(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 308 231 B1**

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **15.07.92**

(51) Int. Cl.[5]: **B01L 3/00**, G01N 33/53, G01N 33/543

(21) Application number: **88308558.1**

(22) Date of filing: **16.09.88**

The file contains technical information submitted after the application was filed and not included in this specification

(54) **Liquid-collecting device.**

(30) Priority: **18.09.87 US 98248**

(43) Date of publication of application:
22.03.89 Bulletin 89/12

(45) Publication of the grant of the patent:
15.07.92 Bulletin 92/29

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL SE

(56) References cited:
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WO-A-85/00156
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US-A- 4 246 339

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Description

This invention relates to a construction used to open and close vents in a liquid-collecting compartment, particularly such compartments used in assay devices.

In the analysis for infectious diseases or pregnancy conditions, it is common to do an immunoassay in a device having an upper compartment, a lower compartment paired with the upper one and containing a liquid-absorbing material, and a filter between them. Examples are shown in US-A-3,888,629. In such devices, a trio of such paired compartments, side-by-side, allows the patient sample to be tested in one, a positive control in another, and a negative control in a third.

In such devices, a vent hole is commonly provided in each of the lower compartments, to allow air to escape as liquid is entering. By appropriately opening and closing such vent holes, an air lock can be created which will allow, or stop, respectively, liquid flow into the lower compartment from above. (Air cannot pass out through the filter either, once it is wetted.) The stoppage of flow is appropriate to allow the liquid to incubate first at the filter, before passing down into the lower compartment, as is well-known.

Thus, prior to this invention, there has been an unsolved problem of convenient, manual operation of the opening and closing of each of the vents in a liquid-collecting and -assaying device. The opening and closing of each vent heretofore has not been conducive to easy use of such devices. Particularly this has been troublesome where the devices are sold for home use, such as in home pregnancy kits. Additionally, it is necessary, particularly in the home kits, that the vent closure be operable manually. Materials that give negligible resistance to hand movement also tend to not reliably seal off the vent. Conversely, those that provide a secure seal tend to give high resistance to a manual opening of the vent. Such problems are magnified if all three compartments are vented at once.

In accord with one aspect of the invention, the above problem is addressed by a liquid-collecting device comprising at least one liquid-collecting compartment, means in that one compartment defining a vent aperture fluidly connecting the compartment to the atmosphere, the aperture-defining means including a portion of a wall in which the aperture is located, and closure means for shutting off the vent aperture, characterized in that a) the closure means comprise a slide valve, b) one of the slide valve and the wall portion comprises an elastomeric member, and c) there is included means for slidably mounting the slide valve and the wall portion relative to each other to move the slide valve between a first position covering the aperture and a second position which uncovers the aperture, the member being formed of an elastomer having the following properties: a durometer valve no greater than 70 Shore A, cold flow at 25 °C that is between 10% and 40% lost recovery and a static coefficient of friction against polystyrene that is between 0.3 and 0.6.

In accord with another aspect of the invention, the above problem is addressed by a liquid-collecting device comprising three separate but adjacent liquid-collecting compartments, means in each of the compartments defining a vent aperture fluidly connecting each compartment to the atmospehre, the aperture-defining means including a portion of a wall in which the aperture is located, and closure means for each of the compartments for shutting off the respective aperture. The device is improved in that each of the three closure means comprises a slide valve comprising an elastomeric member and means for slidably mounting the member over the aperture to move between a first position covering the aperture and a second position in which the member uncovers the aperture, the member being formed of an elastomer having the following properties: a durometer value no greater than 70 Shore A, cold flow at 25 °C that is between 10% and 40% lost recovery and a static coefficient of friction against polystyrene that is between 0.3 and 0.6.

Thus, it is an advantageous feature of the invention that a device useful in immunoassays is provided with a valve for closing the necessary vent, that is manually operable with a minimum of effort.

It is a further advantageous feature of the invention that such a device is provided with a plurality of liquid-collecting compartments, each independently vented, and a slide valve that opens and closes each vent simultaneously, with a minimum of effort.

The present invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a perspective view of a device constructed in accord with the invention;

Figure 2 is a plan view, partially broken away, and with the slide valve exploded away, of the device;

Figure 3 is a section view taken along line III-III of Figure 2;

Figure 4 is an enlarged section view of the portion of Figure 3 encircled as "Fig. 4"; and

Figure 5 is a section view taken generally along line V-V of Figure 4, of only the slide valve 50.

The invention is described herein in the context of the preferred embodiments, in which the device has three pairs of upper/lower compartments, to assay a) the patient sample, b) a positive control and c) a

negative control, all more or less simultaneously. In addition, aspects of the invention are useful with only a single pair of compartments, and even without the upper compartment if one simply desires control over the rate of flow into a liquid-receiving compartment.

