

June 22, 1965

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3,190,731

SAMPLE-SUPPLY CUPS FOR ANALYSIS APPARATUS

Filed March 8, 1961

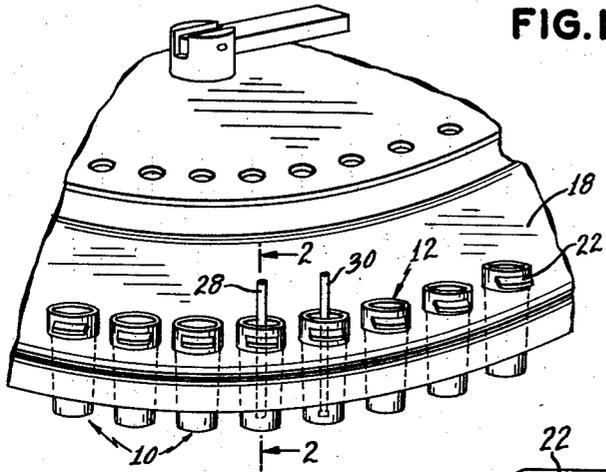


FIG. 1

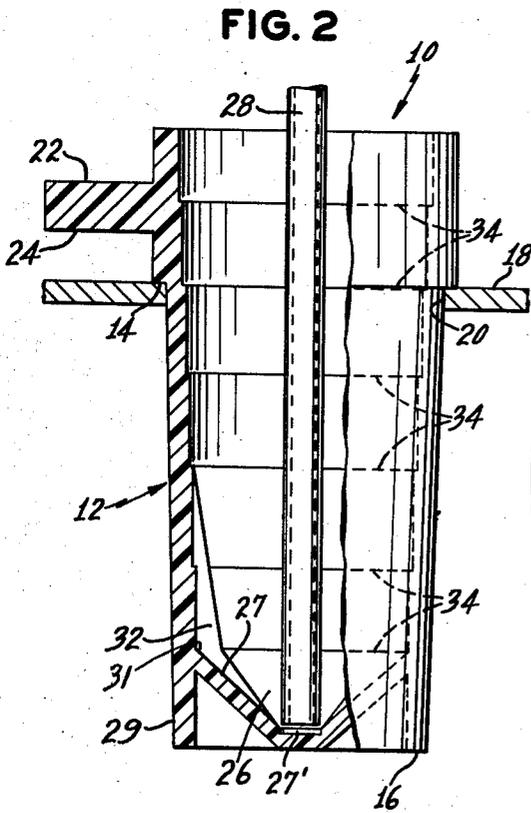


FIG. 2

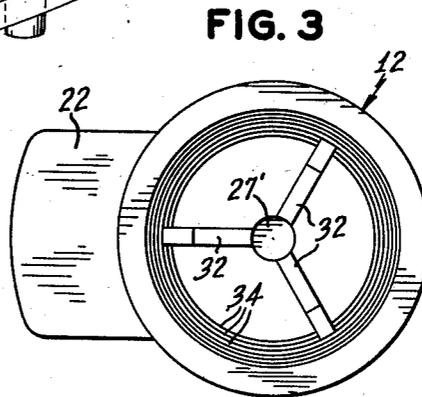


FIG. 3

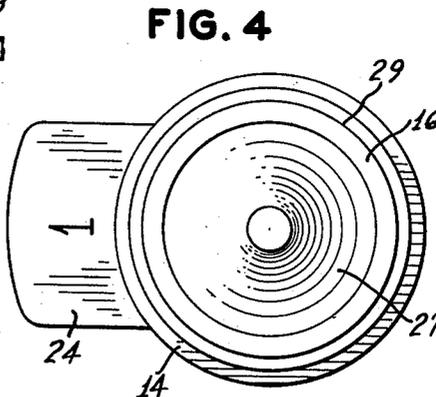


FIG. 4

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SAMPLE-SUPPLY CUPS FOR ANALYSIS APPARATUS

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Filed Mar. 8, 1961, Ser. No. 94,286

3 Claims. (Cl. 23—292)

This invention relates to sample-supply cups or similar receptacles for use with automatic analysis apparatus, especially but without limitation in clinical chemistry for the analysis of blood and other body-liquids, in which case the cups are to be utilized only once as receptacles for blood or other liquid specimens of a comparatively large number of hospital patients or other persons whose body-liquid specimens are taken for chemical examination in respect to one or more constituents thereof.

