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BOTTLE SUPPORT AND CAP ASSEMBLY FOR CENTRIFUGE

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FIG. 1.

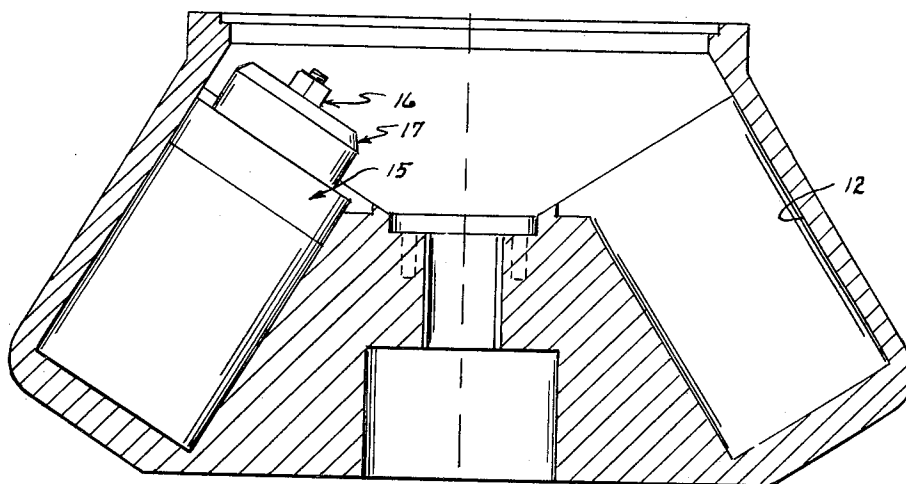
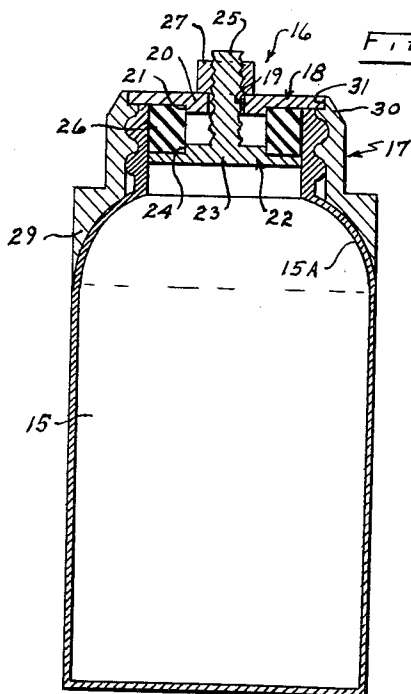


FIG. 2.



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1

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BOTTLE SUPPORT AND CAP ASSEMBLY FOR CENTRIFUGE

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1 Claim. (Cl. 233-26)

This invention relates to bottle supports and more specifically to a support in combination with a sealing cap assembly for a bottle, as mounted in an angle type centrifuge.

The prior art relating to the support of a fragile bottle with a cap assembly is apparently only found in the type of mounting used for a vacuum bottle, in which the inner bottle is securely retained between the outer shell, a vacuum about the inner bottle and a cap assembly to retain the inner bottle so that it will not be displaced or break. In utilizing a bottle, whether capped or uncapped, in an angle type centrifuge, because of the angle of the rotor compartments and the high speeds and the resultant centrifugal forces involved, all of the presently available plastic bottles have inadequate strength to withstand the centrifugal force when they are filled and capped. Further, the presently available sealing caps do not offer effective sealing during centrifugation.

It is an object of this invention to provide a cap assembly for a fragile bottle, as mounted in the rotor of an angle type centrifuge.

It is a further object of this invention to provide a reinforcing supporting assembly for the cap mounted in a fragile bottle that is to be utilized in the rotor of an angle type centrifuge.

Further objects of this invention shall be apparent by reference to the accompanying detailed description and the drawings, in which:

FIG. 1 is a cross sectional view of a centrifuge rotor, in which a plurality of bottles are mounted in spaced relation in pockets within the rotor, and

FIG. 2 is a cross sectional view of the bottle and supporting cap assembly.

Referring to the drawings, there is illustrated an angle type centrifuge rotor that is provided with a plurality of pockets 12 (six compartments or pockets in this instance) in which bottles 15 (of approximately 250 ml. or 500 ml.) are mounted. These bottles are at approximately a 28° angle to the vertical axis.

