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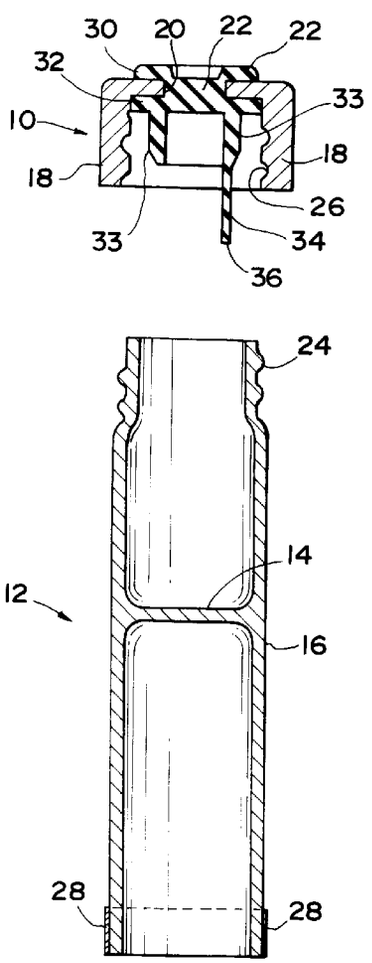
(54) Container for a liquid specimen.

(57) The container is for a liquid specimen such as blood or urine, and is used in the field of clinical examination or the like. The container has a cap (10) and a container main body (12) with a specimen cavity which is openable and closable by the cap (10). The bottom (14) of the specimen cavity is disposed towards the middle of the main body (12). Thus, the external size of the container may be the same as for an ordinary container, whilst the internal size is smaller. The small internal size prevents a small specimen from being damaged when it is agitated. The standard external size makes the container compatible with existing open and closed sampling systems. Preferably, an elastically deformable member (22) is located in an opening (20) in the middle of the upper surface of the cap (10). Preferably, a light shielding part (28) is positioned at the bottom of the main body (12) to permit the presence of the container to be detected, and a specimen adhering part (34) for preparing a smeared specimen extends downwards from a position offset from the middle of the elastically deformable member (22) in order to avoid obstructing a sampling needle.

FIG. 1



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The present invention relates to a container for a liquid specimen such as blood, urine or the like which is used in the field of clinical examination or the like.

Various containers having caps are already known. For example, the following are known.

(1) As disclosed in Japanese Laid-open Utility Model Hei. 1-148859, by having a rubber material in the central part of a cap, the container may be used with an automatic analyzer of both open system, by removing the cap, and closed system, by aspirating the specimen by piercing a fine tube (syringe needle) into the rubber material with the cap attached to the main body of the container.

(2) As disclosed in Japanese Laid-open Patent Hei. 2-212768, an annular seal material is used to fasten the cap to the tube body.

(3) As disclosed in Japanese Laid-open Patent Hei. 1-219561, a protuberance (projection) is provided in the lower surface of a plug body (cap), so that the specimen may be easily applied to a glass plate. However, the protuberance is provided in the centre of the lower surface of the cap.

Before presenting (supplying) the liquid specimen to the analyzer, the specimen in the container must be stirred uniformly. As the method of stirring, agitation by tumbling (inverting) is generally used.

If, however, the specimen in the container is small in quantity, the motion of the specimen in the container is excessive, and the specimen (such as blood) may be damaged. Besides if a small amount of specimen is contained in a container of large capacity, it is not easy to handle. To avoid this, if a container of a small volume is used for a small amount of specimen, the size of the container may differ for each specimen, which is inconvenient for feeding (supplying) automatically to the automatic analyzer. It hence gives rise to a need for a container for liquid specimen small only in the internal volume, while the external shape is the same as an ordinary container for liquid specimen.

Japanese Laid-open Utility Model Hei. 2-27565 discloses accommodating a container of small volume (a test tube) inside a container of large volume, when using a small volume of reagent, but it relates to a container for reagent for handling different amounts of reagents on the same turn-table, and not to a container for a liquid specimen.

According to the present invention, there is provided a container for a liquid specimen, comprising a cap and a container main body having a specimen cavity which is openable and closable by the cap, wherein the bottom of the specimen cavity is disposed towards the middle of the main body. By positioning the bottom of the specimen cavity substantially at the middle or closer to the middle than the bottom of the container main body, the internal specimen volume is suited to small specimens whilst the overall external volume may remain the same as for a conventional large specimen container.

