March 26, 1968 M. E. McGUCKIN 3,374,678

HEAD SPACE SAMPLER

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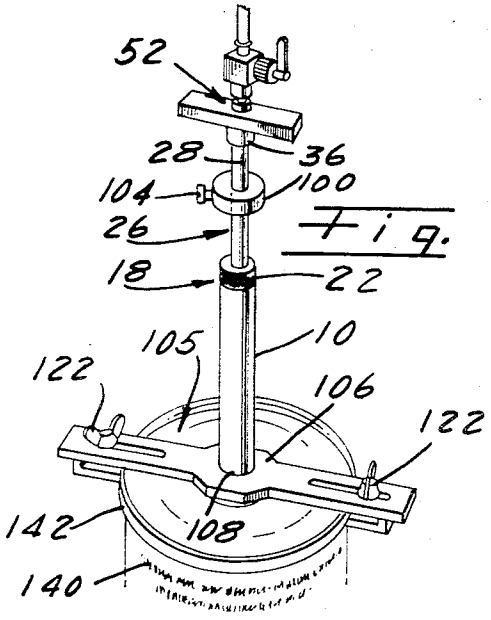


Fig. 1.

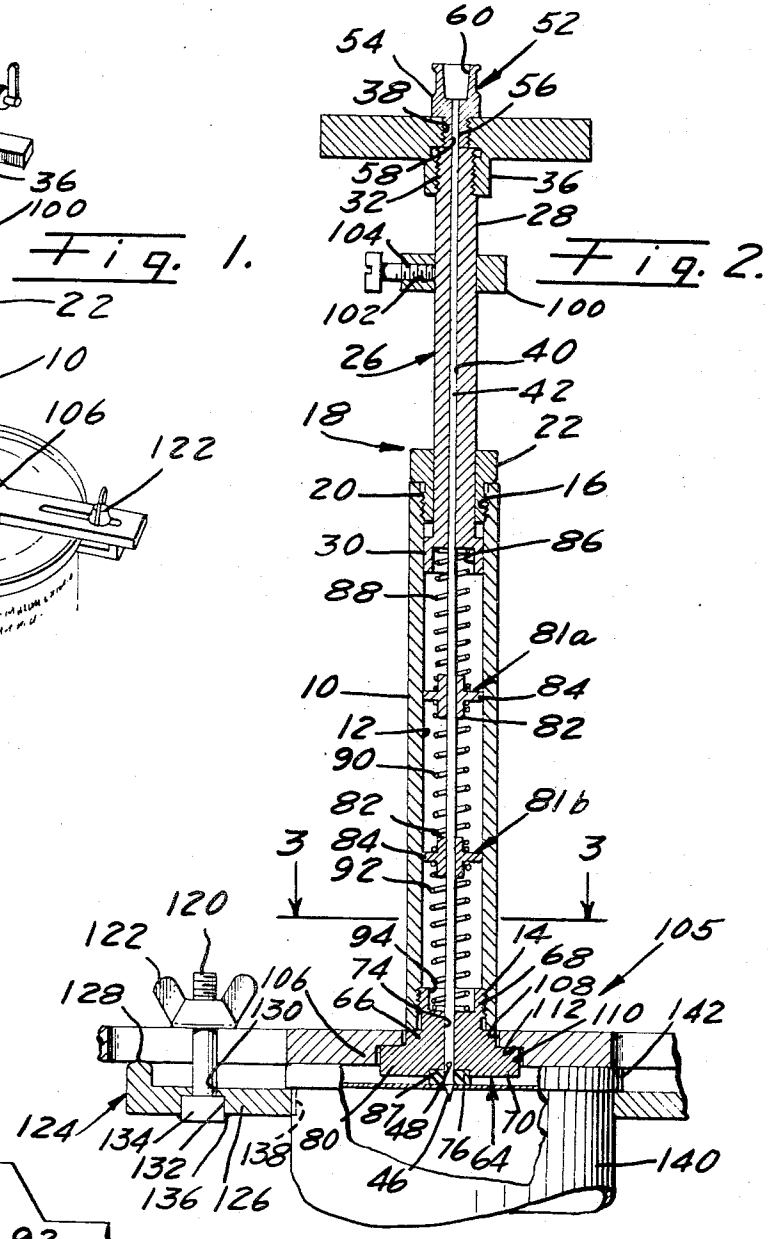
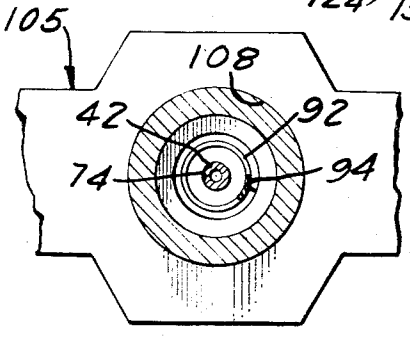


