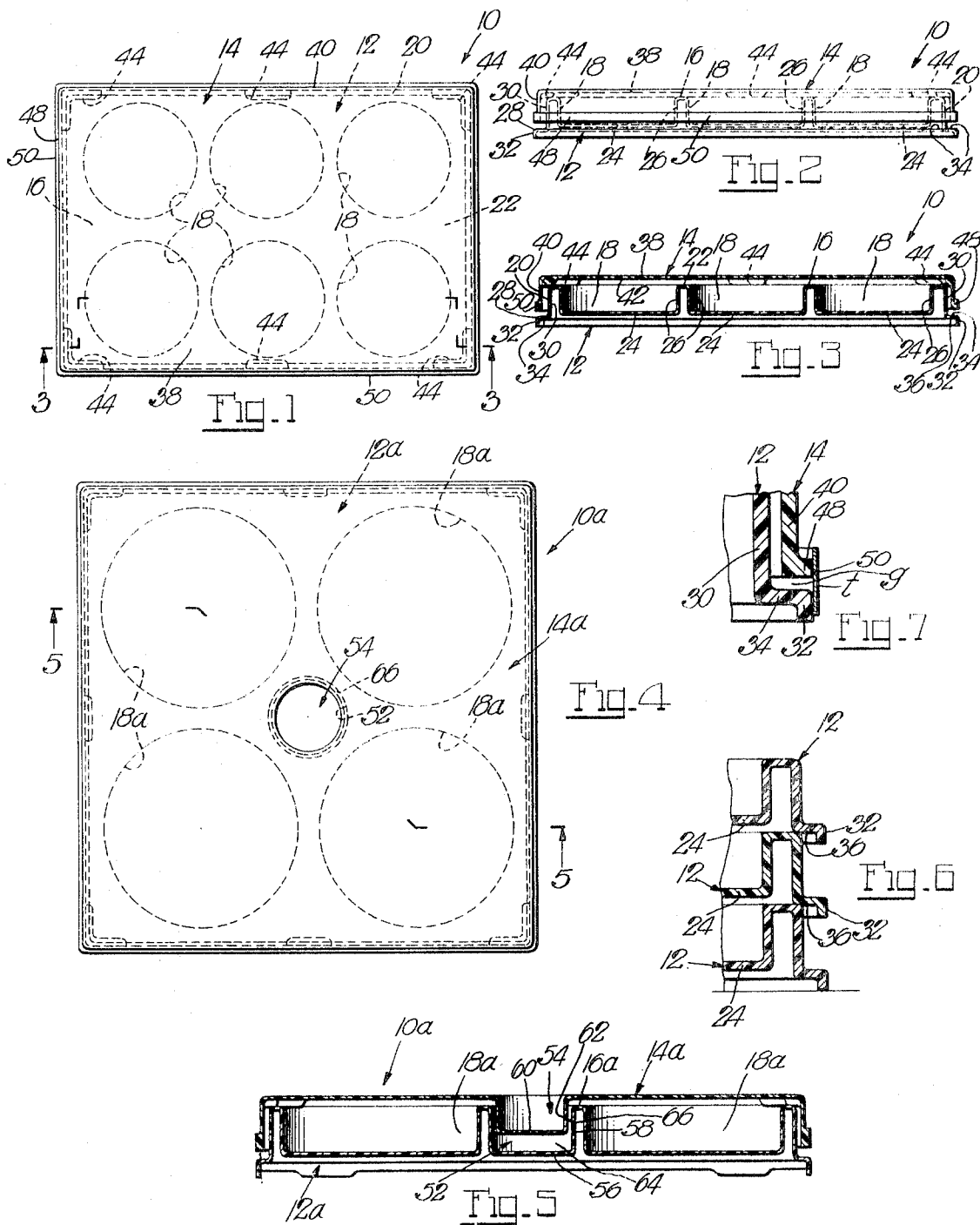
Aug. 3, 1971

J. LINER

3,597,326

MULTI-DISH LABORATORY UNIT

Filed July 26, 1968



INVENTOR
John Liner
BY
Natta Spengler
ATTORNEY

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3,597,326

MULTI-DISH LABORATORY UNIT
John Liner, Barkwood Drive, Woodbridge, Conn. 06525
Filed July 26, 1968, Ser. No. 747,935