Thus the container is easy to use in both open and closed systems, and can be handled in the same way as an ordinary container.

Preferably, the cap includes a circumferentially extending cover part for covering the upper end of the container main body, and an elastically deformable member located in an opening in the upper surface of the cap so as to close the opening. If a downwardly extending specimen adhering part is disposed at a position offset from the middle of the opening containing the elastically deformable member, the specimen adhering part may be used to smear specimen on a slide glass or the like. However, because of the offset of the specimen adhering part, it will not obstruct the sampling needle of a closed system particle analyzer or the like.

Preferably, the container main body comprises a tubular body made of transparent material and a light shielding part for use in detecting the presence of the container, the light shielding part being disposed at the lower end of the tubular body. The light shielding part attenuates the quantity of light reaching a detector so as to permit the optical detection of the difference between the presence and absence of the container.

The container of the invention is usable in a closed system when the cap is attached, and usable in an open system when the cap is detached. In the closed system, a fine tube (e.g. a syringe needle) pierces the elastically deformable member, and aspirates the specimen. In the open system, the cap is removed, and a specimen aspiration pipe is inserted into the upper opening of the container main body, and the specimen in the container is aspirated.

The invention will now be described by way of a non-limiting embodiment with reference to the accompanying drawings, in which:-

Fig. 1 is a longitudinal sectional view of an embodiment of a container for a liquid specimen in accordance with the invention, with the cap removed;

Fig. 2 is a perspective view of the container of Fig. 1; and

Fig. 3 is a partially cut-away right side view of the cap of Fig. 1.

The embodiment comprises, as shown in Fig. 1, a container for liquid specimen comprising a cap 10, and a tubular container main body 12.

The cap 10 is made of synthetic resin, and has an elastic soft member 22 made of rubber. The container main body 12 is made of transparent glass or transparent synthetic resin.

The rubber material of the elastic soft member 22 (also called rubber member 22) is fitted in an opening 20 provided in the centre of the cap and held in place by projections (clipping pieces) 30, 32. When the cap 10 is screwed onto the container main body 10, the

projection 32 of the rubber member is located between the main part of the cap 10 and the container main body 12, and the inside of the container is kept airtight.

In the case of a closed system, the container is kept airtight by the cap 10 and is repeatedly tumbled to stir the contents. Then, with the cap 10 facing downwards, a fine tube (a syringe needle) for aspirating the specimen is pushed through the central part of the rubber member 22, so that the specimen in the container is aspirated.

In the case of an open system, the cap 10 is manually detached from the container main body 12, and the specimen aspiration pipe is inserted in the upper opening, and the specimen is aspirated.

The rubber member 22 has a annular skirt 33 extending downwards so as to abut tightly against the upper inner wall of the container main body 12 when the cap 10 is attached to the container main body 12. From the lower end of the skirt 33, there projects a specimen adhering part 34 to which a small amount of specimen adheres.

In this embodiment, the lower end part 36 of the specimen adhering part 34 is slightly broadened (see Fig. 3). This is intended to increase the surface area and increase the amount of specimen that adheres. The area of the lower end part 36 may be adjusted to suit particular requirements.

Instead, as disclosed in Japanese Laid-open Patent Hei. 1-219561, a specimen groove may be provided at the lower end of the specimen adhering part 34.

When preparing a smeared specimen, the cap 10 is turned by hand and detached from the container main body 12, and the specimen adhered to the specimen adhering part 34 is deposited on a slide glass plate. Because of the cover part 18, the specimen does not come in contact with the user's hand when the user detaches the cap 10.

Meanwhile, since the specimen adhering part 34 is offset from the centre of the cap 10 and points directly downwards, it does not get in the way when piercing the rubber member 22 with the fine tube (syringe needle) in a closed system.

As shown in Fig. 2, a light shielding part 28 extends around the lower part of the tubular body 16 of the container main body 12. Symbols P, D are respectively a light emitting device such as a light emitting diode, and a photo detector such as a photo transistor. The light shielding part 28 attenuates (decreases) the light passing across the detection region between the light emitting device P and photo detector D. Any material that scatters light may be used. For example, the material may be ground (frosted) glass or may be coloured (for example, red).

