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Carls et al.

[11] **3,733,768**

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[54] **STORAGE OF HISTOLOGY SPECIMENS**

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[52] **U.S. Cl.** **53/25,** 206/72

[51] **Int. Cl.** **B65b 63/08**

[58] **Field of Search** 53/25; 206/72

[56] **References Cited**

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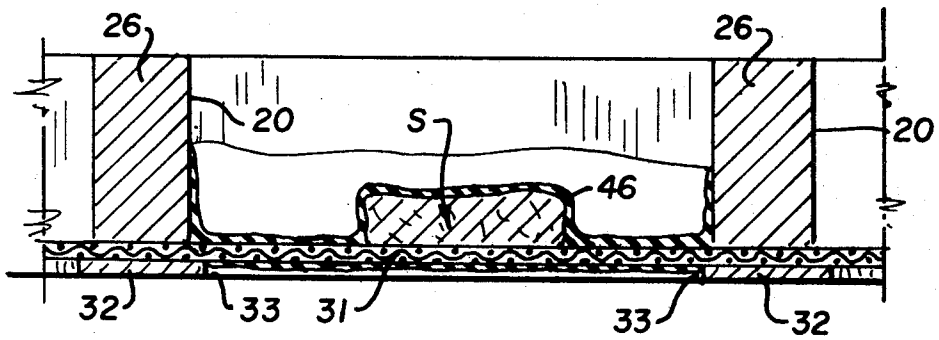
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[57] **ABSTRACT**

A storage tray for histology specimens which is formed as a rectangular sheet having rows and columns of compartments within the face of the sheet. The thickness of the sheet is selected to provide for compartment depths sufficient to receive the specimens. The floors of the compartments are porous to permit melted wax to flow through the compartments. The method of transferring the specimens from their wax embedments and to the compartments thus includes the steps of placing embedments above each compartment, melting the wax forming the embedments to permit it to flow through the tray but retain the specimens on the compartment floors. Subsequent cooling causes a residual layer of wax to harden to secure the specimens in position.

