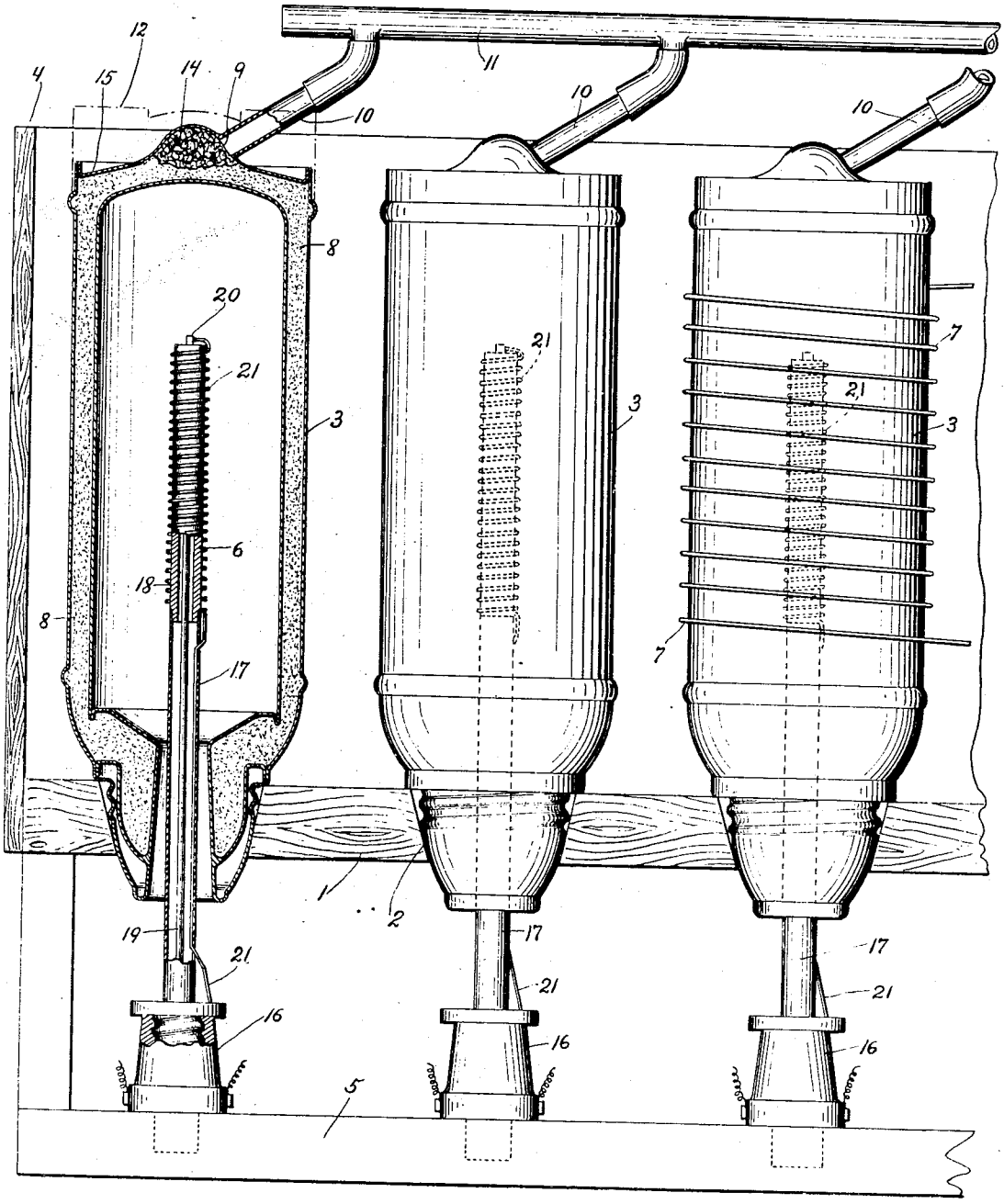
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METHOD AND APPARATUS FOR MAKING HEAT INSULATED RECEPTACLES OR THE LIKE.

APPLICATION FILED SEPT. 30, 1918.

1,360,809.

Patented Nov. 30, 1920.



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METHOD AND APPARATUS FOR MAKING HEAT-INSULATED RECEPTACLES OR THE LIKE.

1,360,809. Specification of Letters Patent. Patented Nov. 30, 1920.

Application filed September 30, 1918. Serial No. 256,290.

To all whom it may concern:

Be it known that I, HERBERT MILLS SMITH, a citizen of the United States, residing at Great Barrington, in the county of Berkshire and State of Massachusetts, have invented certain new and useful Improvements in Methods and Apparatus for Making Heat-Insulated Receptacles or the like, of which the following is a specification.

This invention relates to the manufacture of vacuum bottles of the sort shown in the United States patent to William Stanley No. 1,071,817 in which there are inner and outer shells with a vacuous space between them which is filled with finely divided insulating material.

The finely divided insulating material is in practice thoroughly heated and dried before it is put into the vacuous space, but in spite of all precautions it is liable to absorb moisture, which not only tends to destroy the insulating quality of the material but also makes it difficult to produce the desired vacuum between and around the particles of the material.

Accordingly it is an object of my invention to so treat the article with its contained insulating material during the process of pumping or evacuation, that any moisture contained in the material will be driven off simultaneously with the going on of the pumping. This I preferably accomplish by subjecting the bottle to heat during the pumping operation.