Ordinarily, these cups are of small size, their maximum volumetric capacity usually being only a few milliliters, and they are designed to be mounted removably on a turntable which is turned step by step to position the cups in succession to a take-off device of analysis apparatus for the supply of the specimens in succession to the automatic analysis apparatus. Such type of apparatus is described in U.S. Patent No. 2,879,141 issued March 24, 1959, to the assignee of this application upon an application of Leonard T. Skeggs. Although in the apparatus shown by said patent, the cups are in the form of wells in the turntable as integral parts thereof, in actual practice individual, removable one-use cups are utilized.

One of the objects of the present invention is to provide a sample-supply cup which is so constructed as to enable the sample take-off device of the analysis apparatus to remove substantially the entire sample from the cup while the cup remains in upright position on the turntable. This is of considerable importance, especially in the case of the examination of a specimen of human blood, and all the more so when a single blood specimen is divided into aliquots for a series of examinations of the specimen in respect to various constituents thereof.

A further object is generally to provide a sample-supply cup of improved construction, especially in respect to its quality, use facility, quantity-production facility, and production cost.

The above and other objects, features and advantages of the invention will be apparent from the following description of the presently preferred embodiment of the invention considered in connection with the accompanying illustrative drawings.

In the drawings:

FIG. 1 is a perspective view of part of a specimen-supply turn-table with cups of the present invention mounted thereon;

FIG. 2 is an enlarged sectional view partly in elevation, on the line 2—2 of FIG. 1;

FIG. 3 is a top view of the cup; and

FIG. 4 is a bottom view of the cup.

Referring now to the drawings in detail, the sample-supply cup 10 of the invention is formed preferably by molding it from clear polystyrene. The cup is of circular cross section and its side wall 12 which is generally cylindrical tapers slightly from the peripheral shoulder 14 to its lower end 16, to facilitate removal from the mold. The peripheral shoulder 14 supports the cup on the turn-table plate 18 around a companion opening 20 through which the cup extends and which positions the cup laterally of the other cups similarly mounted on the turn-table. The cup has an integral handle 22 which is adjacent the top of the cup and which may have a numeral or other identification device molded in its lower surface, as indicated at 24. The cups may be thus marked in sets of fifty in which case

they will be marked with the numerals 1 to 50, respectively, to identify the specimens or for other purposes.

The lower part of the cup is provided with a steeply tapered well 26 defined by an inner conical wall 27 for accomplishing the first stated object of the invention, namely the removal of all or substantially all of the liquid from the cup by the aspirating tube indicated at 28. The conical wall terminates in a narrow flat part 27' at the extreme bottom of the well. In the take-off position of said tube its lower end is positioned close to the bottom of the well so that none or only a minute quantity of the liquid remains in the cup at the end of the take-off operation for delivery of the liquid to the analysis apparatus. Side wall 12 of the cup has a lower external skirt portion 29 which surrounds the well 26 and extends to the lower end 16 of the cup for supporting the cup in vertical position on any flat surface, when the cup is not mounted on the turn-table. As indicative, but not as a narrow limitation of the steep taper of the wall of the well 26, it may be noted that the depth of the tapered well is about 0.14 inch and that its internal diameter at the top 31 of the well is about 0.42 inch. Further, by way of a non-limitative example, it may be noted that total depth of the cup is about 1.2 inches and that its outer diameter at the upper end of the cup is about 0.60 inch. It will be understood from this description and the drawings that the tapered well constitutes a volumetrically small part of the cup, and since the lower end of the take-off tube is positioned close to the bottom of this small well, very little if any appreciable quantity of liquid can remain in the cup at the conclusion of the aspiration operation.

As illustrated more or less diagrammatically a removable stirrer 30 in the form of a rotary rod may be inserted in vertical position in the cup for rotation about its vertical axis centrally of the vertical axis of the cup for mixing the liquid in the cup. The cup is provided with means to aid in the mixing of the liquid by the stirrer. As here shown, said means comprises a plurality of circumferentially spaced projections or ribs 32 which extend from the bottom of the well 26 upwardly to an intermediate part of the side wall 12 of the cup. The ribs prevent or considerably reduce the rotation or swirling motion of the liquid by the rotation of the rod and co-act with said rod to provide turbulence of the liquid and thus improve the stirring action. The stirrer 30 operable by a motor (not shown) and mounted for movement automatically into and out of the sample cup in succession during the rest periods of the turn-table is disclosed in the application of Andres Ferrari, Serial No. 94,342, now Patent No. 3,107,536, filed concurrently herewith and assigned to the assignee of my present application. As the automatic stirrer is not part of my invention and as the stirring of the liquid in the cup may be accomplished by manual rotation of the stirring rod, further description or illustration thereof in this application is unnecessary.

