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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : C12M 1/28, 1/32

A1

(11) International Publication Number: **WO 94/17175**

(43) International Publication Date: 4 August 1994 (04.08.94)

(21) International Application Number: PCT/IT94/00005

(22) International Filing Date: 27 January 1994 (27.01.94)

(30) Priority Data:
RM93A000038 27 January 1993 (27.01.93) IT

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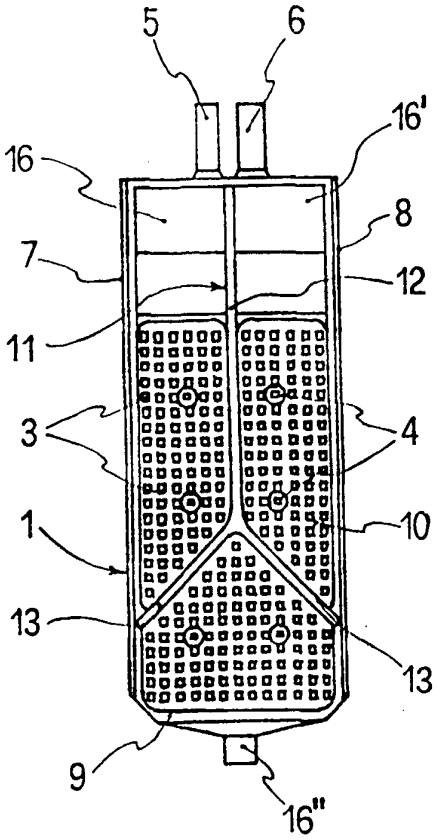
(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: KIT FOR MICROBIOLOGICAL CULTURE ANALYSIS

(57) Abstract

Herein described is a kit for microbiological culture analysis comprising a container with a hermetically sealable lid and one or more supports for culture media. The supports are made up of a plate-type element, both surfaces of which have supporting elements and supporting protrusions to bear the culture medium. Dividing ribs are provided to divide the culture media into a number of zones according to the requirements of the analysis to be performed. Each one of the culture zones is associated with a respective element for identification of the culture medium.



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KIT FOR MICROBIOLOGICAL CULTURE ANALYSIS

DESCRIPTION

Technical Field

The present invention relates to a kit for microbiological culture analysis.

Background Art

From the state of the art, devices are already known for microbiological analysis, comprising a container (preferably transparent) into which is placed a support upon which a culture medium is fixed, which is then hermetically closed in the container by means of a lid. For microbiological analysis the support on which the culture medium is fixed, is immersed in the liquid to be analyzed, or alternatively said liquid is poured over it; in case of submersion the support is then allowed to drip and placed in the container to observe the growth of microorganisms, following closure of said container. These devices are mainly used to determine microorganisms in urine or urinoculture, but other areas of use may also be mentioned, such as dermatological uses, alimentary and industrial uses in general, in case it should be necessary to determine the bacterial load of fluids.

The kits of equipment for microbiological culture analysis according to the state of the art show a certain number of disadvantages, which can be seen during habitual use and in laboratory practice.

First of all, removal of the support with the culture medium from the liquid to be tested, after dipping, frequently causes the substances to be tested contained in the various culture media to be drawn from the top part of the support to the bottom part. This flow of liquid frequently causes a reduction in the precision of results obtained.

In the second place, the need to perform simultaneously, and often urgently, a large number of

analysis means that the operator often needs a large number of supports, each one for one or more culture media simultaneously, to be used according to need. Kits for microbiological culture analysis made up of a number of supports for culture beds are not described in the prior art.

Disclosure of Invention

It has now been surprisingly found that a kit for microbiological culture analysis made up of at least one support in the form of a plate with dividing ribs shaped in such a way as to cause the liquid to be tested to slide off when the support is extracted from the liquid to be tested, and/or by at least one support in the form of a plate which allows application of a different culture media on each face and/or by at least one support in the form of a plate with one of its two faces divided in two vertically by a dividing rib, and by at least one container with a sealed lid, is capable of overcoming the problems described above with reference to the prior art, giving great versatility of use for the kit itself.