Int. Cl. C12b 1/00

U.S. Cl. 195—139

10 Claims

ABSTRACT OF THE DISCLOSURE

Plastic multi-dish tray with removable plastic cover having spaced supports with which closed cover rests on top of tray with clearance between tray and cover for atmospheric exposure of multi-dishes, with tray and cover being of transparent plastic and having also circumferential depending base and cover skirts with similar clearance between them when cover closed, and base and cover skirts having at their respective bottoms vertically-spaced circumferential lips with outer coplanar surfaces for stick-on of tape to seal the multi-dishes from the atmosphere.

This invention relates to multi-dish laboratory trays and covers therefor which, when closed, provide either for subjection of test medium in the multi-dishes to, or for their seal from, the atmosphere.

Dishes of the type contemplated for the multi-dish tray, being of relatively large expanse, have heretofore been provided as single dishes with covers of peripherally wider depending skirts, with the dishes having on their annular rims a few top projections on which the closed covers rest with breathing clearance from the dishes. While these single dishes are generally satisfactory, they are deficient in a few, but important, respects. Thus, such a dish, while of relatively large circumference, is nevertheless small enough to render its handling a more or less awkward task, often leading to spillage of sometimes dangerous test medium from the dish. Also, while such a covered dish provides for subjection of test medium therein to the atmosphere, it has no ready provision to seal other medium therein from the atmosphere in many tests requiring such a seal. Also, such an individual dish rests on its flat bottom which, therefore, becomes readily scratched and, in consequence, obscures microscopic examination of test medium through the bottom as required in some tests. Resting such a dish with its flat bottom directly on a support has still other disadvantages in different tests.

It is among the objects of the present invention to provide a tray with multiple dishes of this type, and a cover therefor, with the tray and cover having none of the deficiencies or disadvantages of single dishes, and the tray, moreover, affording multiple dishes for closely related test series under easiest supervision and for quickest and most accurate comparison, besides providing for common handling of all dishes.

It is another object of the present invention to provide a tray and cover of this type which are molded from sheet plastic. In thus molding the tray and cover, their cost is so low as to indicate their advantageous disposal after one-time use of any number, and even a single one, of the available dishes, and their weight is desirably low, yet they are by proper configuration of their molded walls or reasonably small thickness sufficiently rigid for their easy and safe handling, particularly at their considerable size necessitated by the provision of the multiple dishes.

It is a further object of the present invention to provide a tray and cover of this molded type, of which the tray has a flat top wall at which the therefrom depending multiple dish formations are open, and a peripheral depending skirt of greater height than the dish formations so that the tray will rest with its skirt on a support while

the bottoms of the dish formations are spaced from the support, and the cover is in the form of a rigid sheet larger than the top wall of the tray and having a peripheral depending skirt and on its cover surface a few spaced bead formations with which the closed cover rests on the top wall of the tray with breathing clearance from the latter not only at its top wall but also between the depending skirts on the tray and cover. Fashioned in this way, the top wall of considerable spread of the tray and the therefrom depending dish formations and skirt mutually reinforce each other for rigidity of the tray with the least amount of plastic, and also make for simple molding of the tray with high accuracy in the respects of relative location or disposition and dimensions of the dish formations and planar bottom of the depending skirt for non-shaking rest of the tray on any flat support, while the cover, by virtue of its depending skirt and clearance of the same from that of the covered tray, is not only sufficiently rigid for easy and safe handling, but also lends itself to particularly facile and unfailingly correct covering of the tray at which it has the right breathing clearance from the tray throughout.