The actual chemistries of the assay are not described in detail, primarily because the mechanics of the device are applicable to any, or even no, chemistry provided it is appropriate that flow not take place instantaneously into the liquid-receiving compartment. If the flow should proceed instantaneously, there is no need to have a valve to close the vents, as provided for by this invention.

In the most preferred embodiment, the chemistries provide for an immunoassay, in which there is separately received at three filters in three compartments, a patient antigen complexed with an antigen, a positive control for the complex so formed, and a negative control for the complex so formed, respectively.

A device 10 constructed in accord with at least one aspect of the invention comprises, Figure 1, a frame 12 having a top surface 14, and a front edge 16. Mounted on edge 16 is a slide valve 50 in accord with the invention. Top surface 14 has three wells or upper compartments 17, 18 and 19. At the bottom of each of the compartments is a filter 24, Figures 2 and 3, of appropriate pore size and pore volume. Filters 24 have an upper surface 25 and an under surface 26, Fig. 3. Surface 26 is in liquid-flow contact with an absorbent material 28 that preferably occupies each of three lower compartments 30, 32 and 34, Fig. 2, paired with the upper ones. As used herein, "liquid-flow contact" means, in sufficient proximity such that a liquid meniscus emanating from surface 26 will also wet material 28 and flow into it, if no air lock exists in the lower compartment. Material 28 is any bibulous material, having a sufficient pore volume to soak up about 2 cc of liquid. Useful materials include cellulose acetate, cotton, and rayon. Useful materials for filters 24 include polyamides, such as nylons, and for example nylon-66 microporous membranes manufactured under the tradenames BIODYNE A or ULTIPOR N-66 by Pall Corporation. Most preferably, the membranes are precoated (prior to use) with one or more water-soluble proteins, such as casein derivatives obtained from acylation, alkylation or sulfonylation of the casein.

Optionally the device can contain (between the filter and the absorbent material) a porous member which restricts flow back up to the filter, but allows flow from the filter to the absorbent material.

Various optional treatments can be given the filter's upper surface 25, depending on the assays to be used. For example, the filter can be treated with a water-soluble polymeric overcoat selected to provide an induction time of from about 30 to about 300 seconds of delay, for a liquid head of pressure of about 6 mm of water. This treatment allows aqueous-based reagents to be coated thereafter onto the filter, and dried in less than 30 seconds, without having the reagents pass through the filter. Useful examples of such polymers include polyvinyl alcohol, polyvinyl pyrrolidone, carboxymethyl cellulose, and carboxyethyl cellulose.

Optionally, a liquid level indicator ridge 38, Figure 3, is provided in the wall 40 of each well, as a circular ring. Alternatively, such an indicator can be one or two fragments of a ring vertically spaced on wall 40, or a vertical bar (not shown).

Vent aperture 44 is provided in each compartment 30, 32 and 34, Figures 2 and 3, to allow air passage out of the compartment as liquid flows in. Without such vents, or when the vent apertures are closed, an air lock precludes liquid from flowing through filter 24 into the lower compartments. The vent apertures extend to a wall surface 46, Figure 4, each of which comprises the end face of a stud 47 extending from edge 16. Stud 47 is grooved at 48 and 49, Fig. 4, to slidably accommodate mating lips from valve 50, as will be apparent. There are three studs 47, one for each aperture, Figure 2.

To insure that absorbent material 28 does not come in contact with aperture 44, and thus leak liquid, stops 51 are pendent from frame 12, Figure 3, in a position interposed between material 28 and aperture 44.

In accord with the invention, slide valve 50 is provided to alternately open and close vent apertures 44. Valve 50 comprises mounting member 52, and three valve seats 54, 56 and 58 that correspond to each of studs 47. Lips 60, 62 are provided at the side edges of member 52, to ride in grooves 48 and 49, respectively, and to force studs 47 against the valve seats.

In either the valve seats or the contacting wall surface 46, there is an elastomeric material, and in the other contacting member there is a relatively rigid material such as polystyrene. The elastomeric member is preferably in the valve seats and is especially selected for durometer hardness, cold flow, and coefficient of friction that will ensure that, when the valve seats are to be slid to the side of studs 47, having been compressed by the studs an amount of about 0.15 mm, they can be slid with a force that is between about 0.15 newtons and 20 newtons. (Anything less than about 0.15 newtons will cause member 52 to slide uncontrollably under its own weight. A force in excess of 10, and certainly in excess of 20, newtons is too high for easy manual manipulation.). The most preferred range is 0.15 to 10 newtons.