According to the present invention is provided a support for culture media for microbiological analysis, characterized in that it comprises:

a substantially rectangular plate having on both faces a multiplicity of supporting elements to bear the culture medium;

fixing pins on the upper short edge of said plate;

side walls along the long edges of said plate;

a bottom wall along the lower short edge of said plate;

a first rib in the shape of an upside down Y standing on the short lower edge, comprising a stem and two wings, arranged on a first face of said plate, and a second rib in the shape of an upside down V standing on the short lower edge on the second face of said plate;

said first and second ribs having a height such that they extend beyond the height of said side walls, furthermore said second rib and said wings being substantially at the same height on the two corresponding faces of said plate;

identification elements of the culture medium;

the arrangement being such that said first and second ribs define, on the faces of said plate, five separate and distinct zones of culture medium, each of said zones corresponding to its own identification tag.

According to the present invention is also provided a support for culture media, characterized in that it comprises:

a substantially rectangular plate having on both faces a multiplicity of supporting elements and supporting protrusions to support the culture medium;

fixing pins on the upper short edge of said plate;

side walls along the long edges of said plate;

a bottom wall along the lower short edge of said plate;

identification elements of the culture medium;

the arrangement being such that on the faces of said plate two separate and distinct zones bearing the culture medium are obtained, each of said zones corresponding to its own identification tag.

According to the present invention is also provided a support for culture media, characterized in that it comprises:

a substantially rectangular plate having on both faces a multiplicity of supporting elements and supporting protrusions to bear the culture medium;

fixing pins on the upper short edge of said plate;

side walls along the long edges of said plate;

a bottom wall along the lower short edge of said plate;

a rib arranged on one face of said plate in such a way as to divide it into two distinct zones;

identification elements of the culture medium;

the arrangement being such that on the faces of said plate three separate and distinct zones bearing the culture medium are obtained, each of said zones corresponding to its own identification tag.

According to the present invention are also provided:

a container substantially having a frusto-conical shape and provided with a thread at its open end and a recess at its closed end,

and a lid with a counter-thread and one or more housings,

the arrangement being such that the thread of the container and the counter-thread of the lid engage to give a hermetic seal, said one or more housings in said lid being capable of receiving respective fixing pins.

According to the present invention is also provided a kit for microbiological culture analysis comprising:

one or more five zone supports;

one or more two zone supports and

one or more three zone supports and at least one container with hermetically sealed lid.

Brief Descriptionf of Drawings

Enclosed with the present description are 5 sheets of drawings, in which

figure 1 shows a front view of a first face of the five areat support for culture media according to the present invention;

figure 2 shows a side view of the same support;

figure 3 shows a front view of the second face and

figures 4 and 5 are cross-section views of figure 3, respectively along line AA and along line BB;

figure 6 shows a front view of a first face of the two zones support for culture media;

figure 7 shows a side view of the same support;

figure 8 shows a front view of the second face;

and

figures 9 and 10 are cross-section views of figure 8, obtained respectively along line A-A and along line B-B;

figure 11 shows a front view of one face of the three zone support for culture media;

figure 12 shows a side view of the same support;

figure 13 shows a front view of the second face of the support; and

figures 14 and 15 are cross-section views of figure 13, obtained respectively along line A-A and along line B-B;

figure 16 shows a top view of the container according to the present invention; and

figure 17 shows a cross-section view of figure 16 along the line A-A:

figure 18 shows a top view of the lid of the container according to the present invention;

figure 19 shows a side view of the same lid;

figure 20 shows a bottom view of the lid; and

figure 21 shows a cross-section view of the lid in figure 18, obtained along the line A-A.

Mode for Carrying Out the Invention

The present invention will now be described in greater detail with regard to its component parts, with reference to the enclosed drawings.

The five zone support 1 according to the present invention takes the form of a plate 2 of substantially rectangular shape. On part of both surfaces of said plate a multiplicity of supporting elements 3 is formed, which serve to anchor the culture medium. Additional supporting protrusions 4, substantially in the shape of tongues, ar also present to help adhesion of the culture medium to the plate 2. Following a method known from the state of the art, a number of culture media are stratified on these supports, each medium specific for the species of bacteria or

microorganism to be determined. The culture media are substantially made up of agar and a nutrient substance.

Along the upper short edge of said plate 2 are arranged fixing pins 5, 6 which will engage with respective housings formed on the lid of the hermetically sealed container (see figures 16 to 21) into which the support will be inserted and within which cultivation of the microbial colonies will take place, the number of said colonies being counted visually.

