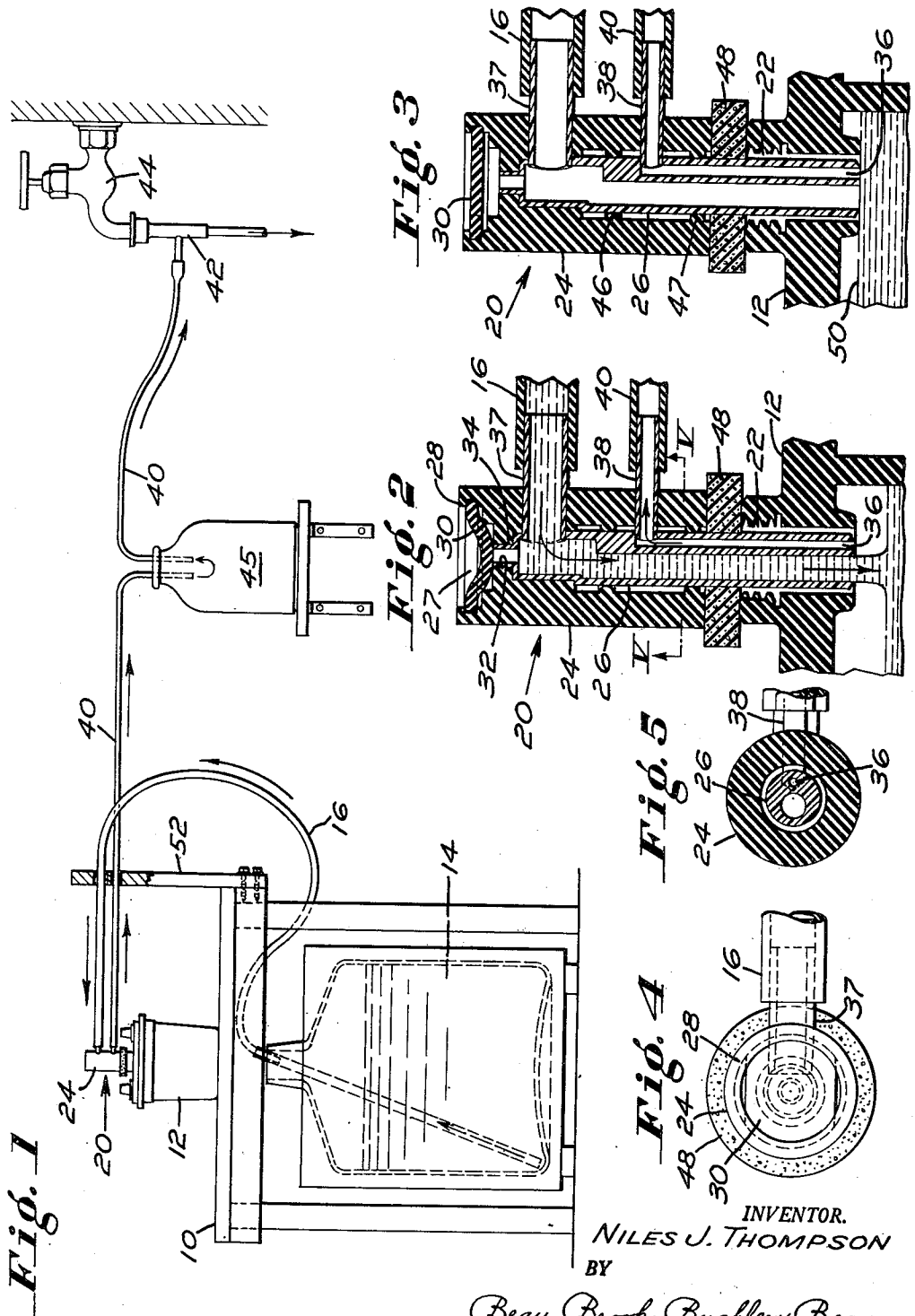
Nov. 20, 1956 N. J. THOMPSON 2,771,101

STORAGE BATTERY FILLER

Filed March 12, 1954



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United States Patent Office 2,771,101
Patented Nov. 20, 1956

2,771,101

STORAGE BATTERY FILLER

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Application March 12, 1954, Serial No. 415,882

5 Claims. (Cl. 141—57)

This invention relates to storage battery filling apparatus for use, for example, in loading lead-acid type storage batteries with electrolyte at the factory or distributor shops or the like. More particularly the invention relates to improvements in so-called vacuum-operated devices for the above stated purposes.

