

[54] **DISPOSABLE PLASTIC SYRINGE FOR USE IN COLORIMETRY**

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[22] Filed: **Feb. 3, 1971**

[21] Appl. No.: **112,234**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 800,887, Feb. 20, 1969, Pat. No. 3,620,676.

[52] U.S. Cl. **23/253 TP**, 116/114, 128/2, 206/56

[51] Int. Cl. **G01n 1/14**, G01n 31/22

[58] **Field of Search** 23/253, 253 TP, 259; 206/43, 17.5, 56 AA; 128/2 R, 231, 232; 116/114.19, 114.20; 73/425.4, 425.4 P, 441, 442, 443, 446; 222/215

[56] **References Cited**

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Primary Examiner—Morris O. Wolk

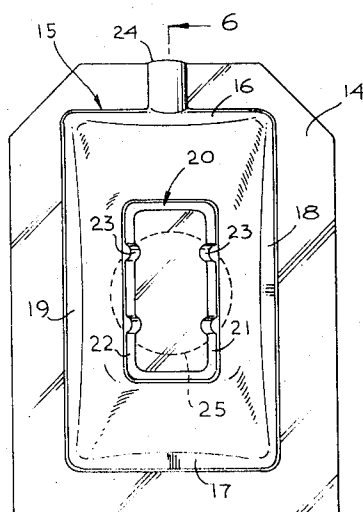
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[57] **ABSTRACT**

A disposable plastic syringe particularly for use in colorimetry is formed by embossing a sheet of transparent synthetic plastic, or otherwise forming in it, a bulbary cavity, and subsequently closing the cavity by adhering a plane synthetic plastic sheet over the cavity, the two sheets being either heated sealed or adhesively joined together at the margins around the cavity. The cavity is connected to the outside edge of the device by an embossed groove which when attached to the plane sheet forms a tubular inlet or outlet. The cavity is shaped as a truncated pyramid with a turret closing the top, this turret forming a finger-pressable "button" by which the syringe will draw in or expel liquid through the tubular connection to the margin of the device. The volume of liquid drawn into each specimen syringe is relatively accurately measured. A partial coating, such as a stripe or spot, inside the bulbary cavity using a color-change-indicator composition provides means for making a colorimetric determination of the acidity or the content of some individual constituent of the liquid drawn into the syringe device.

6 Claims, 6 Drawing Figures



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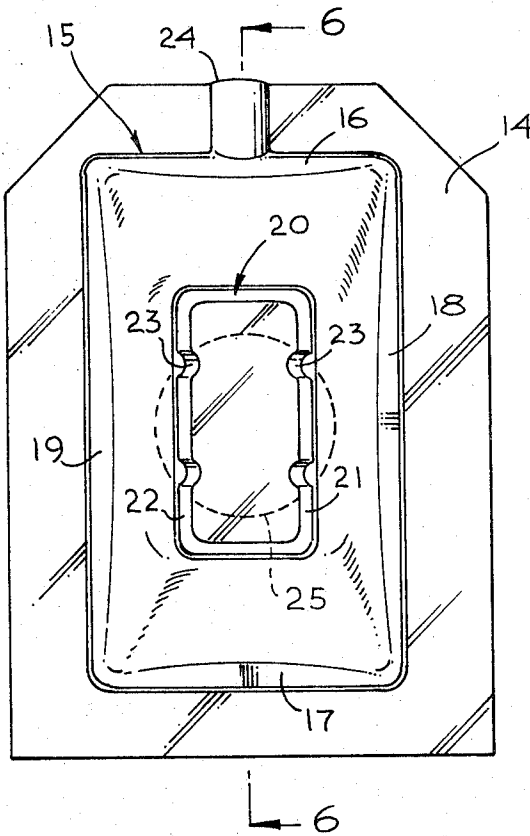