Two side walls 7 and 8 are arranged along the long edges of the plate 2 and close it in at the sides. The bottom wall 8 is arranged along the lower short edge of the plate 2. On a first face 10 of the plate 2 in the zone provided with supporting elements 3 and supporting protrusions 4, a first rib 11 is provided, said rib having the shape of an upside down Y and comprising a stem 12 and two wings 13. The stem 12 divides said first face 10 into two parts and extends beyond the area provided with bearing elements. On the opposite surface 14 a second rib 15 is provided, in the shape of an upside down V. The second rib 15 and the wings 3 of the first rib 11 are substantially at the same height on the two surfaces 10 and 14 of the plate 2. On both surfaces of the plate, both in the upper part and in the lower part, identification elements (16, 16',....16n) of the culture beds are provided.

The presence of the ribs 11 and 15 on the faces 10 and 14 of the plate 2 causes a division of the latter into five separate and distinct zones, in which a corresponding number of different culture media can be stratified, for example for total bacteria count and for the count of four different bacterial species.

As can be clearly seen in figure 2, the ribs 11 and 15 have a height from the base of plate 2 which is greater than that of the side walls 7 and 8, so they extend beyond the level of the side walls themselves.

This arrangement ensures that, during extraction of the plate 2 from the sample to be tested, the liquids slide off along the upper part of said ribs. The special shape of the ribs prevents substances contained in the various culture media from being dragged from the top part to the bottom part. This increases the sensitivity of the measurements performed on single culture media, in particular the lower ones, and guarantees a total absence of biochemical contamination in stratified culture beds on the same face of the plate shaped support. In fact, contamination might lead to incorrect microbic growth results due to special materials contained in the culture media, which might have inhibitive effects if dragged into the "confining" culture medium by the liquid in which the support is submerged.

Figures 6, 7, 8, 9 and 10 show in detail the two zone support 101, while figures 11, 12, 13, 14 and 15 show the three zone support 201. In the drawings, parts in common with the five zone support are indicated with the same reference numbers, with the addition of one hundred and two hundred, respectively. Figure 13, however, shows a detail of the vertical rib 17 which divides one face of the support 201 into two zone and has a height such as to extend beyond the height of the side walls.

Figures 16 and 17 show the container 18, substantially having a frusto-conical shape, in which the supports 1, 101, 201 are to be inserted. The container has a thread 19 in correspondence with its open end 20, and a recess 21 on its closed end 22. The recess 21 has been developed to minimize the effects of condensation formed by the sweating of culture beds (with a high water content), which might cause bacterial contamination.

The lid 23 (see figures 18 to 21) has a counter-thread 24 for engagement with the thread 21 on the

container 18, in order to provide a hermetic seal. The seal has the object of eliminating or at any rate minimizing possible bacterial contamination problems. Inside the lid the housings 25 and 26 are formed to engage the fixing pins 5 and 6 (or, respectively, 105 and 106, and 205 and 206) and to make the supports 1, 101 and 201 integral with the lid 23.

The relative ease with which the supports are locked into and unlocked from the lid allows the operator to choose, according to requirements, which of the supports to insert in the container in order to carry out the analysis. It will be evident to an expert in the field that the number of housings formed in the lid, which depends on the number of fixing bolts used, is not of critical importance, and can be varied without in any way departing from the scope of the present invention.

On the outer surface of the lid 23 a knurl 26 is preferably formed in order to aid opening and closing operations.

The lid of the container and the support to be used in the kit according to the present invention are made of materials that must have the following characteristics: elasticity, impact strength and, above all, must be chemically inert and non-toxic. Plastic materials are naturally included among the materials suitable for construction thereof. Among these, the following have been shown to be particularly suitable: for the lid polyethylene HD type Enichem OG 7015; for the support copolymer polypropylene type Enichem G 66; for the container crystal polystyrene type Montedison Edistir 1824.

The use of a larger amount and a larger surface area of culture medium in the supports according to the present invention causes an increase in the fertility of the stratified media, thus favouring a better growth of any microorganisms found in the liquids under

examination. This is also due to the fact that the increase in culture medium surface prevents, or minimizes, competition or the flow into a single colony of the microbic units present in the material undergoing analysis. In this way the cultural test is clearer thanks to the greater precision when counting the microbic colonies.