Whereas vacuum-operated filler nozzles have been previously developed for such purposes, one of the objects of the present invention is to provide an improved filler nozzle device for use in such systems, such as may be conveniently mounted upon a work bench in company with a series of similar nozzles for simultaneously filling a gang of storage batteries.

Another object is to provide an improved nozzle for the aforesaid purposes whereby a group of said nozzles may be separately connected to a vacuum source and manually set in electrolyte dispensing condition, whereupon they will be automatically operable upon filling of the associated batteries to stop the electrolyte dispensing operations at the proper times without further operation attention.

Another object of the invention is to provide in a vacuum-actuated filling nozzle device of the character described an improved vacuum cut-off arrangement, which cuts off automatically upon filling of the container into which liquid is being dispensed without operator attention.

Another object of the invention is to provide an improved vacuum-actuated dispensing nozzle device which is semi-automatic in operation, and is adapted to be set in liquid dispensing condition with improved facility and subsequently automatically cuts off the dispensing operation upon filling of the associated container.

Another object of the invention is to provide an improved device as aforesaid which is relatively inexpensively manufactured, and which is extremely rugged and fool-proof in operation.

Another object of the invention is to provide a device as aforesaid which is readily adjustable with respect to the level to which liquid will be dispensed in the associated container.

Another object of the invention is to provide an improved device as aforesaid which may be readily fabricated from standard stock plastic tubing parts and rubber washers and the like, without requiring use of threaded fittings or the like.

Other objects and advantages of the invention will appear from the specification hereinafter.

In the drawing:

Fig. 1 illustrates application of the invention to a typical battery assembly bench type electrolyte filling station, showing an improved dispensing nozzle arrangement of the present invention connected for actuation by a standard type water faucet vacuum generator;

Fig. 2 is a vertical sectional view through the filling nozzle device of Fig. 1, showing the device in liquid dispensing or battery filling condition;

Fig. 3 is a view corresponding to Fig. 2 but showing

the nozzle device in inactive or non-dispensing condition;

Fig. 4 is a fragmentary plan view of the mechanism of Figs. 2–3; and

Fig. 5 is a section taken along line V—V of Fig. 2.

As illustrated in Fig. 1, the device of the invention is shown as being embodied in a storage battery electrolyte filling apparatus including a work bench designated **10**, upon which may be placed a series of storage battery cases such as is indicated at **12**. Electrolyte supply jars may be conveniently stored under the work bench as indicated at **14**, and a suitably acid-resistant tube as indicated at **16** is arranged to dip into each jar for sucking the electrolyte therefrom and dispensing it into the battery cell **12**, as will be explained more fully hereinafter.

The filling nozzle of the present invention is indicated generally at **20**, and as shown in Figs. 1–3 is arranged to be inserted at its lower end into the conventional filler opening **22** of the storage battery case. As shown in detail in Figs. 2–5, the filling nozzle device comprises a generally cylindrically shaped casing **24** into which is slip-fitted an inner tube **26**. The outer casing **24** may be conveniently molded of semi-soft neoprene rubber or plastic or any other suitable acid-resistant material, whereas the inner tube member **26** may be conveniently formed of some suitably acid-resistant but more rigid material such as hard rubber or plastic or the like. The casing **24** is formed with a counterbore portion **27** at its upper end terminating in an overhanging flange **28** so as to retain therein a soft rubber washer **30** which is slip-fitted in place, for purposes to be explained hereinafter. The fit of the washer **30** under the flange **28** and in the counterbore portion is so loose as to provide a free communication between the central bore portion of the casing and the ambient atmosphere when washer **30** is in the position shown in Figure 3.

The casing **24** is also formed with a reduced throat portion **32** which intercommunicates the central bore portion of the casing and the counterbore portion **27** thereof; and the inner tube **26** is provided with a reduced collar portion **34** to complement the throat portion **32** of the casing. The inner tube **26** is also formed with a longitudinal passageway **36** in a sidewall portion of the tube, and the casing and tube members are both laterally apertured in relatively aligned positions so as to accommodate in slip-fitted connected relation therein short nipples as illustrated at **37—38**.

