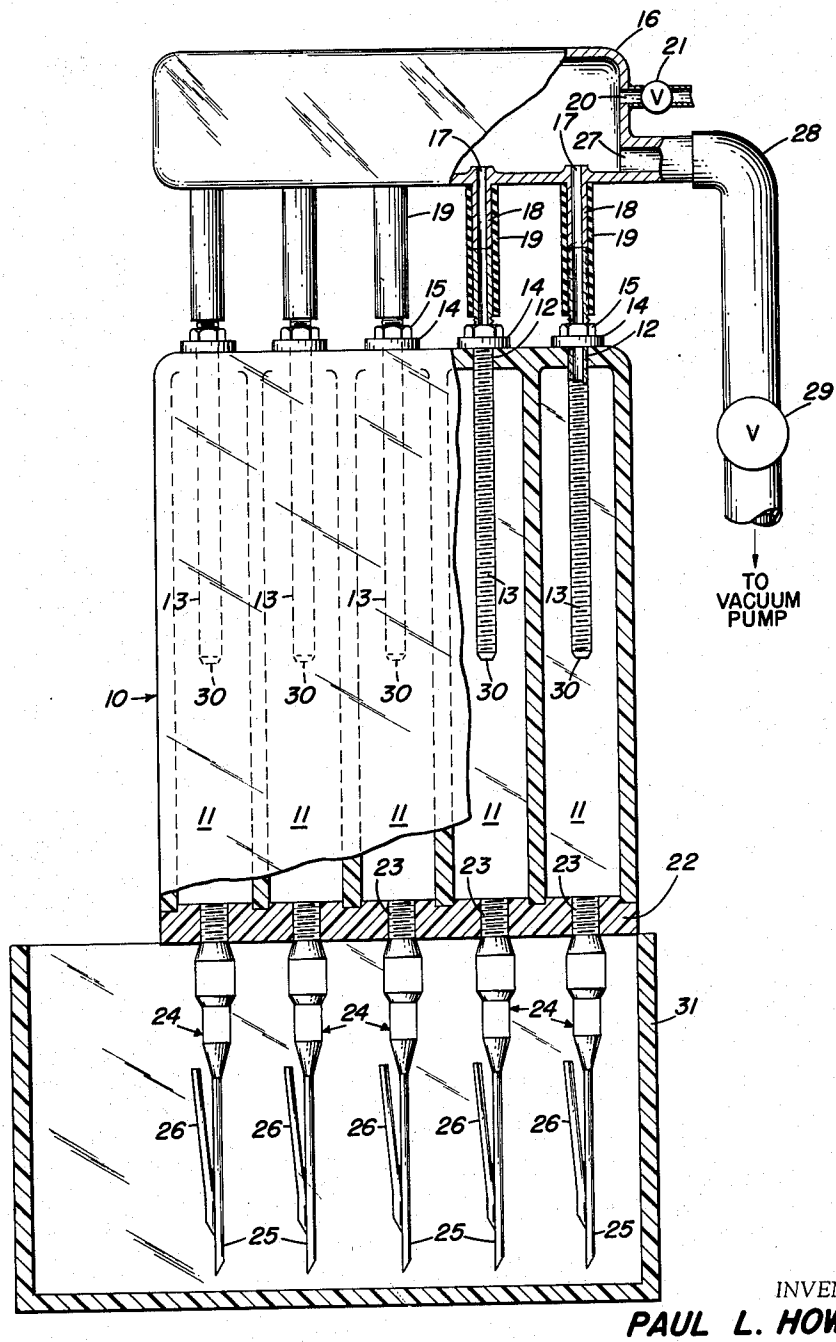
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ELECTROLYTE FILLING DEVICE AND METHOD
FOR RESERVE TYPE PRIMARY BATTERIES
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ELECTROLYTE FILLING DEVICE AND METHOD FOR RESERVE TYPE PRIMARY BATTERIES

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This invention relates to an electrolyte filling device and method for reserve type primary batteries.

In the prior art methods of filling the cells of a primary battery, it was necessary to carefully measure out the correct amount of the electrolyte required, and individually fill each cell. For mass production procedures, this proved costly in time and labor.

It is an object of this invention, therefore, to provide a method and apparatus for quickly, accurately and simultaneously filling all the cells of a primary battery with the exact amount of the electrolyte required.

Another object of this invention is the provision of a simple apparatus into which an electrolytic solution may be pumped, and by which the amount of the electrolyte used in the cells of a primary battery is accurately controlled.

A still further object of this invention is to provide a container having a conduit of adjustable length inserted in the top thereof, and a needle type filling device on the bottom, and wherein a vacuum is applied to the tubing and the filling device is inserted in a solution.

Further objects and advantages of this invention will become apparent to those skilled in the art after consideration of the following detailed description and the appended claims, taken in connection with the attached drawing in which the single figure, drawn partly in section, schematically represents a preferred form of this invention.

Referring now to the drawing, there is shown a container **10** having a plurality of partitioned chambers **11**. The number of chambers in the container is determined by the particular primary battery to be filled and by the number of cells therein. In the instant disclosure, the apparatus has been designed for a primary battery having five cells. The container **10** is constructed of plastic or other materials which will not be effected by the corrosive action of an electrolytic solution.