Although the present invention has been described in considerable detail, it will be evident to an expert in the field that it is possible to make alterations which are to be considered as falling within the scope of the same invention.

CLAIMS

1. A support (1) for culture media for microbiological analysis, characterized in that it comprises:

a substantially rectangular plate (2) having on both faces a multiplicity of supportint elements (3) and supporting protrusions (4) to bear the culture medium ;

fixing pins (5, 6) on the upper short edge of said plate;

side walls (7, 8) along the long edges of said plate;

a bottom wall (9) along the lower short edge of said plate;

a first rib (11) in the shape of an upside down Y standing on the short lower edge, comprising a stem (12) and two wings (13), arranged on a first face (10) of said plate, and a second rib (15) in the shape of an upside down V standing on the short lower edge on the second face (14) of said plate;

said first and second ribs having a height such that they extend beyond the height of said side walls, furthermore said second rib and said wings of said first rib being substantially at the same height on the two faces (10, 14) of said plate;

identification elements (16, 16',...16n) of the culture medium;

the arrangement being such that said first and second ribs define, on the faces of said plate, five separate and distinct zones of culture medium.

2. A support (101) for culture media for microbiological analysis, characterized in that it comprises:

a substantially rectangular plate (102) having on both faces a multiplicity of supporting elements (103) and supporting protrusions (104) to bear the culture medium;

fixing pins (105, 106) on the upper short edge of said plate;

side walls (107, 108) along the long edges of said plate;

a bottom wall (109) along the lower short edge of said plate;

identification elements (116, 116',...116n) of the culture medium;

the arrangement being such that on each face of said plate one zone of culture medium is obtained.

3. A support (201) for culture media for microbiological analysis, characterized in that it comprises:

a substantially rectangular plate (202) having on both faces a multiplicity of supporting elements (203) and supporting protrusions (204) to bear the culture medium;

fixing pins (205, 206) on the upper short edge of said plate;

side walls (207, 208) along the long edges of said plate;

a vertical rib (17) arranged on one face of said plate, said vertical rib being of a height such as to extend beyond the height of said side walls; and

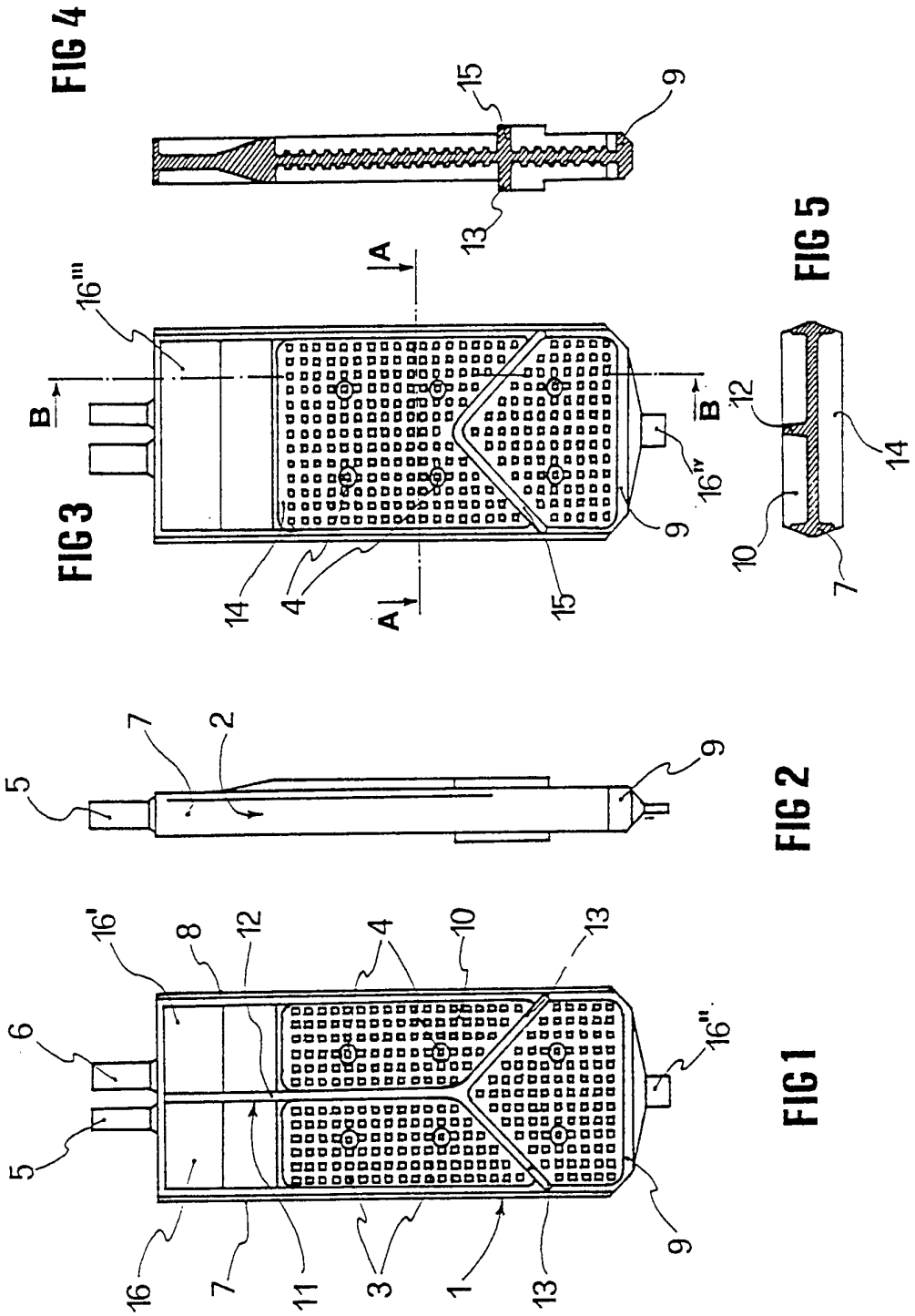
identification elements 216, 216',...216n) of the culture medium,