The nipples **37—38** are also conveniently formed of some suitable acid resistant plastic material or the like, and particular attention is called to the fact that the nipple **37** is arranged in communication with the main central bore of the inner tube **26** and extends laterally from the device for a slip-fit connection with the electrolyte conveying hose **16**. The nipple **38** intercommunicates with the inner passageway **36** and extends laterally from the device for a slip-fit connection with a hose **40** leading to any suitable vacuum source. Thus, for example as shown in Fig. 1, the hose **40** may be coupled to the vacuum port of an inspirator device as indicated at **42** arranged to be operated by a water faucet or the like as indicated at **44**. As shown in Fig. 1 the hose **40** may be broken and coupled into a catch basin device as indicated at **45** for trapping any electrolyte such as may gain access into the hose **40** from the filler nozzle; but it is to be understood that the inspirator or any other suitable source of vacuum may be otherwise suitably connected to the vacuum supply nipple **38** of the filler device, in lieu of the specific arrangement shown.

The inner bore of the main casing **24** is provided with inwardly extending pressure-sealing ring portions **46—47** straddling the position of inlet of the vacuum connection; thereby positively segregating the vacuum and electrolyte chambers in the device. The inner tube **26** is dimensioned

longitudinally so as to extend a substantial distance below the bottom end of the casing **24**, and a soft sponge rubber washer or the like as indicated at **48** is slip-fitted over the bottom end of the inner tube against the bottom of the casing **24** as shown in Figs. 2–3. Thus, the filling nozzle device may be inserted at its lower end into the conventional filling port **22** of a storage battery case in such manner that the sponge rubber washer **48** rests upon the upper end of the filling port while the inner tube member **26** extends downwardly into the interior of the battery cell. Then, upon generation of a vacuum in the hose **40**, as may be obtained by opening the water faucet **44**, the air in the hose **40** is drawn through the inspirator **42**, thus setting up a partial vacuum in the inner passageway **36** of the nozzle device.

If at this time the soft rubber washer **30** at the top of the nozzle device is manually pressed downwardly as to the position thereof shown in Fig. 2, the washer **30** will thereby close the neck portion **34** of the inner tube **26**, thus cutting off any ingress of air through the top of the nozzle device around the washer **30**. Hence, a partial vacuum condition will be set up interiorly of the battery cell, whereby electrolyte will be sucked up through the hose **16** and into the central bore portion of the nozzle device and thence downwardly into the battery cell. Immediately upon such establishment of a vacuum condition resulting in electrolyte flow through the nozzle device, the control washer **30** may be released by the attendant. The vacuum condition within the nozzle device thereupon operates to maintain the washer **30** downwardly in the port-sealing position as shown in Fig. 2, so that the attendant may then move on to the next battery filling position for repetition of the procedure on the other batteries of the series.

Upon filling of the battery case, such as to the level of the electrolyte as indicated at **50** in Fig. 3, the closing of the bottom end of the passageway **36** by the electrolyte will cut off the supply of vacuum to the central bore whereby the control washer **30** will be released and will thereupon tend to spring upwardly to its normal or "open" position as illustrated in Fig. 3. In fact, at this moment the flow of electrolyte into the nozzle device will have attained such momentum that it momentarily establishes a pressurized condition as distinguished from a partial vacuum condition within the inner bore of the device, thereby further facilitating spring-back of the control washer **30** to its "open" position. It will be appreciated of course, that upon opening of the washer **30** the vacuum drawing the electrolyte from the bottle **14** will be discontinued, whereby the battery cell filling operation is automatically terminated without attention by the station operator. The residue of electrolyte in the central bore is then syphoned back through the hose **16** into the supply bottle. Any acid remaining in the passageway **36** will be sucked over into the catch jar **45** for periodic recovery.

By mounting the plastic hose devices **16—40** through suitably apertured portions of a back board **52** extending vertically from the work bench **10**, as shown in Fig. 1, the hoses may thereby be supported so that the filling nozzles **20** are not tilted such as would occur if the hoses were permitted to droop. Such tilting would of course break the vacuum seal. Thus, a series of such hose and nozzle devices may be arranged at intervals along the work bench, and a large number of battery cases may be loaded and unloaded from the filling positions thereunder by a single attendant who merely presses down upon the washer **30** of each nozzle to simultaneously mount the nozzle on a battery filling port and start the electrolyte dispensing operation. The nozzle thereafter automatically "cuts off" as the battery cells are successively filled while the attendant is elsewhere "loading" or "unloading" other batteries.