The above test is not intended to imply that seats 54-58 are only to be compressed 0.15 mm when

member 52 is mounted on studs 47. Instead, the compression can be distance "d", Figure 4, which can be from about 0 to as much as 0.3 mm, measured at surface 64 of the seat shown in phantom for its uncompressed position. Practically speaking, however, some compression is preferred to ensure that surface 64 of seats 54-58 is in fact sealed over aperture 44. For the measurement of the force required to slide the valve, 0.15 mm compression is preferred.

To achieve the desired sliding force, the noted properties for the elastomeric material are preferably within the following ranges: Durometer (a measure of hardness) of no greater than about 70 Shore A, and most preferably from 55 to 65 Shore A. Cold flow (a measure of loss of recovery after being deformed, also known as "compression set") of between about 10 and about 40% lost recovery when compressed at 25 ° C, and most preferably, 23% lost recovery. Coefficient of friction (static) against polystyrene (the preferred material for stud 47) of between about 0.3 and about 0.6, and most preferably about 0.35. Other useful properties are: a specific gravity of from 0.95 to 1.0, a tensile strength of from 45 Kg/cm^2 to 70 Kg/cm^2, ultimate elongation of from 300% to 400%, a 100% modulus value of from 20 to 25 Kg/cm^2, a tear strength at 25 ° C of from 19 to 25 kN/m, a tension set of from 5 to 10%, flex fatigue to failure that is greater than 3.4 million, and a brittle point less than 60 ° C.

Useful materials falling within these ranges include thermoplastic rubber available under the tradename Santoprene Neutral 201-55 and 201-64, from Monsanto Corp. These two rubbers have the following specific properties:

	Neutral 201-55	201-64
Hardness	55 Shore A	64 Shore A
Spec. Gravity	0.97	0.97
Tensile Strength	47 Kg/cm^2	70 Kg/cm^2
Ultimate Elongation	330%	400%
100% Modulus	21 Kg/cm^2	25 Kg/cm^2
Tear Strength (25 ° C)	19 kN/m	24.5 kN/m
Tension Set	6%	10%
Cold Flow at 25 ° C	23%	23%
Flex Fatigue (cycles to fail)	>3.4 million	>3.4 million
Brittle Point	Not Available	<60 ° C
Static Coefficient of Friction (against polystyrene)	0.59	0.35

Optionally, seats 54, 56 and 58 are each chamfered at 70, Figure 5, to aid in sliding the seats onto studs 47. Additionally, studs 47 are optionally chamfered at 72, Figure 2, to aid in assembling slide valve 50 onto the studs during manufacturing.

To assist in keeping slide valve 50 from being slid too far in either direction, stops 80 and 82 are preferably provided at edge 16. These stops cooperate with surfaces 84 and 86 on mounting member 52, Figure 5.

In use, slide valve 50 is first kept in place with seats 54, 56 and 58 sealed over apertures 44, the position shown in Figures 1-4. This position prevents liquid from entering compartments 30, 32 and 34 because of the air lock. (Each lower compartment is fluidly isolated from the others.) To uncover apertures 44, member 52 is slid to the left, Figures 1 and 2, to the position shown on studs 47 in phantom, Figure 5. As is readily apparent, apertures 44 are uncovered simultaneously in this position, so that air can flow out. At the same time, any liquid on filter 24 flows into the lower compartment.

Filters 24 act as follows, in the preferred embodiment: In compartment 18, the patient sample's antigens, if any, complex with antibodies coated on wall 40 or added by the user, some of which are labeled, so that the complex is unable to pass through the filter. If no antigen is present, all the labeled antibodies pass through and are not available for detection. In compartment 19, antigen is supplied on the filter or on upper chamber wall 40 as manufactured, and when antibody is added by the filter, a complex forms as a positive control, and remains on the filter for detection. In compartment 17, no complexing will occur unless the test conditions are improper, such as due to the presence of high amounts of salt, in which case a special anti-complexing agent such as N-acetylglucosamine is overcome and complexing forms for detection as a negative control.

Device 10 is not a large device, having a length for valve 50, Figure 2, and thus for the entire device, of no more than about 6.5 cm. Thus, with the properties of the valve seats 54, 56 and 58 described above, it is readily feasible to slide slide valve 50 back and forth manually, by using finger pressure.

Alternatively (not shown), the elastomeric member can comprise at least the surface portion 46 of stud

47, Figure 4, with the member 56 being formed of a relatively rigid material, for example, polystyrene. In that case, it is the surface portion 46 that is preferably compressed distance "d" when the slide valve is on the studs.