Fig. 2.

Fig. 3.



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HEAD SPACE SAMPLER

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Fig. 4.

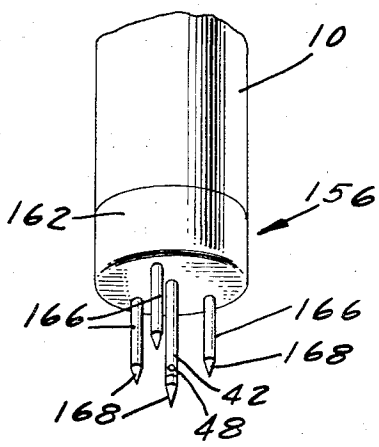


Fig. 5.

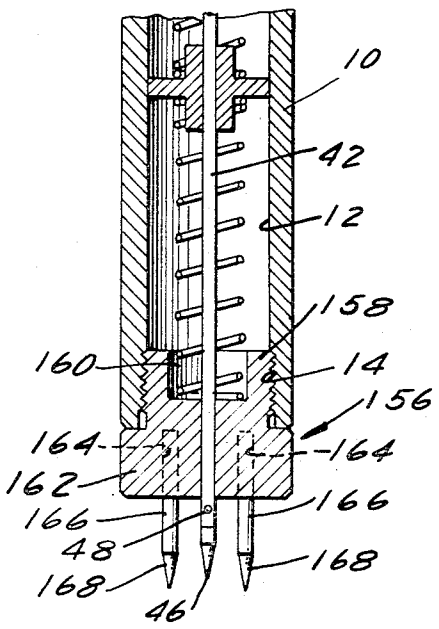


Fig. 6.

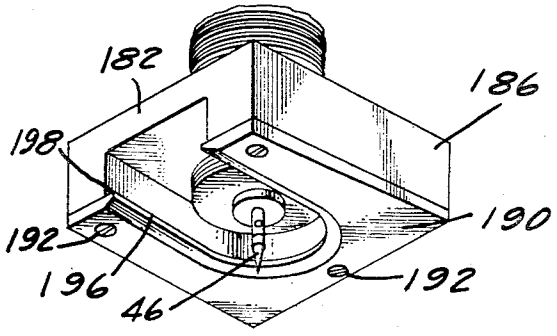


Fig. 7.

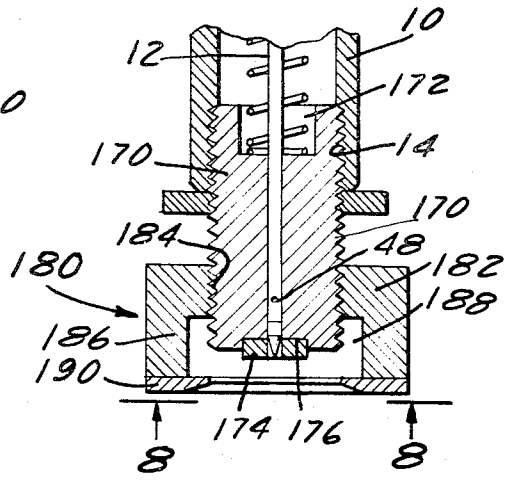
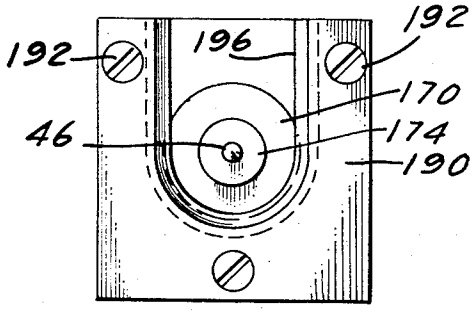