A further object is to provide means interposed between the insulation material of the bottle and the pump connection so that the particles of insulating material adjacent the pump connection will not be disturbed. This I accomplish by providing a body of material which is pervious so far as air is concerned but which acts as a barrier against the movement of particles of insulation material.

Another object of the invention is to provide a form of apparatus well adapted to the carrying out of my improved process.

Other objects of the invention, more or less broad than those stated above, together with the advantages inherent, will appear from the following description of the elements, combinations, arrangements of parts and applications of principles constituting the invention; and the scope of protection contemplated will appear from the claims.

In the drawing the figure illustrates a form of apparatus which is adapted for the practice of my invention and shows the same partly in section and partly in elevation.

Referring to the numerals on the drawings, there is shown at 1 a bed piece provided with openings 2 adapted to receive the necks of vacuum bottles of the kind referred to, the bottles being indicated at 3. Above the bed piece 1 there is a box-like structure 4 which surrounds the bottles and below the bed piece there is a sub-frame 5, from which extend upwardly electrical heating elements 6, which are adapted to pass into the open mouths of vacuum bottles which are positioned in the seats 2. These heating elements 6 are of any preferred kind and their purpose is to give off heat to the interiors of the bottles. If desired also, provision may be made for heating the bottles externally, as by providing heating coils 7 placed around the bottles. The insulating material in the vacuous space of the bottle is indicated at 8, and there is an opening left in the bottom of the bottle indicated at 9 through which the evacuation of the vacuous space takes place. Adjacent this opening 9 and between the opening and the insulating material within the vacuous space I preferably interpose a body of some material such as steel wool, indicated by the reference character 14, which permits of the withdrawal of the air from the vacuous space through it, but which prevents the withdrawal of the finely divided insulating material through the action of the vacuum pump. The pump connection is shown at 10, and leads to a vacuum line 11 common to all of the bottles of a bank or series, the line 11 going to the usual vacuum pump. In operation the bottles are placed in position as shown in the drawing, and either the internal or external heating means, or both, set into operation and continued simultaneously with the operation of evacuating the bottles through the pump connections 10 and by way of the openings 9. As a result of the heat, any moisture which may be in the insulating material is driven off and removed by the pump along with the air. By this method the time necessarily consumed in pumping out the bottles is

shortened and furthermore the moisture, which might give considerable trouble if sealed up in the vacuous space of the bottle, is positively removed. The provision of means for guarding against the sucking out of the insulating material by the pump is also important. After the drying and evacuation are completed the opening 9 is sealed up in any preferred way and a false bottom, shown in dotted lines in the figure and indicated by the reference character 12, is fixed in position. It may be observed that for the better positioning of the barrier 14 I prefer to draw the bottom 15 of the bottle down to a central projection or hump, in which the steel wool 14 is held and in the wall of which projection the vacuum opening 9 is made.

For heating and other effects interiorly of the bottle I prefer to use the form of heating element shown, with alternating current of low voltage (or direct current may be employed, with an interrupter). From the socket piece 16 extends upwardly a tube 17, and in extension of this is a lava tube 18; through tubes 17 and 18 pass conductor rod 19, spaced from tubes 17 and 18, and emerging at the top of the tube 18, as at 20, from which point wire 21 coils downwardly around tube 20, into the interior of tube 17 and to the socket piece 16. By using such an electric heating element, with an alternating current of low voltage, I believe that, in addition to the heating effect, there is caused a vibration of the surrounding metallic wall because of the magnetic waves arising from the operation of the heater, which causes molecules of gas adhering to the outer surface of the inner bottle shell to be shaken off, so that they may be removed in the process of evacuation. In this the heat waves and the magnetic waves cooperate.

I claim:

1. The method of evacuating bottles of the kind described in which the vacuous space is filled with insulating material, which consists in subjecting the vacuous space to the action of a vacuum pump simultaneously with the application of heat to the bottle, and interposing within the vacuous space and between it and the connection to the evacuating means, a body of material which permits of the withdrawal of air from the vacuous space but prevents the withdrawal of the insulating material therefrom.

2. An apparatus for the purpose described, comprising a support perforated to receive the neck of a bottle and having a sub-frame with a heating element extending upwardly through the perforation to enter the open mouth of a bottle therein, and a box-like structure surrounding the bottle so held.

3. An apparatus for the purpose described, comprising a support perforated to receive the neck of a bottle and having a sub-frame with a heating element extending upwardly through the perforation to enter the open mouth of a bottle therein, and a box-like structure surrounding the bottle so held, and means for heating the exterior of the bottle.

4. The method of evacuating receptacles of the kind described in which there are two metallic shells defining a vacuous space filled with insulating material, which consists in subjecting the vacuous space to the action of a vacuum pump, simultaneously with the functioning (interiorly of the receptacle) of an electric heating element operating with alternating current at low voltage, whereby, in addition to the generation of heat, magnetic waves are set up, substantially as and for the purpose described.

5. The method of evacuating receptacles of the kind described in which there are two metallic shells defining a vacuous space filled with insulating material, which consists in subjecting the vacuous space to the action of a vacuum pump, simultaneously with the functioning (adjacent the receptacle) of an electric heating element operating with alternating current at low voltage, whereby, in addition to the generation of heat, magnetic waves are set up, substantially as and for the purpose described.

In testimony whereof I affix my signature.

HERBERT M. SMITH.