Claims

1. A liquid-collecting device (10) comprising at least one liquid-collecting compartment (17, 30; 18, 32; 19, 34), means (44) in said at least one compartment defining a vent aperture fluidly connecting said compartment (17, 30; 18, 32; 19, 34) to the atmosphere, said aperture-defining means (44) including a portion of a wall (46, 47) in which said aperture (44) is located, and closure means (50, 52) for shutting off said vent aperture (44);

   characterized in that a) said closure means (50, 52) comprise a slide valve (54; 56; 58), b) one of said slide valve (54; 56; 58) and said wall portion (46, 47) comprises an elastomeric member, and c) further including means (48, 49, 60, 62) for slidably mounting said slide valve (54; 56; 58) and said wall portion (46, 47) relative to each other to move said slide valve (52) between a first position covering said aperture (44) and a second position which uncovers said aperture (44);

   said member being formed of an elastomer having the following properties: a durometer value no greater than 70 Shore A, cold flow at 25 ° C that is between 10% and 40% lost recovery and a static coefficient of friction against polystyrene that is between 0.3 and 0.6.

2. A device as defined in Claim 1, wherein said elastomeric member is in said slide valve (54; 56; 58).

3. A device as defined in Claim 1 or 2, and further including at least one additional liquid collecting compartment (17, 28; 18, 30; 19, 32), means (44) in said at least one additional compartment (17, 28; 18, 30; 19, 32) defining a vent aperture fluidly connecting said compartment (17, 28; 18, 30; 19, 32) to the atmosphere, said aperture-defining means (44) including a portion (47) of a wall (46) in which said aperture (44) is located, and closure means (50, 52) for shutting off said vent aperture (44); said closure means (50, 52) of said additional compartment (17, 28; 18, 30; 19, 32) comprising a slide valve (54; 56; 58) substantially identical to said slide valve of said at least one compartment.

4. A liquid-collecting device (10) comprising three separate but adjacent liquid-collecting compartments (17, 28; 18, 30; 19, 32), means (44) in each of said compartments defining a vent aperture fluidly connecting said each compartment (17, 28; 18, 30; 19, 32) to the atmosphere, said aperture-defining means (44) including a portion (47) of a wall (46) in which said aperture (44) is located, and closure means (50, 52) for each of said compartments (17, 28; 18, 30; 19, 32) for shutting off said respective aperture (44);

   characterized in that each of said three closure means (50, 52) comprise a slide valve (54; 56; 58) comprising an elastomeric member and means (48, 49, 60, 62) for slidably mounting said member over said aperture (44) to move between a first position covering said aperture (44) and a second position in which said member uncovers said aperture (44),

   said member being formed of an elastomer having the following properties: a durometer value no greater than 70 Shore A, cold flow at 25 ° C that is between 10% and 40% lost recovery and a static coefficient of friction against polystyrene that is between 0.3 and 0.6.

5. A device as defined in Claim 4, and further including filtering means (24, 25, 26) for each of said compartments (17, 30; 18, 32; 19, 34), constructed to receive on said filtering means (24, 25, 26), each at one of the respective compartments (17, 30; 18, 32; 19, 34), a patient antigen complexed with an antibody, and positive and negative controls for the complex formed by the patient antigen;

   whereby said device is useful in an immunoassay.

6. A device as defined in Claim 3, 4 or 5, wherein said slide valves (54, 56, 58) comprise an integral member (52), said valves (54, 56, 58) being disposed on said member (52) to simultaneously cover and simultaneously uncover said apertures (44) as said integral member (52) is moved between said first and second positions.

7. A device as defined in any one of the preceding claims, and further including a water-absorbing material (28) in the or each compartment (30; 32; 34).

8. A device as defined in Claim 7, and further including a filter (24, 25, 26) disposed upstream of, and in liquid-flow contact with, said water-absorbing material (28).

Revendications

1. Dispositif (10) pour le recueil de liquide, comprenant au moins un compartiment (17,30 ; 18,32 ; 19,34) de recueil de liquide, des moyens (44), associés audit compartiment, délimitant une ouverture reliant fluidiquement ledit compartiment (17,30 ; 18,32 ; 19,34) à l'atmosphère, lesdits moyens (44) délimitant ladite ouverture comprenant des organes (46,47) entourant ladite ouverture (44) et des moyens de fermeture (50,52) pour obturer ladite ouverture (44) ; dispositif caractérisé en ce que :
   a) les moyens de fermeture (50,52) comprennent une valve (54 ; 56 ; 58) ;
   b) soit ladite valve (54 ; 56 ; 58) soit lesdits organes (46,47) comprennent une partie en élastomère ; et
   c) il comprend aussi un agencement (48, 49, 60, 62) pour permettre le coulissement relatif de ladite valve (54 ; 56 ; 58) par rapport auxdits organes (46, 47) de manière à déplacer ladite valve (52) entre une première position dans laquelle elle recouvre ladite ouverture (44) et une seconde position dans laquelle elle découvre ladite ouverture (44),
   ladite partie en élastomère étant formée d'un élastomère présentant les caractéristiques suivantes : une duretée Shore A inférieure à 70, un fluage à froid mesuré à 25 ° C compris entre 10 % et 40 % de perte de récupération et un coefficient de frottement statique avec le polystyrène compris entre 0,3 et 0,6.