Fig. 8.



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3,374,678

HEAD SPACE SAMPLER

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Filed Oct. 14, 1965, Ser. No. 496,104
21 Claims. (Cl. 73—421.5)

ABSTRACT OF THE DISCLOSURE

An apparatus for securing uncontaminated samples of gasses or liquids in the head space of cans, bottles and other containers. A penetrating needle is used for gaining access to the interior of the container and withdrawing samples of the contents thereof.

This invention relates generally to sampling instruments and relates more particularly to instruments for sampling contents of closed or sealed containers without opening same.

While the invention has particular utility in connection with securing samples from sealed containers and is shown and described in such connection, it is to be understood that its utility is not confined thereto.

In certain industries, such as the brewing industry, the wine industry and the soft drink industry, there is a need for securing uncontaminated samples of the head space gases in cans, bottles and similar containers for the products of such industries, for testing purposes, and there have been various difficulties involved in the problem of securing such samples for testing.

It is therefore an object of the present invention to provide head space sample means which solves the problem of securing such uncontaminated samples of the contents of cans, bottles, and similar containers for testing, even when said containers are sealed.

It is another object of the invention to provide means of this character wherewith uncontaminated samples of gases in the head space of such cans, bottles and other similar containers may be secured.

It is still another object of the invention to provide means of this character with which samples of other contents, such as liquids, in these containers may be secured without contamination of the samples.

In other words, gases or liquids may be removed from the containers without contamination by the atmosphere, for example.

A further object of the invention is to provide means of this character having attaching supporting and/or steadying means with respect to the containers, whether cans, bottles or other containers.

A still further object of the invention is to provide means of this character having a penetrating needle for gaining access to the interior of the container and withdrawing samples of the contents thereof.

Another object of the invention is to provide means of this character having means for controlling the stroke of the needle or penetrating element.

Still another object of the invention is to provide means of this character wherein the means for controlling the length of the stroke is adjustable.

A further object of the invention is to provide means of this character having unique needle or penetrating element supporting means.

A still further object of the invention is to provide means of this character having interchangeable head assemblies for use with different types of containers.

Another object of the invention is to provide means of this character that is rugged, effective and reliable.

The characteristics and advantages of the invention are

further sufficiently referred to in connection with the following detailed description of the accompanying drawings which represent certain embodiments. After considering these examples, skilled persons will understand that many variations may be made without departing from the principles disclosed and I contemplate the employment of any structures, arrangements or modes of operation that are properly within the scope of the appended claims.

Referring to the drawings which are for illustrative purposes only:

FIG. 1 is a perspective view of a can sampler operably attached to a can;

FIG. 2 is an enlarged longitudinal sectional view of said can sampler;

FIG. 3 is an enlarged fragmentary sectional view taken on line 3—3 of FIG. 2;

FIG. 4 is a perspective view of the adaptor for bottles having corks;

FIG. 5 is an enlarged sectional view of the adaptor for bottles having corks, such as wine bottles;

FIG. 6 is a perspective view of the adaptor for bottles having crown bottle caps;

FIG. 7 is a sectional view thereof; and

FIG. 8 is a front end view of this adaptor as seen from line 8—8 of FIG. 7.

Referring more particularly to FIG. 1 of the drawings, there is shown a can sampler having a tubular body **10** with a bore **12** therethrough. There is an internally threaded portion at the front and rear ends of the body, said threaded end portions being indicated at **14** and **16** respectively.