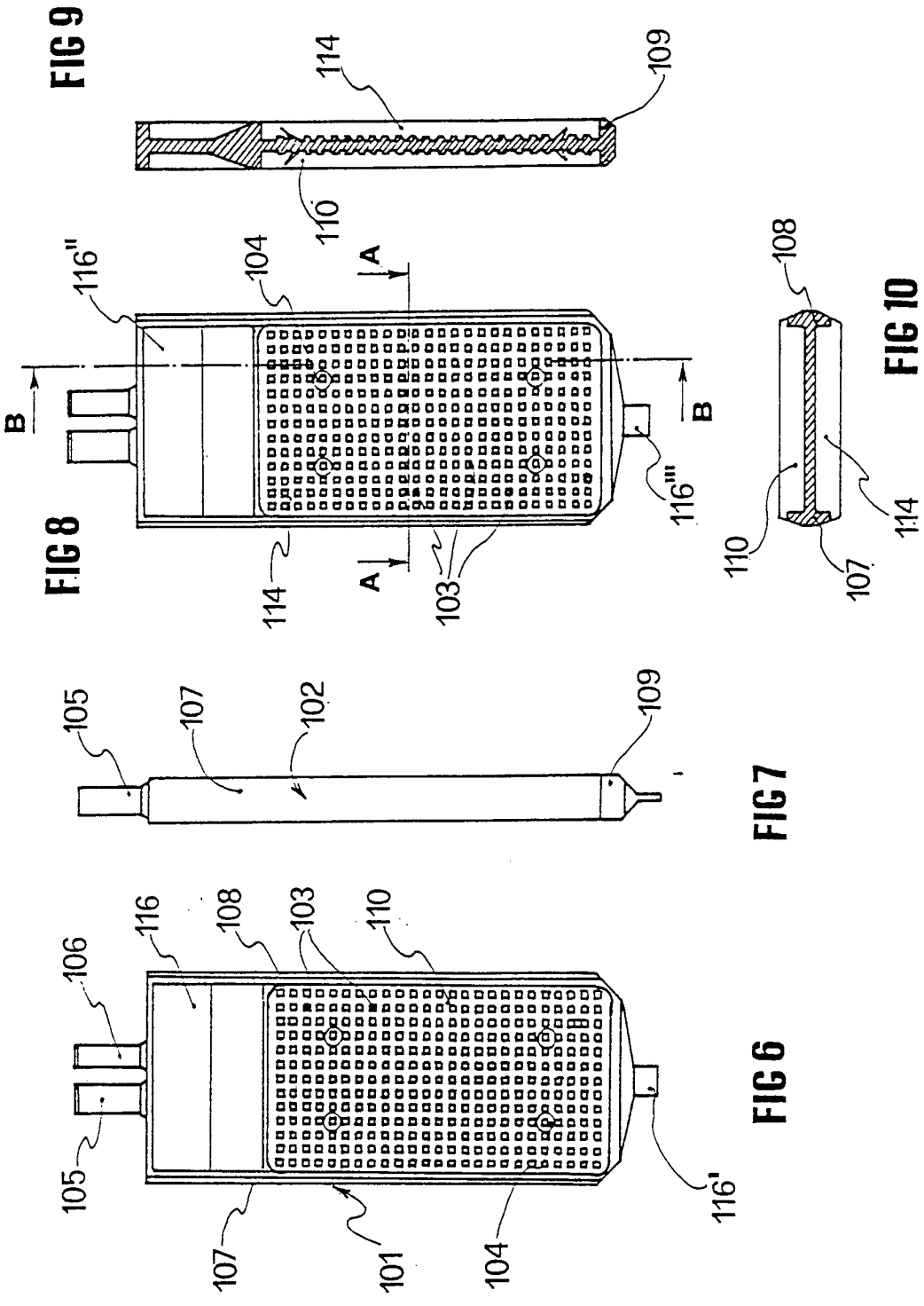
the arrangement being such that said rib forms two separate and distinct zones of culture medium on one surface of said plate.