2. Dispositif selon la revendication 1, dans lequel la partie en élastomère appartient à ladite valve (54 ; 56 ; 58).

3. Dispositif selon l'une des revendications 1 ou 2, comprenant aussi au moins un compartiment additionnel de recueil de liquide (17,30 ; 18,32 ; 19,34) des moyens (44), associé audit compartiment additionnel (17,30 ; 18,32 ; 19,34), délimitant une ouverture reliant fluidiquement ledit compartiment additionnel (17,30 ; 18,32 ; 19,34) à l'atmosphère, lesdits moyens (44) délimitant ladite ouverture comprenant des organes (46,47) entourant ladite ouverture (44) et des moyens de fermeture (50,52) pour obturer ladite ouverture, lesdits moyens de fermeture (50,52) dudit compartiment additionnel (17,30 ; 18,32 ; 19,34) comprenant une valve (54 ; 56 ; 58) pratiquement identique à ladite valve recouvrant ledit au moins un compartiment.

4. Dispositif (10) pour le recueil de liquide, comprenant trois compartiments adjacents (17,30 ; 18,32 ; 19,34) de recueil de liquide, des moyens (44), associés à chaque compartiment, délimitant une ouverture respective reliant chaque compartiment (17,30 ; 18,32 ; 19,34) à l'atmosphère, lesdits moyens (44) délimitant une ouverture respective comprenant des organes (46,47) entourant lesdites ouvertures (44) et des moyens de fermeture (50,52) associés à chacun desdits compartiments (17,30 ; 18,32 ; 19,34) pour obturer lesdites ouvertures (44) respectives, dispositif caractérisé en ce que chacun des trois moyens de fermeture (50,52) comprend une valve (54 ; 56 ; 58) munie d'une partie en élastomère et en ce qu'il comprend un agencement (48,49,60,62) pour permettre le coulissement desdites parties en élastomère par rapport auxdites ouvertures (44) entre une première position dans laquelle elles recouvrent lesdites ouvertures et une seconde position dans laquelle elles découvrent lesdites ouvertures respectives (44), lesdites parties en élastomère étant formées d'un élastomère présentant les caractéristiques suivantes : une dureté Shore A inférieure à 70, un fluage à froid mesuré à 25 ° C compris entre 10 % et 40 % de perte de récupération et un coefficient de frottement statique avec le polystyrène compris entre 0,3 et 0,6.

5. Dispositif selon la revendication 4, comprenant en plus des moyens de filtrage (24,25,26) pour chacun desdits compartiments (17,30 ; 18,32 ; 19,34) qui sont agencés pour recevoir lesdits moyens de filtrage, un pour chaque compartiment (17,30 ; 18,32 ; 19,34) respectif, un anticorps complexable avec un antigène du patient, des controles positif et négatif pour le complexe obtenu avec l'antigène d'un patient, afin de rendre le dispositif utilisable en immunotest.

6. Dispositif selon l'une des revendications 3, 4 ou 5, dans lequel lesdites valves (54, 56, 58) comprennent un élément (52) en une seule pièce, lesdites valves (54, 56, 58) étant disposées sur ledit élément (52) pour simultanément couvrir ou découvrir lesdites ouvertures (44) lorsque ledit élément passe de la

première position à la seconde position.

7. Dispositif selon l'une quelconque des revendications précédentes, comprenant un matériau (28) absorbant l'humidité dans au moins l'un des compartiments (30 ; 32 ; 34).

8. Dispositif selon la revendications 7, comprenant un filtre (24, 25, 26) situé en amont et "en contact" avec ledit matériau (28) absorbant l'humidité pour assurer l'écoulement dudit liquide.