At the rear end **16** there is a retainer, indicated generally at **18**, having an externally threaded body portion **20** and enlarged knurled head **22**, said retainer being screwed into the internally threaded portion **16** to a point whereat the head engages the adjacent end of the body. Retainer **18** has a longitudinally or axially extending bore **24** therethrough for slidable reception of a plunger, indicated generally at **26**.

Plunger **26** comprises a tubular shaft **28** slidable in the bore **24** of the retainer and a cylindrical head **30** at the inner end slidably fitted in the bore **12** of the body **10** and adapted to stabilize, along with the retainer, the plunger when actuated. The outer end of the plunger has an externally threaded portion **32**.

A handle or plunger cross bar **34** is provided at the outer end of the plunger and includes an integral internally threaded socket **36** screwed onto the externally threaded end portion **32** of the plunger shaft. The handle has an internally threaded opening **38** in line with the socket **36** and in axial alignment with a passage **40** through the plunger in which a needle **42** is removably disposed, said needle having a passage **44** extending from the rear end to a point adjacent the forward end which is pointed or conical as indicated at **46**. Just back of the conical end **46** there is a lateral bore **48**, which may be a cross bore, providing communication from without the needle to the interior passage **44** thereof.

An outer end portion **50** of the needle is provided with a female lure hub or lure fitting, indicated generally at **52**, which has a body **54** with an externally threaded part **56**, the part **56** also having an axial bore **58** therethrough communicating with a tapered recess or socket **60** at the outer or rear end of said fitting. A rear end portion of the needle is secured in the bore **58** of the fitting by soldering, brazing or other suitable means and the externally threaded part **56** is screwed into the internally threaded opening **38** of the handle **34**. Thus the needle is securely connected with the handle **34**, and hence the plunger.

At the forward end of the body there is a clamp assembly which includes an adaptor, indicated generally at **64**,

which includes an adaptor body **66** with a reduced diameter, an externally threaded inward extension at the inner side or end and an enlarged knurled head **70** at the outer side or end. The extension is screwed into the internally threaded portion **14** of the body **10** of the device to a point whereat the inner end of the adaptor body engages the adjacent end of the body **10**.

The adaptor **64** has an axial bore **74** therethrough in which the forward end portion of the needle **42** is slidably guided and operably supported. The forward end of the head **70** of the adaptor is provided with an axial recess **76** in which is received a septum **78** in alignment with the needle and adapted to be penetrated by said needle and in sealing engagement therewith. Septum **78** is secured in the recess **76** by any suitable adhesive such as an epoxy cement and it is to be noted that the thickness of the septum is greater than the depth of the recess **76** so that said septum extends forwardly of the plane of the front face **80** of the head **70** of the adaptor which is normal to the axis of said adaptor.

Within the bore **12** of the body **10** are a plurality of longitudinally spaced guides slidably disposed in said bore **12**, said guides being indicated at **81***a* and **81***b*. Each of these guides has a hub **82** with a flange **84** intermediate the ends thereof, the flanges slidingly engaging the wall of said bore **12**.

Head **30** of the plunger has a forwardly facing recess **86** therein for reception of an end portion of a spring **88**, said recess serving as a spring retainer. The opposite end of the spring **88** is disposed on the rear hub portion of the adjacent guide **81***a* which hub portion also serves as a spring retainer, the last mentioned end reacting against the adjacent side of the flange **84**, this guide being spaced longitudinally forwardly of the head **30** of the plunger.

A second spring, indicated at **90**, is disposed between the guides **81***a* and **81***b* with the end portions disposed on the facing hub portions. There is a third spring **92** with a rear end portion disposed on the forward hub portion of guide **81***b*, a forward end portion of said spring being received in a recess **94** in the reduced diameter extension **68** of the adaptor **64**.