Another object of the present invention is to provide a tray and cover of this type of which the bottoms of the depending skirts of the tray and closed cover thereon are vertically spaced for breathing clearance thereat, yet are sufficiently close to each other to apply to them with ease a bridging adhesive strip peripherally therearound for there sealing the breathing clearance between tray and cover from the surrounding atmosphere for tests which require such a seal.

A further object of the present invention is to provide a tray and cover of this type of which the aforementioned spaced bottoms of the skirts on the tray and closed cover thereon have peripheral outward lips with substantially coplanar outer vertical surfaces of sufficient width and also spacing from the skirt proper of the closed cover to apply to these surfaces a bridging adhesive strip with particular ease and also particular reliability in its clearance sealing function.

It is another object of the present invention to provide a tray and cover of this type of which the tray has depending from its flat top wall, besides the multiple dish formations, also a cup formation centralized with respect to the dish formations and serving as a receptacle for matter to create different gaseous environment or conditions for different test media in the dish formations. Thus, the cup receptacle may receive matter that releases carbon dioxide to sustain cell life in the dish formations, or may receive water to produce moisture for the media in the dish formations, or may receive silica gel to produce a dry atmosphere to which other media in the dish formations is to be exposed, just to mention a few examples.

Another object of the present invention is to provide a tray and cover of this type of which the tray has the aforementioned cup formation in addition to the dish formations, and the cover has also a depending cup formation which is open at the top, and a companion to that in the tray in that in closure of the tray by the cover the cup formation on the latter projects into the cup formation in the tray but with side and bottom clearance throughout from the cup formation in the tray. With this arrangement, the cup formation in the tray may be quite wide and also deep for the reception of a lasting supply of conditioning medium for any, including timewise particularly prolonged, tests, yet the projecting cup formation in the closed cover will restrict the communication area between this supply of conditioning medium and the test media in the dish formations to the desired extent for best results. Additionally, the cup formation in the cover may serve as a convenient finger hole in handling the cover.

Further objects and advantages will appear to those skilled in the art from the following, considered in conjunction with the accompanying drawings.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

FIG. 1 is a top view of a tray and closing cover thereon employing the invention;

FIG. 2 is a side view of the tray and cover thereon;

FIG. 3 is a section through the tray and cover thereon taken substantially on the line 3—3 of FIG. 1;

FIG. 4 is a top view of a tray and cover thereon embodying the invention in a modified manner;

FIG. 5 is a section through the modified tray and cover taken substantially on the line 5—5 of FIG. 4;

FIG. 6 is a fragmentary section through several coverless trays stacked on top of each other; and

FIG. 7 is an enlarged fragmentary section through a sealed-off tray.

Referring to the drawings, and more particularly to FIGS. 1 to 3 thereof, the reference numeral 10 designates a multi-dish laboratory unit which provides a tray 12 and a cover 14 therefor. The tray 12, which is molded of any suitable and preferably transparent plastic, has a plane top 16, a plurality of identical dish formations 18 which are open at the top 16, and a peripheral wall 20 depending from the top. The tray top 16 is formed by a plane wall 22, and each dish formation 18 has a bottom wall 24 and an annular rim or sidewall 26 which is continuous with the top wall 22. The dish formations 18 may be of any given size, and they are preferably of the same conventional size as one type of the prior individual dishes, namely 35 mm. in diameter and 10 mm. deep, and the dish formations in the tray may be used for the same purposes as these prior individual dishes, such as for plating, immunodiffusion, virus isolation, hemadsorption, viral inhibitors, clinical bacteriology and cell growth, for example. The tray 12 is in this instance rectangular, and there are presently six dish formations 18 which are preferably arranged in parallel longitudinal and transverse rows. The depending peripheral wall 20 has an outwardly offset bottom margin 28 which forms this wall into main and bottom skirts 30 and 32 and a connecting ledge 34. The overall height of the skirts 30 and 32 is greater than the depth of the dish formations 18, so that the bottom walls 24 of the latter are spaced from a support on which the tray rests with its bottom skirt 32. With this arrangement, the bottom walls 24 of the dish formations 18 are least liable to become scratched and thus remain optically clear for microscopic examination of test medium in these dish formations through the transparent bottoms thereof, also in tests involving cell growth, for example, in which a tray rests on a rack in an incubator, the bottoms of the dish formations, by being spaced from the rack, will not be overheated to an extent at which abnormal and also uneven cell growth would occur.