Patentansprüche

1. Flüssigkeits-Aufnahmevorrichtung (10) mit mindestens einer Flüssigkeits-Aufnahmezelle (17,30; 18,32; 19,34), mit in der (einer) Aufnahmezelle angeordneten Mitteln (44), die eine die Aufnahmezelle (17,30; 18,32; 19,34) mit der Atmosphäre verbindende Entlüftungsöffnung bilden, wobei die eine Öffnung bildenden Mittel (44) einen Wandabschnitt (46,47) aufweisen, in der die Öffnung (44) angeordnet ist, sowie mit Abdeckmitteln (50,52) zum Verschließen der Entlüftungsöffnung (44), dadurch gekennzeichnet, daß a) die Abdeckmittel (50,52) ein Schieberventil (54; 56; 58) aufweisen, b) daß an einem der Schieberventile (54; 56; 58) und an dem Wandabschnitt (46,47) ein nachgiebiges Element vorgesehen ist, und c) daß Mittel (48,49,60,62) vorgesehen sind, die eine Schiebeführung für das Schieberventil (54; 56; 58) mit Bezug zu dem Wandabschnitt (46,47) bilden, um das Schieberventil (52) zwischen einer ersten Stellung, in der die Öffnung (44) verschlossen ist, und einer zweiten Stellung, in der die Öffnung (44) freigegeben ist, bewegen zu können; weiterhin gekennzeichnet dadurch, daß das Element aus einem Elastomeren besteht, der folgende Eigenschaften besitzt: einen Härtewert von maximal 70 Shore A, Kaltfluß bei 25° C, der zwischen 10 und 40 % Druckverformungsrest liegt und einem statischen Reibungskoeffizienten gegenüber Polystyrol, der zwischen 0,3 und 0,6 beträgt.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das elastomere Element in dem Schieberventil (54; 56; 58) angeordnet ist.

3. Vorrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die Vorrichtung mindestens eine zusätzliche Flüssigkeits-Aufnahmezelle (17,28; 18,30; 19,32) aufweist, Mittel (44) in der (einer) zusätzlichen Zelle (17,28; 18,30; 19,32), welche eine die Zelle (17,28; 18,30; 19,32) mit der Atmosphäre verbindende Entlüftungsöffnung aufweisen, wobei die eine Öffnung bildenden Mittel (44) einen Wandabschnitt (46,47) aufweisen, in der die Öffnung (44) angeordnet ist, sowie Abdeckmittel (50,52) zum Verschließen der Entlüftungsöffnung (44); und wobei die Abdeckmittel (50,52) der zusätzlichen Zelle (17,28; 18,30; 19,32) ein Schieberventil (54; 56; 58) aufweisen, das mit dem vorgenannten Schieberventil im wesentlichen identisch ist.

4. Flüssigkeits-Aufnahmevorrichtung (10), welche drei getrennt nebeneinander angeordnete Flüssigkeits-Aufnahmezellen (17,28; 18,30; 19,32) aufweist, Mittel (44) in jeder Zelle, die eine die Aufnahmezelle (17,28; 18,30; 19,32) mit der Atmosphäre verbindende Entlüftungsöffnung bilden, wobei die eine Öffnung bildenden Mittel (44) einen Wandabschnitt (46,47) aufweisen, in der die Öffnung angeordnet ist, sowie für jede Zelle (17,28; 18,30; 19,32) vorgesehene Abdeckmittel (50,52) zum Verschließen der jeweiligen Entlüftungsöffnung (44), dadurch gekennzeichnet, daß jedes der drei Abdeckmittel ein Schieberventil (54; 56; 58) aufweist, welches ein nachgiebiges Element und Mittel (48; 49; 60; 62) besitzt, die eine Schiebeführung bilden, um das Element zwischen einer ersten Stellung, in der es die Öffnung (44) verschließt, und einer zweiten Stellung, in der es die Öffnung (44) freigibt, vor der Öffnung (44) verschieben zu können, wobei das Element aus einem Elastomeren besteht, der folgende Eigenschaften besitzt:
einen Härtewert von maximal 70 Shore A, Kaltfluß bei 25° C, der zwischen 10 und 40 % Druckverformungsrest liegt, und einen statischen Reibungskoeffizienten gegenüber Polystyrol, der zwischen 0,3 und 0,6 beträgt.

5. Vorrichtung nach Anspruch 4, dadurch gekennzeichnet, daß die Vorrichtung Filtermittel (24; 25; 26) für jede der Aufnahmezellen (17,30; 18,32; 19,34) aufweist, die so ausgelegt sind, daß sie jeweils ein sich zu einem Komplex mit einem Antikörper verbindendes Antigen eines Patienten sowie positive und negative Kontrollen für den vom Patienten-Antigen gebildeten Komplex aufnehmen; wobei die Vorrichtung bei einer Immunanalyse verwendet wird.

6. Vorrichtung nach Anspruch 3, 4 oder 5, dadurch gekennzeichnet, daß die Schieberventile (54; 56; 58) ein gemeinsames Bauteil (52) aufweisen, wobei die Ventile (54; 56; 58) so auf dem Bauteil (52) angeordnet sind, daß sie die Öffnungen (44) gleichzeitig entweder verschließen oder freigeben, wenn das Bauteil (52) zwischen seiner ersten und zweiten Stellung verschoben wird.

7. Vorrichtung nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß in der einen oder jeder der drei Aufnahmezellen (30; 32; 34) eine wasserabsorbierende Substanz (28) vorgesehen ist.

8. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß ein Filter (24; 25; 26) vorgesehen ist, das über der wasserabsorbierenden Substanz (28) und in Benetzungskontakt mit derselben angeordnet ist.