The side wall 12 has a smooth outer surface and preferably varies in thickness in adjacent portions longitudinally of the cup to provide graduation lines 34 visible externally of the cup for indicating the quantity of liquid in the cup.

While I have shown and described the presently preferred embodiment of my invention, it will be understood that various changes and additions may be made and will occur in view of this disclosure to those skilled in the art without departing from the principles of the invention within the scope of the appended claims.

What is claimed is:

1. A small cup-like receptacle for a sample liquid for use in connection with automatic analysis apparatus, said receptacle being adapted to be mounted in an opening of a horizontal support, said receptacle having a small volumetric capacity of the order of a fraction of a cubic inch and being of greater depth than width and having a down-

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wardly tapering inner wall part forming the inner bottom portion of the receptacle, the apex of said tapering inner wall part being truncated by a flat surface, so as to facilitate the aspiration of a maximum quantity of the liquid sample from the receptacle through a tube inserted in the cup and positioned with its inlet end close to the bottom of the cup, and an integral horizontal external part projecting laterally from the side of the cup and positioned near the top thereof so that said part is adapted to be positioned over the upper surface of said horizontal support when the cup is mounted thereon, said part also extending a substantial distance peripherally of the cup and having a flat-surface area for sample identification marking, said receptacle having an external shoulder below and adjacent to said horizontal part for supporting the receptacle in the opening of said horizontal support, said cup also having a flat bottom part for supporting the cup when it is not supported by said shoulder in the opening of said horizontal part.

2. A small cup-like receptacle for a sample liquid for use in connection with automatic analysis apparatus, said receptacle being adapted to be mounted in an opening of a horizontal support, said receptacle having a small volumetric capacity of the order of a fraction of a cubic inch and being of greater depth than width to facilitate the aspiration of a maximum quantity of the liquid sample from the receptacle through a tube inserted in the cup and positioned with its inlet end close to the bottom of the cup, the lower part of said cup having an internal downwardly tapering well defined by a conical wall portion terminating at the bottom of the inside of the cup in a truncating flat surface, said cup having an integral horizontal external part positioned adjacent the top of the cup and projecting laterally from the side of the cup, so that said part is adapted to be positioned over the upper surface of said horizontal support when the cup is mounted thereon, said part also extending a substantial distance peripherally of the cup and having a flat surface area for sample-identification marking, said receptacle having an external shoulder below and adjacent to said horizontal part for supporting the receptacle in the opening of said horizontal support, said cup also having a flat bottom part for supporting the cup when it is not supported by said shoulder in the opening of said horizontal part.

3. A small cup-like receptacle for a sample liquid for use in connection with automatic analysis apparatus, said receptacle being adapted to be mounted in an opening of

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a horizontal support, said receptacle having a small volumetric capacity of the order of a fraction of a cubic inch and being of greater depth than width and having a downwardly tapering inner wall part forming the inner bottom portion of the receptacle, the apex of said tapering inner wall part being truncated by a flat surface, so as to facilitate the aspiration of a maximum quantity of the liquid sample from the receptacle through a tube inserted in the cup and positioned with its inlet end close to the bottom of the cup, said receptacle having external shoulder means near its top for supporting the receptacle in the opening in the horizontal support with an uppermost portion of said receptacle extending above the horizontal support and adapted to be manually grasped for the removal of said receptacle from the support, said receptacle also having integral support means disposed laterally of said downwardly tapering part externally of the receptacle and extending to the bottom of the receptacle for supporting the receptacle in upright position when it is not supported by said shoulder in said horizontal support.

References Cited by the Examiner

UNITED STATES PATENTS

54,776	5/66	Robinson.	
774,697	11/04	Ritter	259—114
1,078,175	11/13	Splaine	73—427 X
1,617,643	2/27	Kriete	259—107
1,705,162	3/29	Wahl.	
1,775,109	9/30	Picker	73—427
2,195,133	3/40	Nevin	73—427
2,198,256	4/40	Levy	73—427
2,208,431	7/40	Rochow.	
2,226,372	12/40	Cravaritis.	
2,503,643	4/50	Verbrugge.	
2,897,862	8/59	Malz et al.	
2,932,437	4/60	Wilcox	150—5
2,935,383	5/60	Des Hons	23—253
3,013,436	12/61	Dailey	73—426
3,081,158	3/63	Winter	23—253

FOREIGN PATENTS

833,012	3/52	Germany.
726,478	3/32	France.

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