These guides have axially extending openings therethrough in which the needle is slidably disposed, said guides not only guiding the intermediate part of the needle but prevent it from bending. When the plunger is actuated forwardly the needle is, of course, correspondingly moved and the guides **81***a* and **81***b* move forwardly under the influence of the springs **88** and **90**, which are somewhat compressed as the plunger moves forwardly, said guides moving longitudinally in the bore **12** of the body **10** a lesser distance than the distance the needle moves, the springs **88**, **90** and **92** permitting a certain amount of lost motion between the needle and said guides. Reverse movement of the needle results in reverse movement of the guides.

There is a collar **100** disposed on the plunger shaft **28** and is slidable thereon, there being a radially extending tapped bore **102** in said collar in which is threadably disposed a screw **104** for securing the collar in adjusted positions on said shaft. The collar provides adjustable means for limiting forward movement of the plunger and needle.

Clamp means is provided for the forward end of the device and comprises what is termed a fixed clamp member, indicated generally at **105**, which has a central portion **106** with an opening **108** therethrough for reception of the body **10** of the device, said opening having an enlarged diameter forwardly facing part **110** in which is received the head **70** of the adaptor. There is a shoulder **112** between the part **108** of the opening and the part **110**, said shoulder engaging a peripheral part of the head **70** of the adaptor **64**.

From the central part **106** there are a pair of oppositely extending arms **116**, each of said arms having a longitudinally extending slot **118** therein for slidable reception of respective bolts or screws **120** therein having wing nuts **122** thereon for tightening said screws.

There is a movable clamp member, indicated generally at **124**, for each arm **116**, each of said movable clamp member **124** having a part **126** parallel to its adjacent arm and a part **128** at the outer end extending toward said adjacent arm and engaging same. Each of said movable clamp members has a hole **130** in the part **126** for reception of its screw **120**, there being a counter sink **132** for reception of the head **134** of the screw, said head being brazed or welded or otherwise secured to the part **126** of the movable clamp member **124** as indicated at **136**. The inner end **138** of the part **126** of each clamp member is concavely curved for better engagement with a can.

To operate this arrangement the collar **100** is adjusted for the desired needle penetration and the screw **104** tightened. The clamp member **105** is placed on the top of a can from which a sample is to be taken. With the screws **120** loose, the movable clamp members are moved into engagement with the cylindrical side wall **140** of the can and the screws tightened by means of the wing nut **122** so that the movable clamp members are tight against the wall **140** of the can, with the inner ends beneath the bead **142** of the can. The septum or seal **78** is then tight against the top **144** of the can. Also, the point **46** of the needle is slightly spaced from the top of the can.

With the parts thus positioned the needle is forced downwardly by means of the handle **34** so that it passes through the septum and penetrates the can top, as best shown in FIG. 2. The amount of penetration of the can top is limited by the collar which has been adjustably positioned on the shaft **28** for the desired penetration of said can top. With a shallow penetration of the can top gas may be drawn off, the gas entering the needle by way of the cross bore or opening **48** and passing outwardly through the needle passage **44**. The gas may be carried away by a conduit **146** having a male connector **148** attached thereto and disposed in the socket **60**. Or, the gas may be drawn into a syringe having a tip which is inserted into said socket **60**.

Where a liquid sample is to be drawn off, the collar **100** is set for a greater depth of penetration of the can top and the needle is moved into the liquid contents of the can. The sample is then taken either by reason of the gas pressure in the can or drawn out by means of a syringe or other suitable means.

For some types of sample taking, a valve **150** is used, said valve having a male connector tip inserted into the socket **60**. Thus gas flow from the can may be readily controlled.

When the needle has been forced into the top of the can, as best shown in FIG. 2 it is held therein by friction. When the sample or samples are taken the needle is pulled from the can and the springs **88**, **90** and **92** return plunger and needle to the normal outermost position.