When centrifuging with an uncapped plastic bottle, the bottle cannot be filled, since there would be spillage from the top as the fluids in the bottle build up to a vertical circular wall as the centrifugal force increases during acceleration. When centrifuging with a capped bottle, it has been found that with a rigid bottle such as made of stainless steel, the bottle will stand up under terrific centrifugal force developed without breaking. In this invention, when centrifugal forces in excess of 20,000 times gravity at speeds in excess of 11,000 r.p.m. are to be considered, and when a polyethylene bottle is to be used and filled and sealed with a cap, the bottle 15, if it is not supported at its neck will distort and may rupture at the neck of the bottle. Therefore, to protect this type of bottle that is rather fragile, there is provided a cap assembly 16 for the bottle 15, and a reinforcing support-

2

ing element 17 which may be threadably secured to retain the bottle neck and cap assembly in their proper relationship and prevent rupturing of said bottle. The cap assembly is comprised of a stainless steel circular crown member 18 that covers and rests upon the top aperture or mouth of bottle 15. The crown member 18 is provided with a central aperture 19 and on the inner surface of the crown member there is a reduced portion 20 which provides a shoulder 21. A similar type element 22 of a smaller diameter is provided to be inserted within the mouth of said bottle 15, element 22 is similarly provided with a reduced portion 23 and a shoulder 24. Element 22 is not provided with a central aperture, but rather is provided with an extended threaded stud 25. A neoprene gasket 26 of a fairly good thickness is inserted between elements 18 and 22, and with the stud 25 passing upward through the aperture 19 a nut 27 may be threadably secured to the stud 25 to retain the crown element 18 in juxtaposition to the gasket 26. This assembly may be inserted in the mouth of the bottle 15 and by turning nut 27 to draw element 22 toward element 18, there will be a squeezing and distortion of the gasket 26 to thus provide a tight sealing cap assembly 16. With bottle 15 properly sealed with the cap assembly 16, the bottle 15 may be mounted in a pocket 12 of the rotor. It is apparent that if the rotor were operated at high speed with the bottle cap assembly so mounted, there would be a terrific distortion across the neck area of the bottle 15. Therefore, a supporting element 17 is mounted to surround the neck of the bottle. Supporting element 17 may be comprised of any rigid reinforcing material, such as aluminum, to provide the necessary strength. Element 17 at its base 29 is formed or cut on its inner periphery to fit the contour of the curved upper portion 15A of bottle 15, and the base portion 29, on its periphery, is circular in form, with a diameter to match the diameter of the rotor compartment 12. Element 17 may be formed on its inner periphery of the upper portion 30 with a mating contour to mate with and match the outer periphery of the neck of bottle 15. The upper end of portion 30 is also provided with a cut out portion 31 to permit the crown member 18 to fit into portion 31 of element 17.

It is to be noted that the base portion 29 of the supporting element 17 fits well within the bore of pocket 12 to provide a good solid support when the bottle 15 is mounted within pocket 12. The rest of the bottle is fully supported within the pocket of the rotor. It is apparent that when the rotor 10 is operated and a considerable centrifugal force is developed, this supporting element and cap assembly provides a rigid support for the polyethylene bottle 15 that is being utilized. With this supporting assembly, it is possible to use a fairly light polyethylene bottle without danger of rupturing the bottle or losing the cap from the bottle due to any distortion.

Although a polyethylene bottle has been described as the preferable type of bottle to be used in this instance in an angle type centrifuge, other types of bottles, that is bottles constructed of other material of insufficient strength may be similarly used, without danger of breaking when supported in the manner illustrated herein, and this invention shall be limited only by the appended claim.

What is claimed is:

In an angle type centrifuge, the combination of a

3

central rotor, and a plurality of fragile distortable bottles that are to be mounted in said central rotor, said bottles having a sealing cap and a reduced neck portion, and a plurality of lightweight supporting elements that are composed of a rigid reinforcing material, each one to support the neck of a bottle and said sealing cap, said sealing cap fitted and mounted within the neck of each bottle to seal said bottle, said rotor provided with a plurality of apertures, said bottles fitted into said apertures in said rotor, the necks of said bottles extending above said rotor, each supporting element fitted to the reduced neck portion and extending slightly above said neck portion, and positioned to fit partially into the aperture in said rotor and each sealing cap abutting with the supporting element where it extends above said neck portion to prevent distortion of said cap within the neck of said bottle.

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