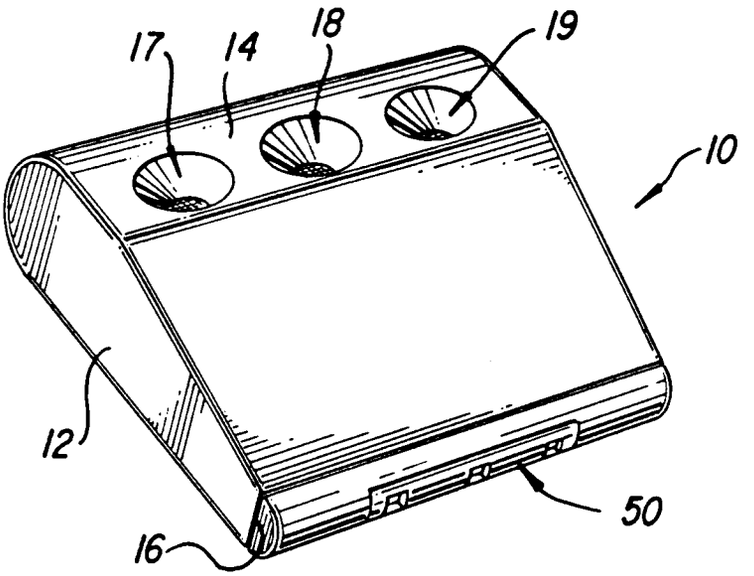
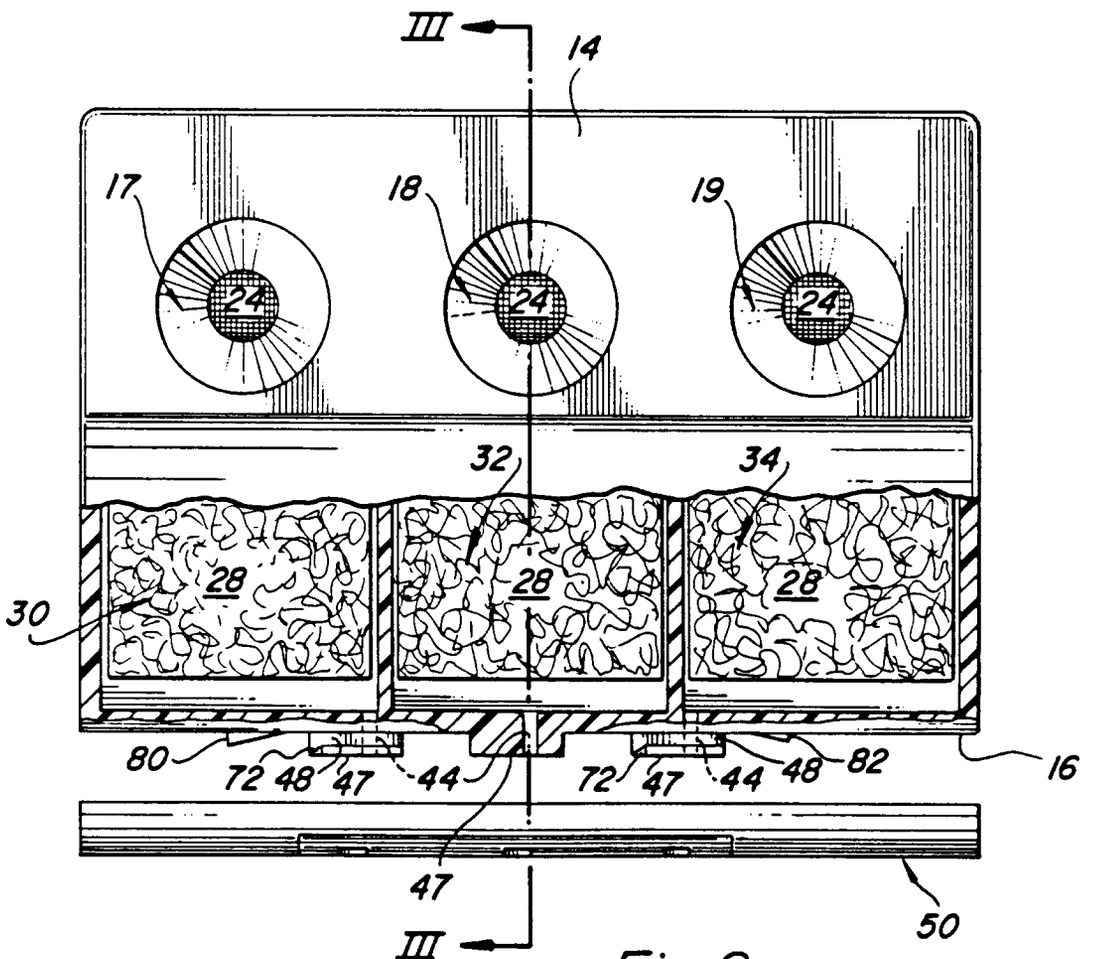