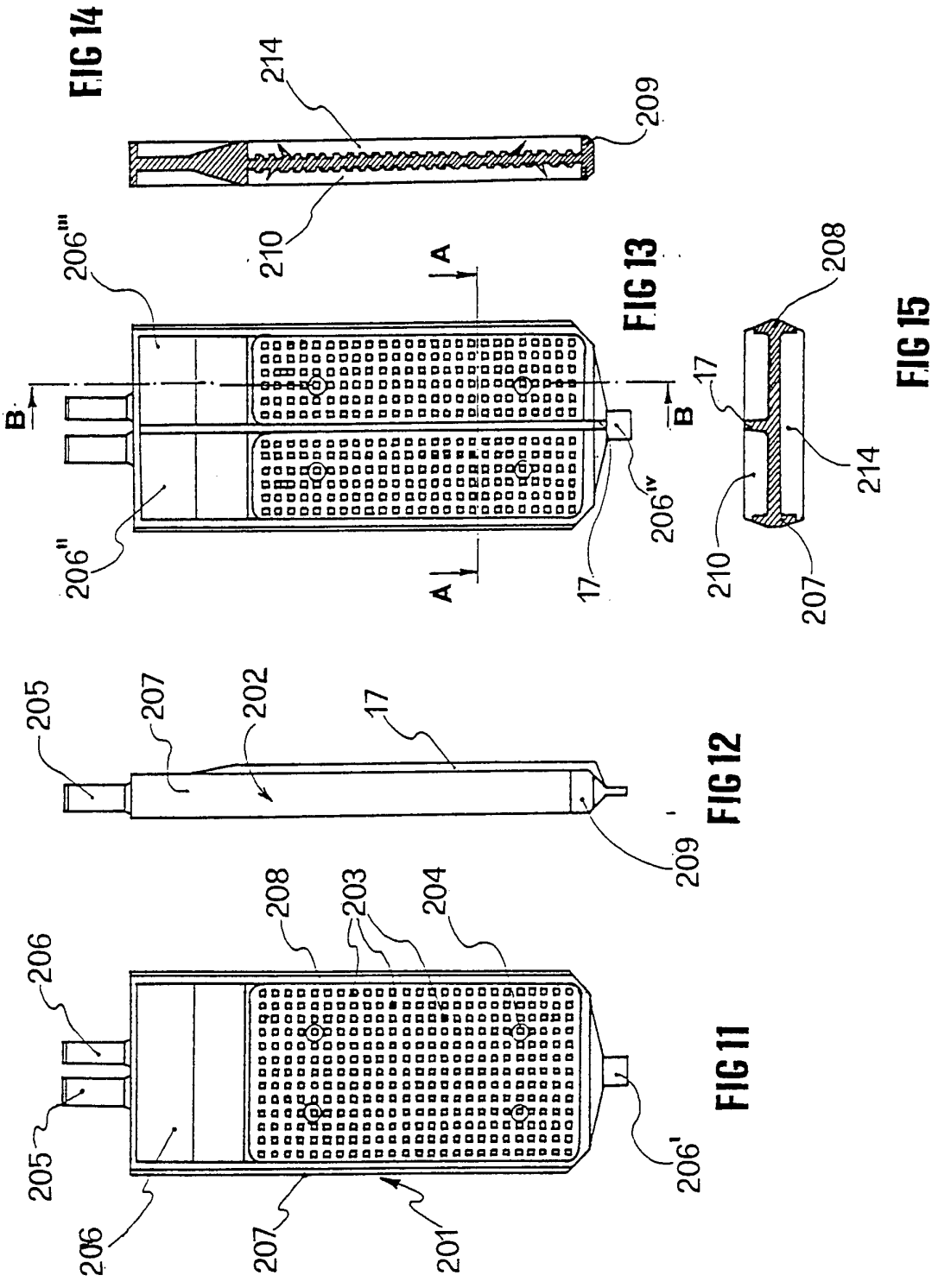
4. Kit for microbiological culture analysis, characterized in that it comprises at least one support as claimed in claim 1, and/or at least one support as claimed in claim 2, and/or at least one support as claimed in claim 3 and at least one container (18) substantially having a frusto-conical shape and provided with a thread (19) at its open end (20) and a recess (21) at its closed end (22), and