The tray 12 is of a wall thickness which is preferably substantially uniform throughout and such that the tray will be quite rigid for easiest and safest handling. The rigidity of the tray is, of course, enhanced by the configuration of its walls, including the offset bottom margin 28 of the peripheral wall 20. Also, the ledge 34 between the main and bottom skirts 30 and 32 lies preferably in a plane parallel to the tray top 16, and is of a width greater than the thickness of the main skirt 30 to provide an advantageous stacking surface 36. Thus, in providing the ledge 34 and its stacking surface 36 at a greater distance from the tray top 16 than the bottom walls 24 of the dish formations 18, identical trays 12 may be stacked in the fashion shown in FIG. 6, i.e., within the confines of their bottom skirts 32 and, hence, against slide-off from each other, and with the bottom walls 24 of the dish formations 18 of each tray out of contact with any other tray.

The cover 14, which is also molded of any suitable and preferably transparent plastic, has a plane top wall 38 and a peripheral depending skirt 40, with the cover surface 42 of the top wall 38 having spaced leg formations 44 at the inner junction of the top wall surface and the peripheral depending skirt which in closed cover position rest on the tray top 16 to keep the cover surface 42 spaced from the latter at a relatively small "breathing" distance. Also, the top wall 38 of the cover, which is of substantially the same rectangular shape as the tray top 16, is of slightly greater area than the latter, so that the skirt 40 on the cover is in closed cover position in overlapping relation with the main skirt 30 of the tray and spaced therefrom throughout by a gap which is of similarly small "breathing" width. While the cover 14 in its closed position thus has some sliding freedom on the tray 12, it is so restricted that in most any cover position the gap is sufficiently long, if not circumferentially complete, for the intended "breathing" purpose, i.e., subjection of medium in the dish formations 18 to the atmosphere or free diffusion of the gaseous environment throughout and from the tray.

The cover 14 further has at the bottom of its skirt 40 an outer peripheral lip 48 which is in the form of a rib formation of some width to provide an outer peripheral surface 50 which in most any closed position of the cover within its restricted sliding freedom is vertically substantially aligned with the bottom skirt 32 on the tray and substantially coplanar therewith. The surface 50 of the cover and the bottom skirt 32 on the tray thus serve as conveniently accessible application surfaces for adhesive tape *t* (FIG. 7) with which to bridge the circumferential gap *g* between cover and tray and thus seal the interior of the tray from the atmosphere as is required in certain tests.

Reference is now had to FIGS. 4 and 5 which show a modified multidish laboratory unit 10a which is generally similar to the described unit 10, except that the tray 12a is square in outline and has four dish formations 18a, and the tray 12a and cover 14a thereon are further provided with companion cup formations 52 and 54. The cup formation 52, with its bottom wall 56 and cylindrical side wall 58, is located centrally of the dish formations 18a and open at the tray top 16a, and is in this instance also of the same depth as the dish formations 18a. The dish formations 18a may be of any desired dimensions, and they may have the conventional dimensions of another type of prior individual dishes, namely 60 mm. in diameter and 15 mm. deep. The cup formation 52 in the tray is, in this instance and also preferably, of smaller diameter than the dish formations 18a, and serves, as already explained, as a receptacle for matter to create different gaseous environments or conditions for different test media in the dish formations 18a.