11 Claims, 10 Drawing Figures



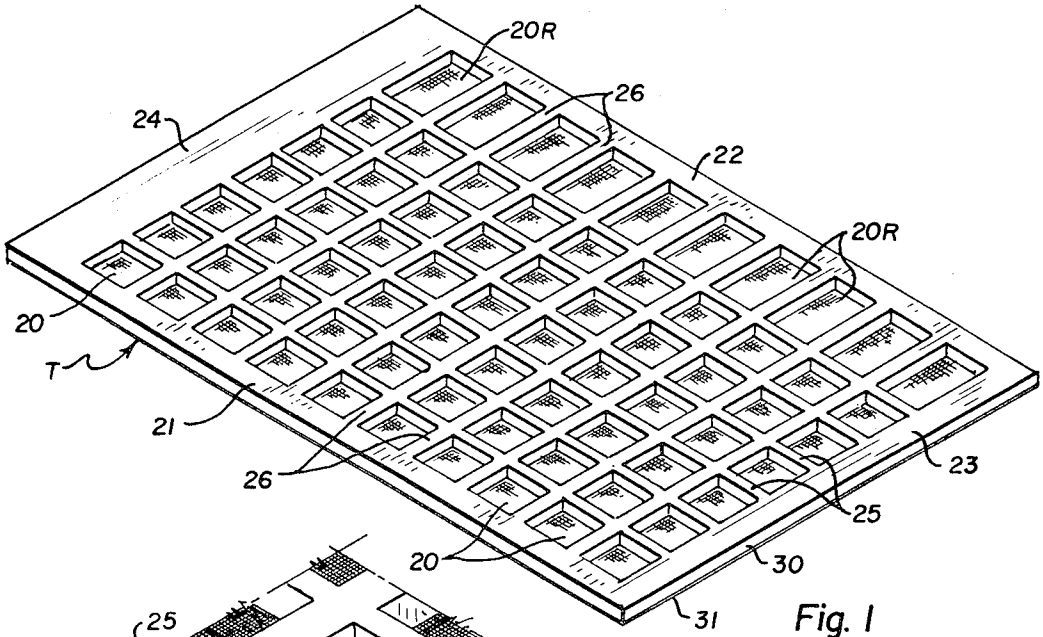


Fig. 1

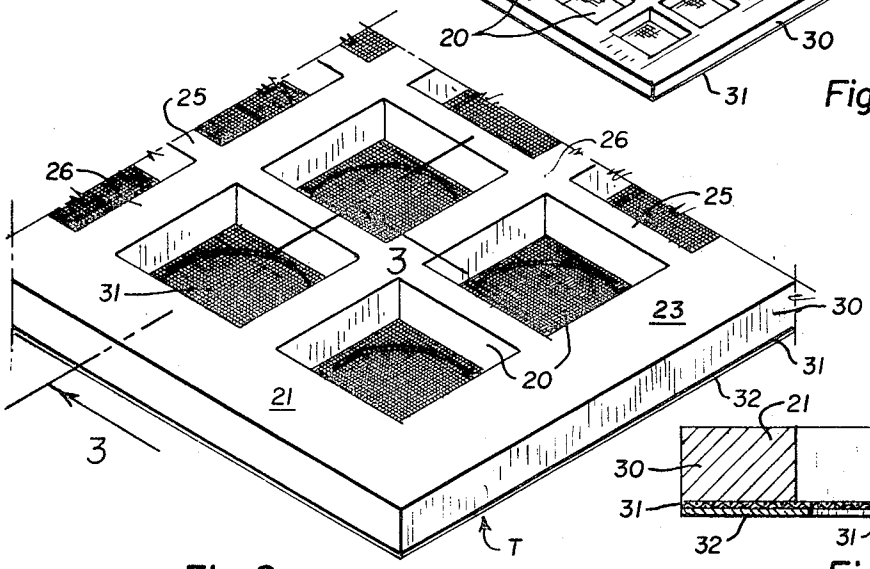


Fig. 2

Fig. 3

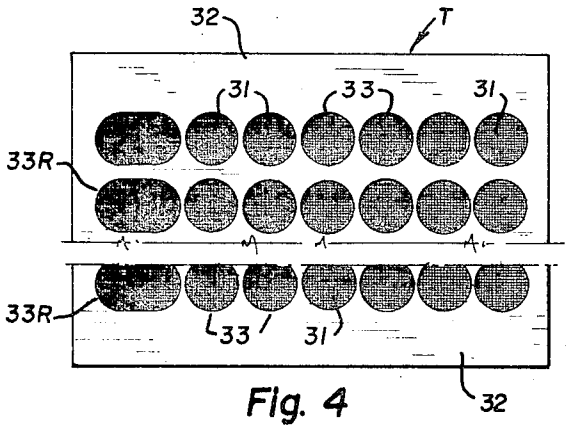


Fig. 4

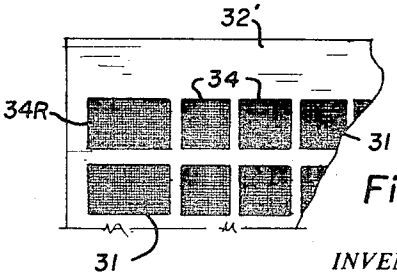


Fig. 5

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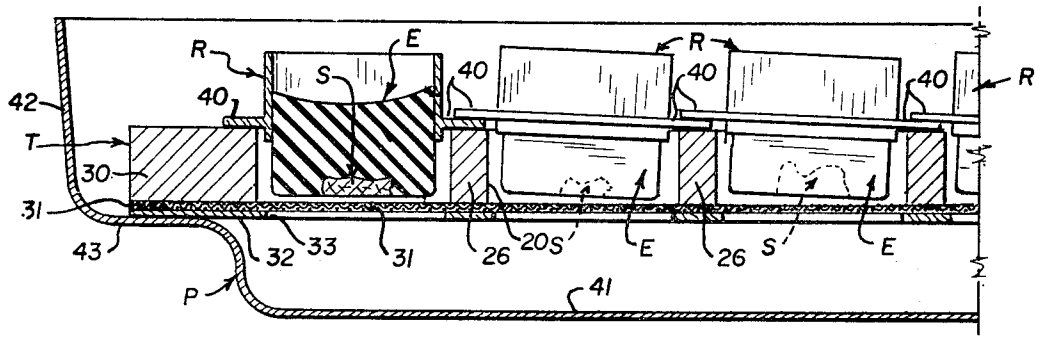