I claim:

1. A storage battery electrolyte filling apparatus comprising a casing member having a vertical inner bore, a dual compartment tube member mounted within said bore, said casing member having an air passageway at its upper end intercommunicating the ambient atmosphere with a first one compartment of said inner tube, a source of electrolyte liquid supply in open communication with said first compartment of said inner tube, a vacuum source in communication with the other of said compartments at its upper end, both of said compartments being open at their bottom ends in communication with the interior of a storage battery cell when said casing member is mounted upon the filler opening of said cell, and a spring washer carried by the upper end of said casing and adapted to be elastically deformed into compartment sealing contact with the upper end of said passageway whereby vacuum forces within said other compartment will cause electrolyte to be drawn into said first compartment and delivered therefrom into said battery cell until such time as the level of electrolyte in said cell reaches the bottom end of said other compartment whereupon the vacuum forces drawing electrolyte into said first compartment will be interrupted.

2. A storage battery electrolyte filling apparatus comprising a casing member having a vertical inner bore, a tube within said bore having a main compartment extending therethrough and a short supplemental compartment extending from the lower end of the tube part way up its length, said casing member having an air passageway at its upper end intercommunicating the ambient atmosphere with said main compartment of said inner tube, a source of electrolyte liquid supply in open communication with said main compartment of said inner tube, a vacuum source in communication with said supplemental compartment at its upper end, both of said compartments being open at their bottom ends in communication with the interior of a storage battery cell when said casing member is mounted upon the filler opening of said cell, a gasket at the bottom end of said casing, and a spring disc carried by the upper end of said casing and adapted to be elastically deformed into compartment-sealing contact with the upper end of said passageway whereby vacuum forces within said supplemental compartment will cause electrolyte to be drawn into said main compartment and delivered therefrom into said battery cell until such time as the level of electrolyte in said cell reaches the bottom end of said supplemental compartment whereupon the vacuum forces drawing electrolyte into said main compartment will be interrupted.

3. A device for filling a storage battery with electrolyte comprising a body member having dual bores leading thereinto from an open end battery connection portion thereof, said body member having an air passageway at its other end intercommunicating the ambient atmosphere with one of the bores of said body member, a source of electrolyte liquid supply in open communication with said last mentioned bore, a vacuum source in communication with the other of said bores, and a normally open resilient valve member carried by said other end of the body and adapted to be manually movable into air passageway sealing position whereby vacuum forces within said bores will cause electrolyte to be drawn into said device and delivered therefrom at the open end thereof until such time as the level of electrolyte in said battery reaches the bottom ends of said bores whereupon the vacuum forces drawing electrolyte into said device will be interrupted.

4. A storage battery electrolyte filling apparatus comprising a casing member having dual vertical bores therein, said casing member having an air passageway at its upper end intercommunicating the ambient atmosphere with a first one of said bores, a source of electrolyte liquid supply in open communication with said first bore, a vacuum source in communication with the other of said bores, both of said bores being open at their bottom ends in communication with the interior of a storage battery cell when said casing member is mounted upon the filler opening of said cell, and a normally open resilient valve member carried by the upper end of said casing and

adapted to be manually displaced against the resiliency of said valve member into air passageway sealing contact with the upper end of said passageway, whereby vacuum forces within said device will cause electrolyte to be drawn thereinto and delivered therefrom into said battery cell until such time as the level of electrolyte in said cell reaches the bottom end of said bores whereupon the vacuum forces drawing electrolyte into said first compartment will be interrupted and the valve member will be released to return to open position.

5. A storage battery electrolyte filling apparatus comprising a casing member having a vertical inner bore, a dual compartment tube member mounted within said bore, said casing member having an air passageway at its upper end intercommunicating the ambient atmosphere with a first one compartment of said inner tube, a source of electrolyte liquid supply in open communication with said first compartment of said inner tube, a vacuum source in communication with the other of said compartments at its upper end, both of said compartments being open at their bottom ends in communication with the interior of a storage battery cell when said casing member is mounted upon the filler opening of said

cell, and a normally open resilient valve member carried by the upper end of said casing and adapted to be manually displaced against the resiliency thereof into air passageway sealing contact with the upper end of said passageway, whereby vacuum forces within said device will cause said valve to be held in closed position and electrolyte to be drawn into said first compartment and delivered therefrom into said battery cell until such time as the level of electrolyte in said cell reaches the bottom end of said other compartment whereupon the vacuum forces drawing electrolyte into said first compartment will be interrupted and the valve will be released to return to open position.

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