a lid (23) with a counter-thread (24) and two housings (25, 26),

the arrangement being such that the thread of the container and the counter-thread of the lid engage to give a hermetic seal, said housings being capable of locking with said fixing pins on said supports.


FIG 4
15
9
13
A
16'''
B
B
16''
9
14
4
A
15
FIG 3
FIG 5
12
14
10
7
FIG 2
7
2
5
9
FIG 1
16'
8
12
4
10
13
6
16''
5
9
16
7
11
3
1
13


FIG 9
114
109
110
FIG 8
116"
104
A
B
B
116'''
114
A
103
FIG 10
108
110
114
107
FIG 7
105
107
102
109
FIG 6
106
116
108
103
110
105
107
101
104
116'


FIG 14
214
209
210
206'''
A
B
206''
206''''
17
FIG 13
208
17
214
210
207
FIG 15
205
207
202
17
209
FIG 12
208
203
204
206
205
206
207
201
206'
FIG 11

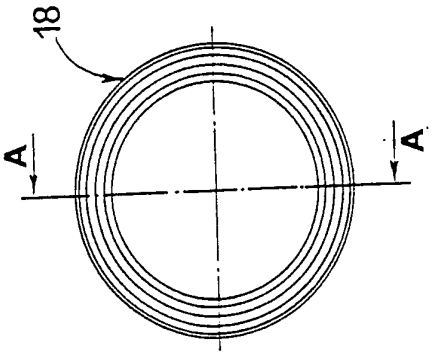


FIG 16

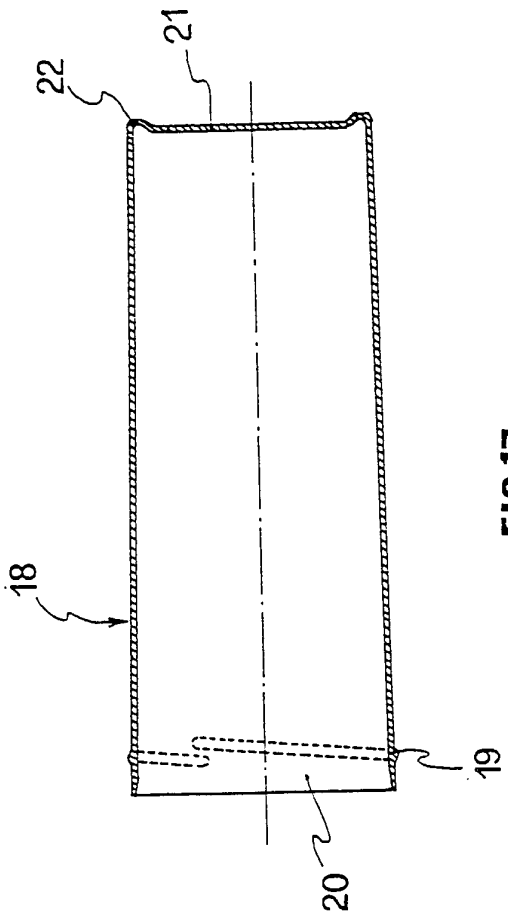


FIG 17

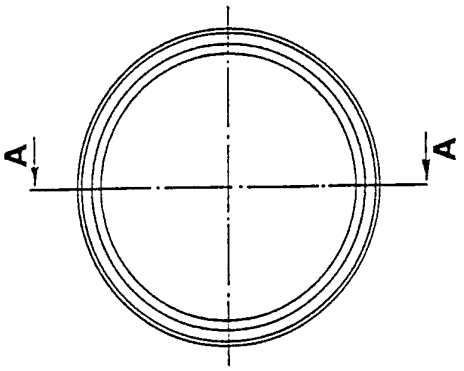


FIG 18

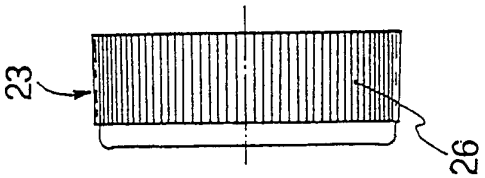


FIG 19

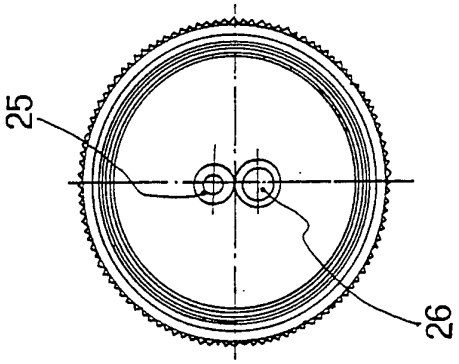


FIG 20

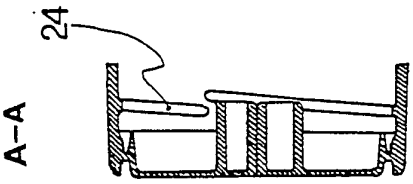


FIG 21

INTERNATIONAL SEARCH REPORT

Inter. ›nal Application No
PCT/IT 94/00005

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 C12M1/28 C12M1/32

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 C12M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	GB,A,2 156 517 (MADAUS AND CO.) 9 October 1985 see the whole document ---	1-4
A	DE,A,29 36 294 (ORION-YHTYMÄ OY) 12 June 1980 see the whole document ---	1-4