Fig. 6

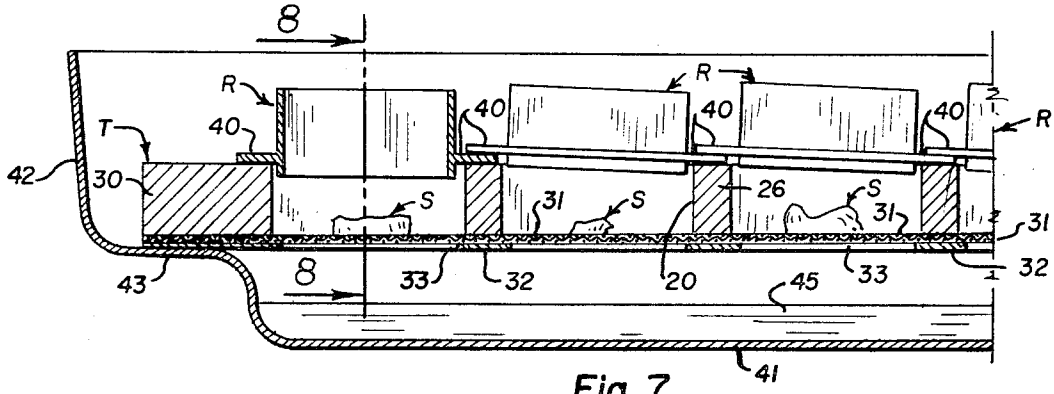


Fig. 7

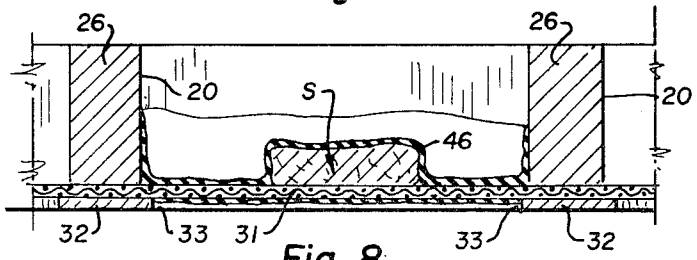


Fig. 8

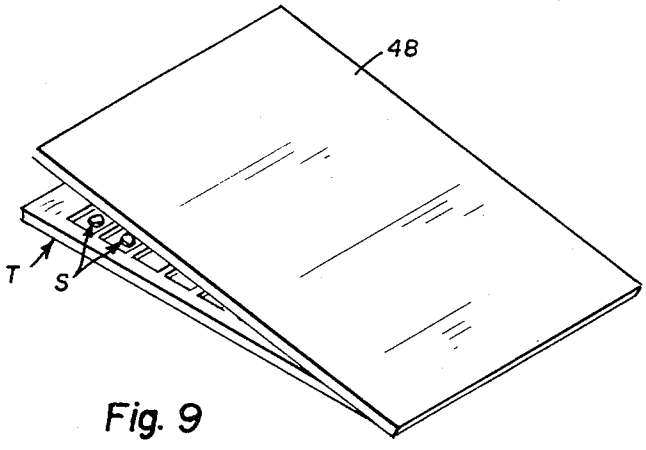


Fig. 9

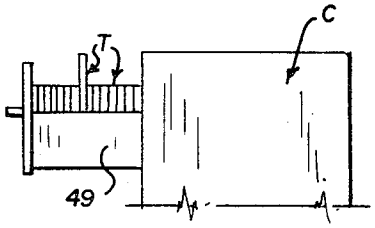


Fig. 10

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STORAGE OF HISTOLOGY SPECIMENS

This invention relates to the storage of histology specimens, and more particularly to tray containers for holding specimens to be stored and to methods for emplacing the specimens in the tray containers.