Referring to FIGS. 4 and 5, the adaptor for bottles having corks is indicated generally at **156**. This adaptor has an externally threaded part **158** with a spring retaining recess **160** therein, part **158** being screwed into the forward end of body **10**. At the outer end of the part **158** is an enlarged head **162** which is knurled, said head having a plurality of longitudinally extending, pin receiving bores **164** therein open at the forward ends and spaced apart about the axis of the head **162**. Pins **166** are secured in the respective bores **164** by press fitting or other suitable means, said pins having sharp pointed conical free ends of tips **168**.

To operate this arrangement the pins **166** are forced into the outer end of the cork of a bottle, such as a wine bottle for example. The needle is then forced through the cork to the desired extent which is limited by engagement of the collar **100**, previously adjustably set, engaging the outer rear end of the retainer **18** at the rear of the body **10**.

A sample or samples of either the gas at the top of the bottle, or liquid in the bottle, or both separately, is then

taken as described above in connection with the can sampler.

Referring to FIGS. 6, 7 and 8, there is shown an adaptor for crown types of seals such as are used on beer bottles and soft drink bottles.

This device includes an externally threaded cylindrical body **170** with a spring retaining recess **172** in the rear end. A portion of the body is screwed into the internally threaded end portion **14** of the body **10**. A lock ring or nut having an internally threaded axial opening therein is screwed onto the body and tightly against the forward end of the body **10** to lock the adaptor to said body.

A sealing septum **174** is secured in a recess **176** provided therefor in the front free end of the body **170**, said septum being secured by a suitable adhesive such as that used to secure the septum **78** in the recess **76** in the can sampling adaptor.

There is a crown seal engaging member, indicated generally at **180**, which includes a wall **182** having an internally threaded opening **184** therein for threadable reception of the body **170**, the member **180** being screwed onto the body **170** to a position whereat the forward end of the body **170** extends forwardly of the wall **182**, as best shown in FIG. 7. There is a flange **186** exending forwardly of the wall **182** which defines a U-shaped recess **188**. A plate **190** is secured to the front end of the flange **186** by any suitable means such as screws **192** received in openings provided therefor in plate **190** and in respective aligned tapped holes in the front end of the flange **186**.

Plate **186** is provided with a notch **196** extending from one edge and open at said edge. There is a marginal area **198** along said notch which overlaps the recess **188**, as best shown in FIG. 7, whereby the recess forms a socket for reception of a crown seal as described more fully hereinafter. This marginal edge portion engages the crimped or other free edge of the crown seal when the adaptor is operably attached to said crown seal.

To operate this sampler the needle must be drawn back far enough to clear the top of the crown seal, as shown in FIG. 7. The neck of the bottle from which a sample is to be taken is inserted in the notch **196** with the crown seal disposed in the recess **188**. The crown seal or cap is in line with the needle and the crown seal engaging member is screwed onto the body **170** until the septum sealingly engages the top of said crown seal and clamps same between said septum and the marginal edge portion or area **198** of the plate **190**. The plunger is then forced forwardly and the needle forced into the crown seal. The position of the needle in the bottle is determined by the position of the collar **100** and the sample taken is either gas or liquid depending upon the position of the cross bore **48** in the bottle. Samples are taken in the same manner as heretofore described.

As used herein the term "container" is intended to include the cover or the cap parts.

The term "cover" as used herein is intended to include caps such as crown caps, for example.

The invention and its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the form, construction and arrangement of the parts of the invention without departing from the spirit and scope thereof or sacrificing its material advantages, the arrangements hereinbefore described being merely by way of example, and I do not wish to be restricted to the specific forms shown or uses mentioned except as defined in the accompanying claims, wherein various portions have been separated for clarity of reading and not for emphasis.

I claim:

1. In a sampler for sampling the contents of fluid containers and the like:

(A) a body;

(B) means secured to one end of said body and carried thereby for operable attachment to a part of a container the contents of which is to be sampled;

(C) and a needle operably carried by said body for longitudinal movement with respect thereto and having a pointed end positioned at said one end of the body, said pointed end being positioned for penetration of a part of a container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end.

2. The invention defined by claim **1**, including means for limiting the amount of penetration of the container part by said needle.