A	FR,A,2 586 426 (REHOVOT BIOMEDIC ASSOCIATES) 27 February 1987 see the whole document -----	1-4

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Date of the actual completion of the international search	Date of mailing of the international search report
16 May 1994	26 -05- 1994

Name and mailing address of the ISA	Authorized officer
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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB-A-2098626	24-11-82	DE-A-	3119541	02-12-82
		AT-B-	384825	11-01-88
		AU-B-	554615	28-08-86
		AU-A-	8225582	25-11-82
		BE-A-	892699	30-09-82
		CA-A-	1188240	04-06-85
		CH-A-	657377	29-08-86
		FR-A,B	2505869	19-11-82
		JP-C-	1448582	11-07-88
		JP-A-	57202284	11-12-82
		JP-B-	62060066	14-12-87
		NL-A-	8201192	16-12-82
		SE-B-	452774	14-12-87
		SE-A-	8203037	17-11-82
		SU-A-	1306480	23-04-87
		US-A-	4830970	16-05-89
GB-A-2156517	09-10-85	DE-A,C	3434851	31-10-85
		AT-B-	388748	25-08-89
		AU-B-	549234	23-01-86
		AU-A-	4034185	03-10-85
		BE-A-	901538	22-07-85
		CA-A-	1249502	31-01-89
		CH-A-	659083	31-12-86
		FR-A,B	2561659	27-09-85
		JP-C-	1426904	25-02-88
		JP-A-	60224485	08-11-85
		JP-B-	62034389	27-07-87
		NL-A,C	8403938	16-10-85
		SE-A-	8501431	27-09-85
		US-A-	4690896	01-09-87
DE-A-2936294	12-06-80	NONE		
FR-A-2586426	27-02-87	CH-A-	671031	31-07-89
		DE-U-	8622419	22-01-87
		GB-A,B	2182144	07-05-87
		US-A-	4859586	22-08-89