The preparation of a histology specimen includes treating it with a variety of chemicals and embedding it into a capsule of a low-melting-point paraffin wax. A microtome is then used to cut thin slices of the embedded specimen and these slices are mounted upon slides for microscopic study. Thereafter, the remainder of the embedded specimen is stored for future reference. The wax capsules which form the specimen embedments are cast in small containers commonly called "boats" because of the prior practice, by technicians, of making small paper boats for the purpose. Presently, however, such devices are commonly small, two-piece containers, constructed substantially according to the disclosure of U.S. Pat. No. 2,996,762 issued Aug. 22, 1961. These two-piece devices include a shallow, cup-like base mold or boat and a flanged ring which sets upon the base mold. When a specimen is embedded in wax, it will be at the bottom of the base mold. The base mold is then removed to expose the embedment for slicing. The ring, however, remains about the embedment and the embedment will be held by the ring during the slicing operation.

It has become a common practice to store an embedded specimen with its embedding ring in place and various types of containers may be devised to hold the specimens. However, this has become a very expensive practice in some of the larger laboratories where it is essential to store the specimens for 10 years or longer, and where the number of specimens being stored runs into the thousands. The problems created involve the expense in purchasing large numbers of rings, providing the necessary space to store the specimens containing rings and retrieving selected specimens from time to time. Thus, there is a real and definite need for improvements in the manner of storing specimens, to reduce the expense of purchasing large numbers of rings, to reduce the space required for their storage and to simplify the retrieval of specimens once they are placed in storage.

The present invention was conceived and developed with the above considerations in view and this invention comprises, in essence, a flat, comparatively thin tray, suitably proportioned to be fitted into an ordinary filing cabinet. Each tray has an array of compartments in its face and these compartments are arranged in rows and columns. Thus, a simple indexing and marking system can then be used to identify each specimen in the tray. The tray structure is arranged to simplify the steps of transferring the specimens from their embedments and into the compartments. It includes a foraminous floor in each compartment which permits a specimen to be deposited therein by merely melting the wax embedment with the specimen dropping into the compartment and the wax draining through the tray, all as hereinafter set forth in detail.

It follows that an object of the invention is to provide a novel and improved compartmented tray for a more economical and compact storage of histology specimens, as in ordinary filing cabinets.

Another object of the invention is to provide a novel and improved compartmented tray for the storage of specimens wherein the compartments are arranged in an array of rows and columns to permit a logical indexing and recording system to be used for the easy and quick retrieval of any selected specimen.

Another object of the invention is to provide a novel and improved compartmented tray for the storage of specimens which permits a simple removal of a specimen from its wax embedment by melting the wax, and which firmly secures each specimen in its selected compartment as an incident of melting the wax embedment.

Another object of the invention is to provide a novel and simplified method to transfer a specimen from a wax embedment and into the compartment of a storage tray.

Other objects of the invention are to provide a compartmented storage tray for receiving and storing specimens which is a simple, low-cost unit and which involves simple, easily performed steps and operations in its use.

With the foregoing and other objects in view, our present invention comprises certain constructions, combinations and arrangements of parts and elements, and sequences and steps, as hereinafter described and illustrated in a preferred embodiment in the accompanying drawing in which:

FIG. **1** is an isometric view of a tray constructed according to the invention;

FIG. **2** is an isometric, fragmentary view of one corner of the tray shown in FIG. **1**, but on an enlarged scale;

FIG. **3** is a fragmentary sectional detail, taken along line **3—3** of FIG. **2** but on a further enlarged scale;

FIG. **4** is a condensed bottom view of the tray shown in FIG. **1**;

FIG. **5** is a fragmentary portion of a bottom view similar to FIG. **4**, but showing an alternative construction;

FIG. **6** is an enlarged sectional view of a portion of the tray, similar to FIG. **3** but at one end thereof and showing three compartments thereof, with the tray set within a melting pan and with specimen embedments, including the embedment rings, placed in the compartments formed by the tray, thus depicting a step preliminary to the transferring of the specimens from the embedments and to the tray compartments;

FIG. **7** is a sectional view similar to FIG. **6**, but illustrating the manner in which the specimens are deposited in the compartments after the wax embedments are melted and the wax has flowed to the bottom of the pan;