3. The invention defined by claim **1**, including a needle guide having a forwardly facing end, and a seal on said forwardly facing end through which said needle slidably and sealingly extends.

4. The invention defined by claim **1** wherein said means comprises clamp means for clamping engagement with a part of a container the contents of which is to be sampled.

5. The invention defined by claim **4**, including a septum attached to said means in alignment with said needle for penetration by and sealing engagement with said needle, said septum being mounted for sealing engagement with the part of the container to be penetrated by the pointed end of the needle when the clamp means is clamped tightly to said part of the container, said septum thereby providing sealing means preventing escape of fluid past the exterior of the part of the can about the point of penetration by the needle as well as preventing escape of fluid about and past the exterior of the needle.

6. In a sampler for securing samples of fluids from containers:

(A) a tubular body having a passage therethrough;

(B) adaptor means including a fixed needle guide secured in the front end of said passage, said guide having a longitudinal bore therethrough;

(C) a plunger assembly including a plunger operably disposed in the body passage for slidable movement therein a rear portion of said plunger extending outwardly of the rear end of said passage, said plunger having a longitudinally extending bore therethrough;

(D) a handle on the rear end of said plunger and comprising part of the plunger assembly;

(E) an elongated needle having a rear end portion disposed in the bore of said plunger, said needle having a pointed tip at the forward end and having a fluid passage extending longitudinally from the rear end to a point adjacent said pointed tip, there being a lateral fluid port connecting the fluid passage of the needle with the exterior thereof adjacent said pointed tip, said needle being slidably disposed in the bore of the needle guide;

(F) a connector secured to the rear end of the needle, said connector being secured to the plunger assembly;

(G) needle guide means slidably disposed in the passage of the body and including spring means urging said needle guide means in opposite directions, said needle guide means slidably carrying said needle and having a lost motion relationship with said needle;

(H) and adaptor means, including said fixed needle guide, said fixed needle guide being removably secured in the front end of the passage of the tubular body, said adaptor means also including means for operably connecting the front end of the sampler to a container the contents of which is to be sampled.

7. The invention defined by claim **6**, wherein said adaptor means includes a clamp for clamping attachment to a part of said container.

8. The invention defined by claim **6** wherein said adaptor means includes a clamp for clamping attachment to a can.

9. The invention defined by claim **6** wherein said adaptor means includes a clamp for clamping attachment to a crown type of bottle closure.

10. The invention defined by claim 6 wherein said adaptor means includes pointed pin means for penetration of the cork of a corked bottle.

11. The invention defined by claim 10, including means adjustable on the plunger for limiting the forward movement of said plunger.

12. An adaptor, including:

(A) a body having means for attachment of the rear portion to a needle actuating mechanism, said body having a bore therethrough for slidable reception of a penetrating needle, the forward end of said body having a recess about the adjacent forward end of said bore;

(B) a septum secured in said recess and having a needle receiving opening therein for sealing engagement with said needle, said septum extending forwardly of the forward end of said body;

(C) and clamping means having a clamp member attached to said body, said clamping means being for clamping to a can.

13. An adaptor, including:

(A) a body having means for attachment of the rear portion to a needle actuating mechanism, said body having a bore therethrough for slidable reception of a penetrating needle;

(B) and at least one sharp pointed pin secured to said body and extending forwardly from the forward end of said body.

14. An adaptor, including:

(A) a body having means for attachment of the rear portion to needle actuating mechanism, said body having a bore therethrough for slidable guiding reception of a penetrating needle, the forward end of said body having a recess about the adjacent forward end of said bore;

(B) a septum secured in said recess, said septum extending forwardly of the forward end of said body;

(C) and cap engaging means including

(a) walls defining a socket open at one side and adjustably secured on said body with the forward end of said body extendable into said socket,

(b) and one of the walls of said socket being at the front and having a notch extending from one side with opening of said notch at the open side of said socket, said notch being adapted to receive the neck of a bottle with the cap disposed within said socket and having a free edge engageable with portions of said front wall adjacent the notch thereof.