The container of the invention has, so to speak, a raised bottom 14 of the internal cavity, and the volume for accommodating the specimen is smaller than for a conventional container. The tubular body 16 may have the conventional external dimensions, and therefore the overall dimensions of the container of the invention may be the same as those of a conventional container.

Moreover, by making the tubular body 16 of transparent material and disposing the light shielding part 28 towards the bottom of the tubular body 16, the presence or absence of the container may be detected by the presence or absence of the transmission of light as disclosed in Japanese Laid-open Utility Model Sho. 63-141455. In other words, when the light is shielded and does not reach the photo detector, the presence of a container is detected. Also, the presence of specimen in the container is also detected. Without the light shielding part 28, however, the light passes through the tubular body 16 and reaches the photo detector, and it is judged that the container is absent. In the case of a conventional container, since the light is refracted by the curved portion of the container bottom, the light does not reach the photo detector.

Specimen sticks to the specimen adhering part 34. Accordingly, by removing the cap 10 and causing the lower end of the specimen adhering part 34 to touch a slide glass, the specimen may be deposited on the slide glass. Hence, a smeared specimen may be prepared. Since the specimen adhering part 34 is offset from the centre of the cap, it does not interfere with the sampling tube of a closed system analyzer, unlike the projection of Japanese Laid-open Patent Hei. 1-219561.

The above embodiment of the container for a liquid specimen has the following characteristics.

(1) The container main body is tubular, with the bottom of the specimen cavity provided towards the middle of the tubular body instead of at the bottom of the tubular body. The volume of the specimen cavity is smaller than for a conventional container, and thus a small amount of specimen will not be damaged by stirring. Also, it is easier to use. That is more, since the outer profile of the container is the same as for a conventional container, there is no problem when presenting (supplying) the container to a sampler (a device for feeding a sample to an analyzer). In addition, the container may be used in both closed and open systems.

(2) By means of the light shielding part at the lower part of the tubular body, the presence of the container can be detected by the sampler which feeds a sample to the analyzer, in the same manner as for a conventional container. This compatibility with existing equipment is very useful.

(3) Since the specimen adhering part for preparing a smeared specimen is offset from the centre of the cap, it does not obstruct the fine tube which pierces the cap to aspirate a specimen from the

container in the closed system mode.

Having described preferred embodiments of the invention with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments, and that various changes and modifications may be effected thereto by one skilled in the art without departing from the invention.

Claims

1. A container for a liquid specimen, comprising a cap (10) and a container main body (12) having a specimen cavity which is openable and closable by the cap (10), wherein
   the bottom (14) of the specimen cavity is disposed towards the middle of the main body (12).

2. A container according to claim 1, wherein the cap (10) includes a circumferentially extending cover part (18) for covering the upper end of the container main body (12), and an elastically deformable member (22) located in an opening (20) in the upper surface of the cap (10) so as to close the opening (20).

3. A container according to claim 2, wherein a downwardly extending specimen adhering part (34) is disposed at a position offset from the middle of the opening (20) containing the elastically deformable member (22).

4. A container according to claim 2 or 3, wherein the container main body (12) has a male threaded part (24) disposed around the outer circumference of its upper end, and the cap (10) has a female threaded part (26) engagable with the male threaded part (24) and disposed around the inner circumference of the cover part (18) of the cap (10).

5. A container according to any one of claims 1 to 4, wherein the container main body (12) comprises a tubular body (16) made of transparent material and a light shielding part (28) for use in detecting the presence of the container, the light shielding part (28) being disposed at the lower end of the tubular body (16).