FIG. **8** is a fragmentary vertical section of a tray compartment, taken along line **8—8** of FIG. **7** but on an enlarged scale, with the ring having been removed and illustrating further, in a somewhat diagrammatic manner, a layer of wax retained in the compartment and upon the specimen to hold the specimen in place upon the floor of the compartment;

FIG. **9** is an isometric view, on a reduced scale, showing a tray similar to that of FIG. **1** but with specimens in place and with the tray being partially closed by a lid, preparatory to storing the tray in a file cabinet; and

FIG. **10** is a fragmentary side elevation of a file cabinet on a reduced scale, and showing a partially open drawer and a number of trays in place, illustrative of the manner in which the trays may be finally stored.

Referring to FIGS. **1** - **3** of the drawings, the improved tray T is a rectangular, sheet-like member having an array of open compartments **20** in its upper face

to receive specimens from melted wax embedments. The tray is proportioned to provide a width and a height which will permit it to fit in a file cabinet, as hereinafter described. The thickness of this tray is such that the compartments will be deep enough to completely retain the specimens S, as shown in FIG. 8. Each compartment 20 is shaped to receive a projecting portion of a wax embedment and when using conventional square or rectangular embedments, each compartment will be a square or rectangle. It is contemplated that the flanges of a ring about the embedment will rest upon the upper face of the tray during transfer, as hereinafter further described.

The compartments 20 are arranged on the face of the tray T in any suitable pattern and are preferably in rows and columns to provide regular lefthand and righthand margins, 21 and 22, a bottom margin 23 and a wider top margin 24 about the edges of the tray. The spacings between the adjacent rows and columns of compartments form longitudinal and lateral dividing strips 25 and 26. These margins 21 to 24 and dividing strips 25 and 26 are wide enough to assure that the tray will be rigid and to provide surfaces whereon markings may be placed to identify the tray, as on margin 24, and the specimens within the individual compartments, as on lateral strips 26. The width of the lateral dividing strips 26 is also at least the extent of the flanges of the boat rings which hold embedments to permit the embedments to be placed upon the tray over the compartments and in an end to end array as will be described. The top margin 24 of the tray may be wider than the other margins to provide space for a title and other markings if such is desired. It is to be noted that the size of the compartments within the tray may vary to accommodate different sized embedments. This is illustrated at FIG. 1. in an exemplary manner, for a row of compartments 20R, adjacent to the righthand margin 22 are wider than the remainder of the compartments to receive wider embedments than are to be received by the other compartments. It is apparent, however, that the size of the compartments and the arrangements of the rows and columns of compartments in a tray may be varied in any suitable manner.

Each tray is formed as a sandwich-like laminate including an upper, comparatively thick main body portion 30, an intermediate porous membrane 31 on the undersurface of the body portion and a thin shield 32 on the undersurface thereof. The main body portion 30 is reticulated by the compartments 20 and 20R according to any selected pattern as hereinabove described. The thickness of this main body portion is such that the specimens will be completely housed within the compartments as aforestated, and this thickness may be varied from one-eighth inch to as much as or more than one-quarter inch to accommodate selected groups and types of specimens which may vary greatly in size. This main body portion 30 may be formed of any rigid material having at least a moderate degree of strength. It may be formed of a laminated paper, plastic or metal and the compartments may be cut or cast in any suitable manner. Regardless of the type of material used, however, the tray must be able to withstand temperatures in the range of 150 to 190° F. to permit the wax embedments to melt to release the specimens without damaging the tray.

The membrane 31 forming the floor of the tray is foraminous to permit a flow of melted wax through it. A preferred material has been found to be a woven rayon fabric. Other types of fabric and porous, cloth-like materials may also be used for the purpose. The membrane is stretched and fastened to the undersurface of the reticulated body portion 30 in any suitable manner, as with adhesive, with the spaces between the margins and the intermediate strips forming the compartment floors being stretched with sufficient tightness as to be comparatively rigid.