15. In a sampler for sampling the contents of fluid containers and the like:

(A) a body;

(B) means secured to one end of said body for operable attachment to a part of a container the contents of which is to be sampled;

(C) a needle operably carried by said body for longitudinal movement and having a pointed end positioned at one end of the body, said pointed end being positioned for penetration of a part of a container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end;

(D) needle guide means attached to said one end of the body, said needle guide means having a longitudinal bore therethrough slidably receiving the adjacent portion of the needle;

(E) and a plurality of pins secured to said needle guide means in spaced relation about said bore and having longitudinally outwardly extending pointed ends for penetration into a cork or the like of a corked bottle.

16. In a sampler for sampling the contents of fluid containers and the like:

(A) a body;

(B) means secured to one end of said body for operable attachment to a part of a container the contents of which is to be sampled, said means including clamp means having a fixed clamp member, and oppositely arranged movable clamp members operably carried by said fixed clamp member, said movable clamp members having end portions for engagement of the side wall of a can having an end bead, said movable clamp members engaging said can side wall beneath said bead;

(C) and a needle operably carried by said body for longitudinal movement and having a pointed end positioned at said one end of the body, said pointed end being positioned for penetration of a part of a container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end.

17. In a sampler for sampling the contents of fluid containers and the like:

(A) a body;

(B) means secured to one end of said body for operable attachment to a part of a container the contents of which is to be sampled, said means including walls defining a socket having a side opening for insertion therein of the free end of a bottle neck having a cap on the free end of the neck of the bottle, said cap being positioned within the socket and the adjacent neck portion being received in the end opening, a portion of the walls defining said socket engaging the free edge of the cap, and means movable into clamping engagement with the cap to clamp same against said portion of the walls defining said socket;

(C) and a needle operably carried by said body for longitudinal movement and having a pointed end positioned at said one end of the body, said pointed end of the needle being positioned for penetration of said cap of the container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end.

18. In a sampler for sampling the contents of fluid containers and the like:

(A) a tubular body having a passage extending longitudinally therein;

(B) a plunger operably disposed in said passage, said plunger having a longitudinally extending bore;

(C) means secured to one end of said body for operable attachment to a part of a container the contents of which is to be sampled;

(D) and a needle a portion of which is received in the bore of the plunger, said needle being secured to said plunger whereby longitudinal movements of the plunger effect corresponding movements of the needle, said needle having a pointed end positioned at said one end of the body, said pointed end of the needle being positioned for penetration of a part of a container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end.

19. The invention defined by claim 18, including a plurality of needle guides having axial openings therethrough for slidable reception of the needle, said needle guides being slidably mounted in longitudinally spaced relation in the passage of said body ahead of the inner forward end of the plunger; and springs providing yielding connections between the forward end of the plunger, and the adjacent needle guide, between the guides; and a spring retainer adjacent the forward end of the body, one of said springs having one end received by said spring retainer, the other end of said spring being received by a part of the adjacent spring guide.

20. The invention defined by claim 19, including a connector secured to the end of the needle opposite the pointed end.

21. In a portable, manually operable sampler for sampling the contents of fluid containers and the like:

(A) a body;

(B) means secured to one end of said body and carried thereby for operable attachment to a part of a container the contents of which is to be sampled;

(C) a needle operably carried by said body for longitudinal movement and having a pointed end positioned at said one end of the body, said pointed end being positioned for penetration of a part of a container the contents of which is to be sampled, said needle having a fluid passage therein communicating with the exterior of said needle adjacent said pointed end;

(D) and means, including a handle, for longitudinally actuating said needle.

References Cited

UNITED STATES PATENTS

2,786,355	3/1957	Day et al.	73—421.5
3,203,248	8/1965	Stutler et al.	73—421.5

LOUIS R. PRINCE, *Primary Examiner.*

S. C. SWISHER, *Examiner.*