6. A container according to claim 3, wherein the opening (20) is in the middle of the upper surface of the cap (10).

FIG. 1

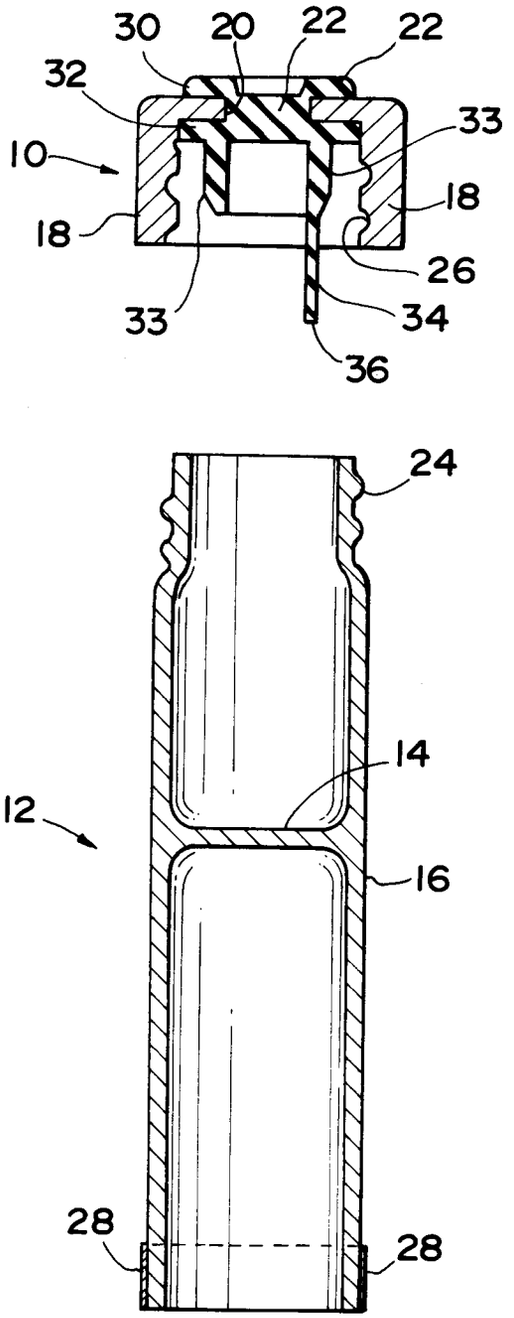


FIG.2

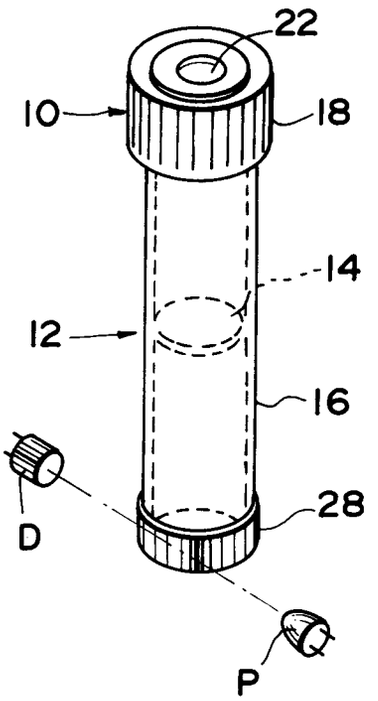
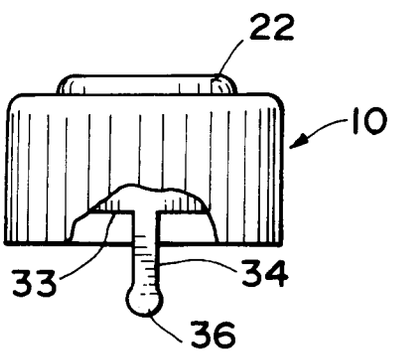


FIG.3



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EUROPEAN SEARCH REPORT

Application Number
EP 92 30 9546

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	EP-A-0 448 795 (BECTON DICKINSON AND CO) * figure 2 *	1,2 4	B01L3/14
X	US-A-4 980 129 (COLUMBUS) * figure 2 *	1	
Y D	EP-A-0 383 262 (TERUMO KK) * figure 2 * & JP-U-1 148 859 (...)	4	
D,A	PATENT ABSTRACTS OF JAPAN vol. 13, no. 533 (P-967)28 November 1989 & JP-A-12 19 561 (TERUMO CORP) 1 September 1989 * abstract *	3	
A	FR-A-2 339 851 (SIEMENS AKTIENGESELLSCHAFT) * page 1, line 36 - page 3, line 7 *	5	
A	DE-B-2 813 680 (WALTER SARSTEDT KUNSTSTOFF-SPRITZGUSSWERK) * column 1, line 66 - column 4, line 20 *	1,3	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B01L G01N
A	CH-A-330 179 (BÖTTGER) * page 2, line 69 - page 4, line 31 *	1,3	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	19 JANUARY 1993	BINDON C.A.

CATEGORY OF CITED DOCUMENTS

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