The bottom shield 32 is a layer of tough paper or the like and its function is to protect the membrane 31 should the tray be handled roughly. This shield is provided with openings 33 and 33R which are in registration with the respective compartments 20 and 20R. These openings are preferably circular or oval, as in FIG. 4, simply to facilitate manufacture of the shield. However, they may be rectangular openings 34 and 34R and of the same size as the compartments they register with, as of the bottom shield 32′ of a tray T′ of FIG. 5. The shield 32 or 32′ is affixed to the undersurface of the membrane 31 by a suitable adhesive or in any other suitable manner, preferably at the same time the membrane is affixed to the main body portion of the tray.

The manner in which specimens S are transferred from wax embedments to the compartments in the tray is illustrated in FIGS. 6 to 8. A first preparatory step is to load the tray, as illustrated in FIG. 6. There, a sectional portion of the tray T shows three adjacent compartments 20. A wax embedment E is placed above each compartment, with a portion thereof depending from a ring R extending into the corresponding compartment. A ring R embraces and holds a portion of each embedment. Each ring R is a short, tubular member, square or rectangular in section and having two opposing flanges 40 outstanding from opposite ends of each ring. Thus, a portion of each wax embedment E extends below this ring, as illustrated, and this portion, which carries the specimen S, projects into the tray compartment with the flanges 40 of the ring lying upon the face of the tray. Each compartment is proportioned to receive the embedment as heretofore stated, and when several embedments are in place upon the tray, the opposing flanges 40 of the several rings will lie upon the marginal edges or wider strips 26 between the compartments or upon each other. For example, in the illustration of FIG. 6, the specimen ring at the edge of the tray is placed squarely within its compartment, while the other specimen rings are tilted slightly because a flange 40 at one end of each ring will rest upon the flange of an adjacent specimen ring, while the flange at the opposite end will rest upon the tray. This tilting can assume various patterns, but this is not significant when specimens are transferred to the tray according to the invention.

In the transfer, it is desirable, but not essential, that embedments E be placed in all of the tray compartments at the same time and before the transfer. Also, the technician in charge of the transfer may identify and record the location of each specimen in the tray compartments, as on the wider strips 26, according to a suitable indexing system which can facilitate the subsequent retrieval of any selected specimen. Several indexing systems are well known and need not be described.

The transfer of specimens is commenced by placing the tray in a wax retaining pan P, of a size slightly larger

than the tray and having a bottom **41**, outer walls **42** and peripheral ledges **43** to hold the tray above the bottom of the pan, as illustrated in FIGS. **6** and **7**. When a tray T is placed in the pan P with embedments E in all or most of the compartments **20**, the pan is then placed in an oven and heated to a temperature sufficient to melt the wax. The melted wax will drop from each supporting ring to liquify in each compartment. Then, it will flow and seep through the membrane **31** to drip from the tray to the bottom **41** of the pan P to form a puddle **45** of wax, as best illustrated in FIG. **7**. At the same time, the specimen, now released from its embedment, will lie upon the membrane **31**. In lieu of the pan P, the oven itself may be provided with a drip trough to catch the melted wax and the trays supported by ledges or by rails extending across the drip troughs. Such a drip trough may be provided with a valve, extending outside the oven, for draining the troughs periodically or as desired.

It is to be noted that although most of the wax will drip through the membrane, a thin layer **46** of wax will remain on the specimen, as well as saturate the membrane, as best illustrated at FIG. **8**. Generally, this thin layer **46** of wax will not only protect but also affix the specimens to the membrane and thus secure them in their compartments in the tray. A particular advantage of the preferred rayon membrane is that the wax, in dripping from the membrane, does not tend to produce teats or solidified wax extending downwardly from the membrane, particularly below the specimen S. Thus, after melting the wax, the tray T may be removed from the oven with the pan P and allowed to cool. After cooling, the several boat rings R may be removed from the tray for reuse.

After the tray is cooled, the specimens will be tightly affixed to the floor of each compartment, but they may be easily removed if they are ever needed, as by local heat application to the underside of the membrane from which a specimen S is to be removed. After removal, such a specimen may be re-embedded in a ring R in the customary manner. However, such removal of a specimen may not occur for a long period of time and the cooled specimen is ready for storage after it has cooled. Preliminary to storage, however, a flat lid **48** may be placed over the tray, as illustrated in FIG. **9**. This lid, such as a simple cardboard lid, will not only protect the specimens, but it will also confine any specimen to its proper compartment should it accidentally become loosened from the membrane.