An internally threaded opening **12** is provided at the top of each chamber **11**, and an externally threaded tube **13**, of stainless steel or other suitable material, is adjustably screwed into said opening. Each of the openings **12** is sealed by means of a washer **14**, and the position of each of the threaded tubes is locked by means of lock nuts **15**. A manifold **16** is provided with a plurality of ports **17** and a plurality of associated, integral tubes **18**. The tubes **18** and **13** are coupled together by means of rubber tubing **19**. The manifold **16** is also provided with an air vent **20**, the opening of which is controlled by means of a valve **21**.

The bottom wall **22** of the container **10** is provided with internally threaded ports **23** into which filling needle units **24** are each threaded. Each filling needle unit is similar to a hypodermic needle and comprises a first hollow needle **25** through which the electrolyte is drawn and through which it drains, and a second hollow needle **26** which provides a vent to permit the escape of air from the cells during the filling operation of the apparatus.

A vacuum pump (not illustrated) is coupled to a second port **27** through a flexible rubber hose **28** and a valve **29**.

In operation, the correct amount of electrolyte having previously been determined, the position of the bottom end **30** of the tube **13** is adjusted to define the height of the column of fluid to be drawn from a receptacle **31**. The valve **29** is then opened and the vacuum created in the manifold **16** draws fluid from the receptacle **31** through the needles **25** into the chambers **11**. The level at which the bottom end **30** of the tube **13** has been set determines the amount of electrolyte which is taken into the chambers **11** since all the excess of this is drawn into the manifold **16** and flows through the port **27** into an overflow container (not shown) of the vacuum pump. When the proper level of electrolyte within the chambers **11** has been attained, the valve **29** is closed. The vacuum created in the manifold **16** prevents the electrolyte from draining back into the receptacle **31** which is now removed, and the needle units **24** are inserted into the cell openings of a primary battery to be filled. By merely opening the valve **21** to permit the entry of air into the manifold **16** through the air vent **20**, the cells will automatically be filled to the proper level by gravity drain through the filling needle **25**. The needles **26** provide a vent to permit the escape of air from the cells as the electrolytic liquid displaces it. The volume of electrolyte which will be provided for each cell will be equal to the volume of a chamber **11** up to the bottom end **30** of the tube **13**, plus a small amount of fluid in the tubes **13** and **18**. Because of a small ledge or shoulder provided at the port **17** in the manifold **16**, no excess fluid remaining in the manifold at the time the valve **29** is closed is permitted to drain back into the chambers **11**.

It is seen, therefore, that a simple, inexpensive, speedy and precise method and apparatus have been provided for automatically filling reserve type primary batteries. It is apparent that the apparatus may find use in many other applications where it is required to measure and fill containers with a fluid.

It is also obvious that many modifications of the disclosed embodiment of this invention will become aparent to those skilled in the art, and it is to be understood, therefore, that while the embodiment described is a preferred form of this invention, this invention is not to be limited except by the scope of the spirit of the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

I claim:

1. An automatic filling device comprising: a chamber having a first port at the top thereof, and a second port at the bottom; a first tube mounted in said first port and extending partially through said chamber; means for varying the length of said first tube within said chamber; a second tube mounted in said second port and extending from said chamber for immersion into a body of fluid; and means for applying a vacuum to said first tube, whereby said chamber will be filled with said fluid up to the lower level of said first tube.

2. An automatic filling device comprising a container having a plurality of chambers, each of said chambers having a first port in the top thereof and a second port in the bottom; a first tube for each of said chambers mounted in each of said first ports and extending into said chambers; a second tube for each of said chambers mounted in said second ports and extending from said chambers for immersion into a body of fluid; means for adjusting the length of each of said first tubes within said chamber; and means for applying a vacuum to said

first tubes, whereby said chambers will be filled with said fluid up to the level of the said first tubes.

3. An automatic filling device comprising: a chamber having a fluid passageway at the bottom thereof, a fluid conduit extending vertically into said chamber from the top and terminating above the bottom thereof; means for adjusting the length of said fluid conduit within said chamber; means connecting said fluid passageway at the bottom of said chamber to a body of fluid; means for supplying a source of reduced pressure to said fluid conduit whereby fluid is forced into said chamber through said fluid passageway; and overflow means for draining off the fluid in said chamber above the lower level of said fluid conduit means.

4. An automatic fluid filling device comprising: a chamber having a first fluid conduit extending from the bottom thereof for immersion into a body of fluid and a second fluid conduit extending vertically into said chamber from the top and terminating above the bottom thereof; means for adjusting the length of said second fluid conduit extending into said chamber; a manifold coupled to said second fluid conduit; means for coupling said manifold to a source of reduced pressure, whereby fluid will rise from said body of fluid into said chamber through said first fluid conduit; overflow means for draining the excess of fluid in said chamber above the lower level of said fluid conduit means; and means for increasing the pressure in said manifold.

5. The method of simultaneously filling the cells of a reserve type primary battery with an electrolytic fluid comprising the steps of: drawing said fluid from a receptacle through a plurality of fluid conduits inserted in said fluid into each of a plurality of similar chambers to a predetermined level by applying a vacuum to said chambers; removing said fluid conduit from said fluid and inserting one of each of said conduits in the opening of said cells while maintaining the vacuum; and then removing the vacuum from said chambers.

6. An automatic filling device comprising a container having a plurality of chambers, each of said chambers having a first port in the top thereof and a second port in the bottom; a first tube for each of said chambers mounted in each of said first ports and extending partially through each of said chambers; a second tube for each of said chambers mounted in said second ports and extending from said chambers for immersion into a body of fluid; means for adjusting the length of each of said first tubes within said chamber; and means for applying a vacuum to said first tubes, whereby said chambers will be filled with said fluid up to the level of the said first tubes.

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