Fig. 1

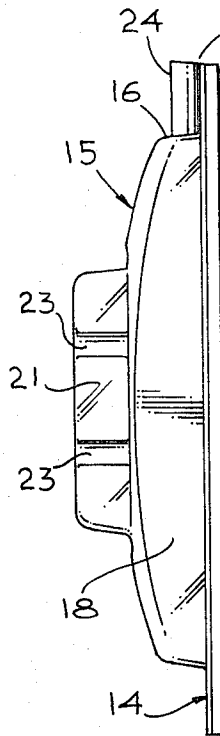


Fig. 2

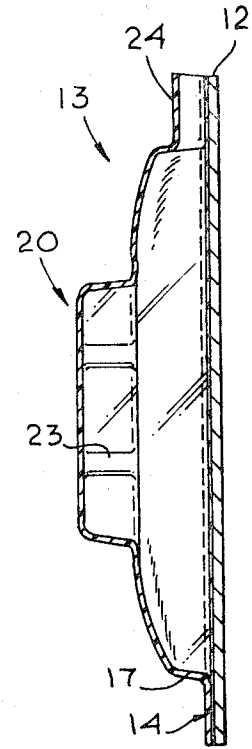


Fig. 6

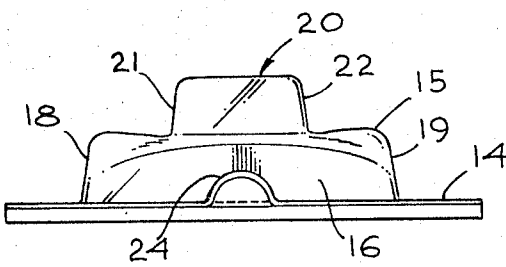


Fig. 3

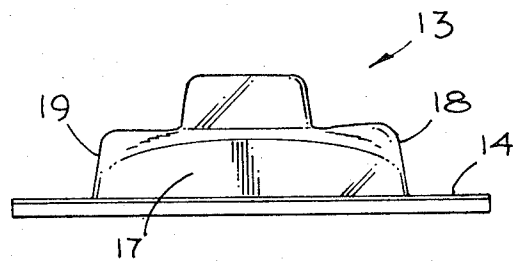


Fig. 4

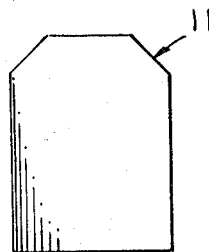


Fig. 5

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REFERENCE TO RELATED APPLICATIONS

This is a continuation-in-part of my pending application for patent, Ser. No. 800,887 filed Feb. 20, 1969 now U.S. Pat. No. 3,620,676.

BACKGROUND OF THE INVENTION

This invention relates to a portable disposable syringe made of transparent plastic by which a sample of a liquid may be withdrawn from a larger quantity, and the withdrawn sample may be colorimetrically tested, either within the syringe itself, or in another vessel into which the withdrawn sample is discharged. In certain types of colorimetric measurements, for example in measuring the concentration of free chlorine in an aqueous solution, the volume of the sample in the syringe must be accurately measured, and the volume must be the same from one syringe to another in the same lot. The plastic syringe device, generally, consists of an inlet tube open at one end, and at its other end communicating with a finger-compressible bulb to draw in and expel the contained fluid, after which the inherent resilience of the material of the syringe restores the bulb to its original volume. If the open end of the inlet tube is submerged in a liquid sample, a measured portion is drawn into the bulb upon release of the compressive finger pressure. If it is desired to make the colorimetric analysis in the syringe, a suitable color-change reagent is disposed in the bulb prior to filling it with the sample of liquid to be tested. The color change reagent may be a dried coating inside the bulb, which preferably is applied as a printed spot of reagent upon the plastic sheeted material which constitutes the back face of the device. The color-change reagent may be in liquid form and injected into the bulb either before sucking in the sample of liquid to be tested, or after the liquid has been inspired.

