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METHOD FOR CLEANING AND FILLING CONTAINERS

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This invention relates to improvement in methods for cleaning and recalibrating containers. For illustrative purposes, the invention is described with reference to a type of pressure gauge, it being understood that the said method is adapted for use on any container.

Absolute pressure gauges of mercury manometers employed for precise measurement of pressure consist of a tube containing a quantity of mercury, said tube being sealed at one end and having the opening of the other end secured in a well containing mercury.

In present practice, errors in calibration occasioned by the entry of foreign particles into the tube are corrected by adding a suitable quantity of mercury to the well, or by removing a suitable quantity of mercury therefrom. When an air pocket has formed in the tube, it is drawn out by the use of a length of fine wire. But the desired sensitivity and accuracy of the instrument is not maintained when these methods are used. No amount of mercury added to or subtracted from a gauge will restore conditions assuring accurate measurement, as the slightest amount of moisture or the presence of any foreign matter whatsoever will vary such calibration. Further, use of a wire to withdraw an air pocket frequently scratches or scores the glass of the tube and slight vibration will then be sufficient to crack such glass.

The primary object of this invention is to provide a method for thoroughly cleaning containers.

Another object is to provide a simple method of cleaning containers, said method being adapted to remove substantially all foreign particles therefrom.

Still another object is to provide a method for cleaning containers, said method being adapted to permit test and recalibration thereof under optimum conditions.

Another object is to provide a method for cleaning containers whereby the operator's hands do not come in contact with the cleaning agents employed.

Further objects and advantages of this invention, as well as its arrangement and operation, will be apparent from the following description and claims.

The tube containing mercury is removed from the well of a mercury manometer and inverted in a filter flask in such a manner that the open end of said tube is positioned interior said flask and proximate the mouth thereof, and is sealed hermetically in said flask. The mercury is then

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withdrawn from said tube by pumping substantially all of the air out of said flask through a port therein. At such time, said mercury will have been deposited on the floor of said flask. The tube is then withdrawn from the flask.

Said tube is then inverted in a filter flask containing a quantity of chromic acid in such a manner that the open end of said tube is positioned interior said flask and proximate the mouth thereof, and is sealed hermetically in said flask. Substantially all of the air is then withdrawn from said tube and flask through a port in said flask. The open end of said tube is then immersed in said acid, meanwhile maintaining the hermetic seal. Air is then bled into said flask through the port thereof until the acid rises and fills the tube. The acid is then withdrawn from said tube in the same manner the mercury, above described, was withdrawn. The tube is then withdrawn from the flask.

The process above described is then repeated with water substituted for the chromic acid as a cleansing agent and finally with alcohol.

The tube is then dried as follows: Said tube is inverted in a filter flask in such a manner that the open end of the tube is positioned interior the flask and sealed hermetically therein. The flask is heated as substantially all of the air is pumped out through the port of the flask. Air is then bled back into the flask through the port and the tube removed.

Said tube is then inverted in a filter flask containing a quantity of clean mercury in such a manner that the open end of the tube is positioned interior the flask and proximate the mouth thereof and is sealed hermetically in said flask. The flask is heated as substantially all of the air is pumped out through the port of the flask. The open end of said tube is then immersed in said mercury, meanwhile maintaining the hermetic seal. Air is then bled into said flask through the port thereof until the mercury rises and fills the tube.

At this stage of the cleansing process, the tube is tested. A pump is applied simultaneously to the port of the flask and to a master gauge. When the reading of the master gauge at any given point, subtracted from absolute vacuum, equals the distance between the level of mercury in the tube and the level of mercury in the flask, the tube indicates pressure accurately.

The tube is then packed into the gauge, which has been pressure tested and filled to the proper level with clean and dry mercury.

Various modifications and changes can be made

in the subject method without departing from the scope of the invention.

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. The method of cleaning contaminated fluid and cantaminating matter out of a container having air tight rigid walls and one closed air tight end, said method comprising hermetically sealing the open end of said container in a first filter flask, pumping substantially all of the air out of said flask and substantially all of the fluid and air out of said container and then bleeding air back into said flask to permit removal of the container therefrom, then immediately hermetically sealing the open end of said container in a second filter flask containing a cleansing agent, pumping substantially all of the air out of said flask and said container with the open end of said container out of the body of the said agent, immersing the open end of said container in said cleansing agent while maintaining the hermetic seal and then bleeding air back into said flask to cause rise of the cleansing agent into the container, removing said cleansing agent from said container with the open end of said container out of the body of said agent, then immediately hermetically sealing the open end of said container in an empty filter flask, heating said container, pumping substantially all of the air out of said flask and container to thereby dry the cleansing agent remaining in the container and then bleeding air back into said flask to permit removal of the container therefrom, then immediately sealing the open end of said container in a filter flask containing clean fluid, heating said container and simultaneously pumping substantially all of the air out of said flask and container with the open end of said container out of the body of said clean fluid, immersing the open end of said container in said clean fluid, and bleeding air into the flask to cause rise of clean fluid into the container to fill completely said container with clean fluid.

2. The method of cleaning contaminated mercury and contaminating matter out of a container having air tight rigid walls and one closed air tight end, said method comprising hermetically sealing the open end of said container in a first filter flask, pumping substantially all of the air out of said flask and substantially all of the contaminated mercury plus the contaminating matter and air out of said container and then bleeding air back into said flask to permit removal of the container therefrom, withdrawing said container from said flask, then immediately hermetically sealing the open end of said container in a second filter flask containing chromic acid, pumping substantially all of the air out of said flask and said container into the open end of said container out of the body of said acid, immersing the open end of said container in said acid while maintaining the hermetic seal and then bleeding air back into said flask to cause rise of the acid into the container, withdrawing said acid from said container and then withdrawing said container from said second flask, then immediately repeating the steps above described with reference to the second filter flask with water in lieu of chromic acid, then immediately repeating the steps above described with reference to the second filter flask with alcohol in lieu of chromic acid, then immediately hermetically sealing the open end of said container in another filter flask and simultaneously heating said container and pumping substantially all the air out of said flask and container to thereby dry the alcohol remaining in the container, bleeding air back into said flask to permit removal of the container therefrom and withdrawing said container therefrom, then immediately hermetically sealing the open end of said container in a filter flask containing clean mercury, heating said container and simultaneously pumping substantially all of the air out of said flask and container with the open end of said container out of the body of said clean mercury, immersing the open end of said container in said clean mercury, and bleeding air into the flask to cause rise of clean mercury into the container to fill completely said container with clean mercury.

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