17
14
18
19
10
12
50
16

Fig. 1


III
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80
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47
44
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50
III

Fig. 2

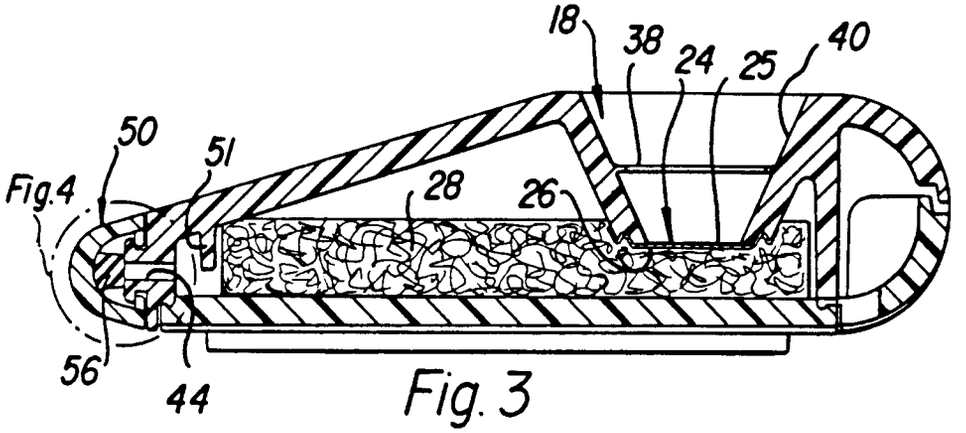

Fig. 3

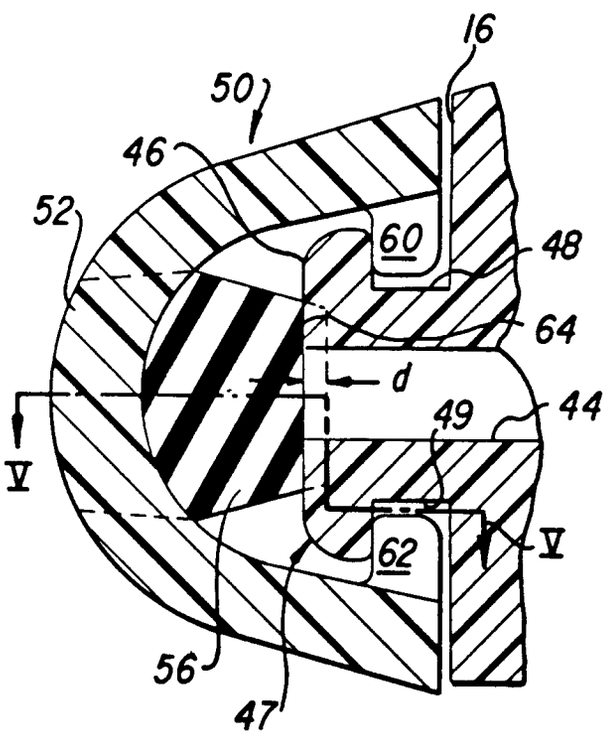

Fig. 4

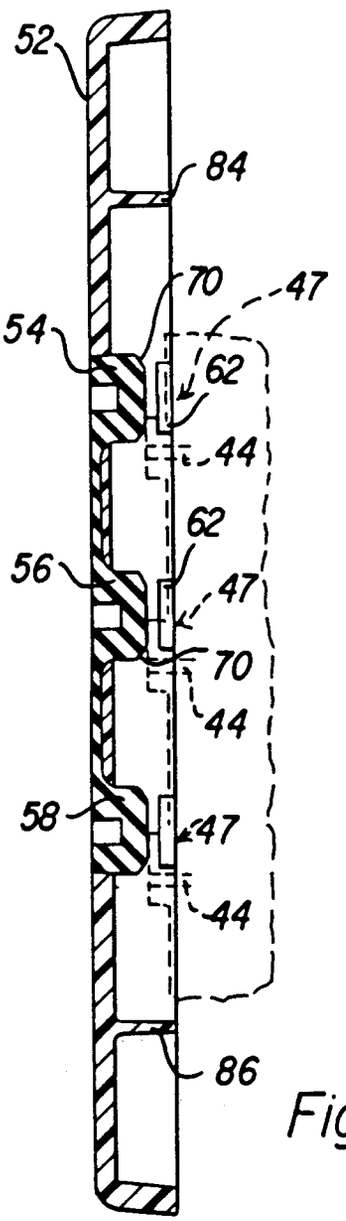

Fig. 5