The principal object of the invention is to provide an inexpensive syringe fabricated from sheet plastic, or otherwise formed, for the purposes above stated. Another object is to provide a syringe-like device which will, after compressive distortion, draw in a liquid sample of known volume, and which may act as a reactive vessel for colorimetric analyses, or which will subsequently expel a fixed volume of the liquid to be tested into another reaction vessel.

These and other objects are attained by my invention, which will be understood from the following description, reference being made to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of the syringe-like device;
FIG. 2 is a side elevational view of the same;
FIG. 3 is an elevational view from the inlet tube end of the device;
FIG. 4 is an elevational view from the end opposite the tube;
FIG. 5 is a bottom elevational view; and
FIG. 6 is a cross-sectional view taken on the line 6-6 of FIG. 1.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings which show a preferred embodiment of the invention, the syringe-like device consists of a rigid base 11, which is a plane piece of plastic coated hard cardboard 12 to which the formed bulb 13 may be attached (as by heat sealing) at its outwardly projecting flanges 14, to form a water-proof container or bulb. The bulb 13 consists of a rectangular pyramidal-shaped body 15 with its walls 16, 17, 18 and 19 tapering upwardly and joined to the walls of a rectangular turret 20 which constitutes the "button" upon which finger-pressure is applied in the operation of the device. The side-walls 21 and 22 of the turret are preferably stiffened by two vertical indented flutes 23. The flutes 23 strengthen the structure of the turret so that it moves downwardly as a unit upon applying pressure of the finger, to constrict the total volume of the bulb, and, upon releasing the finger pressure, is restored to its original position because of the inherent resiliency of the synthetic plastic material, for examples polyvinyl chloride or styrene, from which the device is molded. Other sheeted plastic materials having similar properties may be used. The sheet thickness is preferably in the range of 6 to 10 mils.

An inlet tube 24 connecting the bulb 13 to the outer edge (of a single cut-out unit) is formed by molding a rounded groove in the flange 14 adjacent the end wall 16, and this groove forms a tubular opening when the bulb molding is sealed to the base sheet.

A plurality of bulb cavities may be molded from large sheets, and subsequently be die cut into the individual units before or after heat-sealing the formed sheet at the flanges between units to the plastic coated cardboard base. The base sheets before assembly may be printed, flexographically, in spots or stripes, with a printing ink comprising a color-change indicator composition. Other methods of forming the complete bulb with inlet tube may be employed.

The indicator spot 25 or a stripe may be printed by any suitable printing process, for example flexographically, on the inside face of the base using a water soluble ink containing a colorimetric reagent. One such composition consisted of the following essential ingredients, in the approximate proportions which are not critical:

Methanol	8 parts by weight
2 Ethoxyethanol	2 parts by weight
Phenol red dye	0.1 to 1.5 parts by weight.

I claim:

1. A disposable syringe for use in making chemical analyses of liquids comprising a molded resilient plastic body having a bulbar cavity, and an inlet tube open at one end and communicating at the other end with said cavity, said bulbar cavity being finger-pressure-constrictable in volume so that upon release of the pressure, a fixed volume of liquid is drawn into said cavity; and a sufficient amount of a color-changing indicator composition is enclosed within said cavity to effect a colorimetric analysis therein when a liquid is drawn into it.

2. The syringe defined in claim 1 in which the color-changing indicator composition is applied as a printed spot on the inside of said cavity.

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3. The syringe defined in Claim 1, in which at least a portion of the body is transparent.

4. The syringe defined in claim 3, in which said body comprises a plane backing sheet of plastic adhered to plane margins around a figure embossed in a second sheet of plastic, said figure consisting of an enlarged truncated rectangular pyramidal cavity, and a tubular cavity extending from said pyramidal cavity to the edge of said second sheet.

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5. The syringe defined in claim 4 in which a rectangular turret is formed atop said pyramidal cavity, said turret having upright walls and being closed on top to provide a finger-pressable surface.

6. The syringe defined in claim 5, in which at least some of the upright walls of said turret are provided with vertical reinforcing flutes.

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