The cup formation 54 in the cover 14a has a bottom wall 60 and a cylindrical side wall 62, and is open at the top of the cover. This cup formation 54 is of smaller size, in diameter and depth, than the cup formation 52 in the tray 12a, and is also centrally located on the cover 14a, so that in closed cover position the cup formation 54 projects into the cup formation 52 but with clearance from the latter throughout. Thus, in closed cover position the cup formations 52, 54 provide a chamber 64 for receiving a lasting supply of conditioning medium for any, including timewise particularly prolonged, tests, and a desirably restricted communication passage 66 between this supply of conditioning medium and the rest of the covered tray for best results. Additionally, the cup formation 54 in the cover 14a may serve as a convenient finger or thumb hole in handling the cover. Also, with the cover 14a being of preferred transparent plastic, it is quite easy, by mere observation of the closed cover, to shift the latter within its restricted sliding freedom on the tray so that the restricted ring-shaped passage 66 between the cup formations 52, 54 is of uniform width throughout. Of course,

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the cup formation 52 in the tray 12 may perform its useful function even if the cover is devoid of a companion cup formation, such as the cup formation 54, although the companion cup formation in the cover is preferred because of its sizing function of the supply chamber 64 and of the communication passage 66.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

What is claimed is:

1. A multi-dish laboratory unit, comprising a molded plastic tray having a plane top, a plurality of identical dish formations with bottom walls and open at said top, and a peripheral wall depending from said top and having an outwardly offset bottom margin to form a main skirt and a bottom skirt outwardly spaced from said main skirt, with the overall height of said main and bottom skirts being uniform throughout and greater than the depth of said dish formations so that said bottom walls of the latter are spaced from a support on which the tray rests with its bottom skirt; and a removable molded plastic cover having a top with a plane wall surface and spaced raised feet thereon to rest on said tray top and keep said wall surface spaced from the latter in closed cover position, said cover top being substantially of the same shape as, but of larger area than, said tray top and having a peripheral depending skirt so that in closed cover position said cover skirt overlaps said main tray skirt and is outwardly spaced therefrom throughout at a distance less than the outward spacing between said main and bottom tray skirts said spaced raised feet positioned at the inner junction of the top wall surface and the peripheral depending skirt of said cover, and said cover skirt is of a height to leave a gap between it and said bottom tray skirt in closed cover position, with said cover skirt having at its bottom an outwardly projecting peripheral border which in closed cover position is vertically substantially coplanar with said bottom tray skirt and forms together with the latter an application surface for an adhesive strip in bridging and sealing relation with said gap between said cover skirt and bottom tray skirt.

2. A multi-dish laboratory unit as in claim 1, in which said tray and cover are of transparent plastic.

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3. A multi-dish laboratory unit as in claim 1, in which said tray top is rectangular in outline, said dish formations have annular rims and are arranged in parallel rows longitudinally and transversely of the tray top.

4. A multi-dish laboratory unit as in claim 1, in which said peripheral border on said cover skirt is an integral rib formation on the latter.

5. A multi-dish laboratory unit as in claim 1, in which said peripheral tray wall is of substantially uniform thickness throughout and has a ledge in a plane parallel to the tray top and connecting said main and bottom skirts, with said ledge being wider than the thickness of said main skirt and being spaced farther from the tray top than said bottom walls of said dish formations so that said ledge provides a surface with which the tray may be stacked on the top of another tray.

6. A multi-dish laboratory unit as in claim 1 in which said tray additionally has one cup formation having a bottom wall and open at the top of different size than said dish formations and centered with respect to said dish formations.

7. A multi-dish laboratory unit as in claim 6, in which said cover also has a cup formation continuous with and open at said top wall, and in closed cover position projecting into said cup formation in the tray with clearance therefrom throughout.

8. A multi-dish laboratory unit as in claim 6, in which said tray top is rectangular in outline, and said dish formations have annular rims and are arranged in parallel rows longitudinally and transversely of the tray top.

9. A multi-dish laboratory unit as in claim 8, in which said tray top is square in outline and has a center, said dish formations are four in number and equally spaced from said center, and said cup formation in the tray is cylindrical with its axis passing through said center.

10. A multi-dish laboratory unit as in claim 7, in which said cup formations in the tray and cover are cylindrical and in closed cover position substantially concentric with each other.

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ALVIN E. TANENHOLTZ, Primary Examiner

U.S. Cl. X.R.

220-23.8, 23.6