After the lid is closed on the tray, the tray is then ready for storage and it may be stored in a drawer **49** of a file cabinet C, as in the manner illustrated in FIG. **10**. It is to be noted that a certain amount of wax may flow onto the bottom surface of the tray, onto the surface of the shield **32**, and that if trays are stored together in an abutting relation, as illustrated in FIG. **10**, a slight welding together of the trays might occur. This can be prevented by treating the outer surface of each lid by smoothly calendering it or using a release type paper treated with silicone or a similar material.

We have now described our invention in considerable detail. However, it is obvious that others skilled in the art can build and devise alternate and equivalent constructions which are nevertheless within the spirit and scope of our invention. Hence, we desire that our protection be limited not by the constructions illustrated and described, but only by the proper scope of the appended claims.

What we claim is:

1. A specimen tray having compartments for the storage of histology specimens which are provided in substantially uniformly sized wax embedments with the specimen adjacent the surface of each embedment, wherein:

a. said tray is formed as a sheet-like member having an upper face and a bottom surface and a thickness between these surfaces selected to provide a compartment depth sufficient to retain a specimen therein;

b. said compartments are open at the upper face of the sheet and are of a size sufficient to permit at least a portion of an embedment to be placed in each compartment;

c. a porous floor for each compartment adjacent to the aforesaid bottom surface constructed and arranged to permit melted wax to drain through the compartment, whereby an embedment may be placed in selected compartments of a tray, the tray and embedments then heated to melt the wax to permit the wax to flow through the floor of the compartment with the specimen remaining on the floor thereof; and

d. a series of histology specimens in a plurality of compartments of said tray, said specimens being adhered to said porous floor by wax.

2. In a tray as defined in claim **1**, wherein:

said tray is formed as a generally rectangular member suitable for storage; and wherein

said compartments are formed as an array of rows and columns in said tray.

3. In a tray as defined in claim **2**, wherein:

said tray provides strips at the upper face between said compartments, said strips in at least one direction of said tray having a sufficient width for the placement of indicia identifying the specimen in the corresponding compartment.

4. In a tray as defined in claim **3**, wherein:

said embedments are carried by rings having a flange at each end; and

said indicia placement strips have a width corresponding to the length of said flanges, whereby a series of rings may be placed on the top of the tray with the flanges of adjacent rings in overlapping relation on said strips.

5. In a tray as defined in claim **1**, wherein said tray is formed as a laminate including:

a main body wherein said compartments are formed; and

a layer of a porous, sheetlike material attached to the undersurface of the main body to provide said compartment floors.

6. In a tray as defined in claim **5**, wherein:

said porous sheeting is a cloth-like material.

7. In a tray as defined in claim **6**, wherein:

said sheeting is a woven fabric of acetate fiber threads.

8. In a tray as defined in claim **1**, including:

a lid adapted to be fitted over the upper face of the tray to facilitate retention of specimens within their compartments when the tray is being stored.

9. A method for the transfer of histology specimens from wax embedments and into the compartments of a flat tray for storage wherein said compartments are

proportioned to receive the portion of the corresponding embedment containing the specimen and wherein the floor of the compartment is porous, including the following steps:

a. placing a series of embedments into the compartments of a tray with the portion containing the specimen within a compartment;

b. heating the tray and embedments thereon to a temperature sufficient to melt the wax forming the embedments;

c. permitting the melted wax to flow through the corresponding compartment floor and away from the tray; and

d. cooling the tray and specimens carried therein, whereby to permit a residual layer of wax to solidify and secure the specimens to the porous floor of the compartments.

10. In a method as defined in claim **9**, including:

collecting the wax flowing through said compartment floors for reuse.

11. In a method as defined in claim **9**, wherein:

said embedments are carried by rings having a flange at each end;

said compartments are arranged in rows and columns and are separated by strips, said strips in at least one direction having a width corresponding to the length of said flanges; and

said rings are placed on the top of said tray with said embedments extending into said compartments and the flanges of adjacent rings in overlapping relation on said strips.

* * * * *