F. W. BARTLETT.

DRYING APPARATUS.

APPLICATION FILED SEPT. 27, 1913.

1,123,833. Patented Jan. 5, 1915.

Fig. 1.

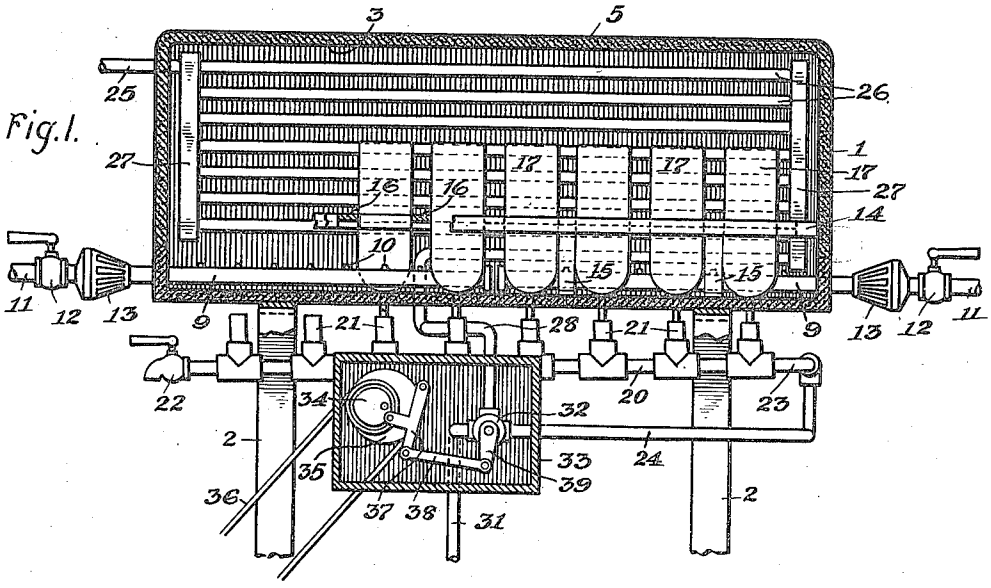



Fig. 2.

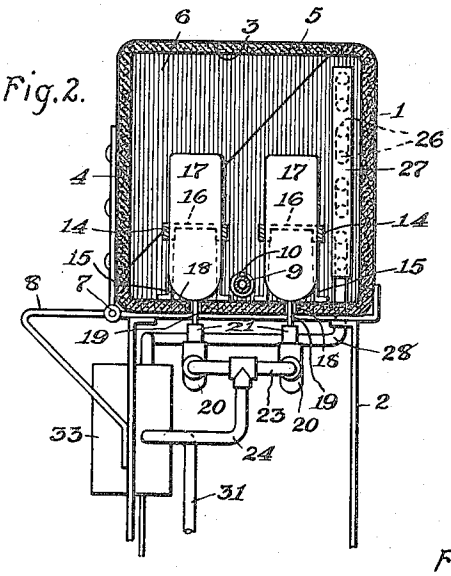



Fig. 3.

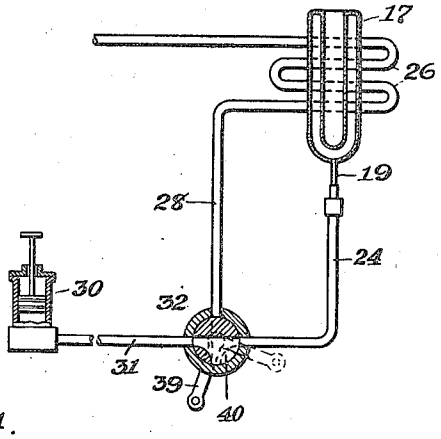
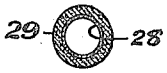



Fig. 4.




Witnesses

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# UNITED STATES PATENT OFFICE.

FREDERICK W. BARTLETT, OF CALDWELL, NEW JERSEY.

## DRYING APPARATUS.

1,123,833. Specification of Letters Patent. Patented Jan. 5, 1915.

Application filed September 27, 1913. Serial No. 792,206.

*To all whom it may concern:*

Be it known that I, FREDERICK W. BARTLETT, a citizen of the United States, residing at borough of Caldwell, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Drying Apparatus, of which the following is a specification.

This invention relates to apparatus used in the manufacture of vacuum bottles, that is to say, bottles or receptacles having a double wall with an evacuated space between the inner and outer walls. Such receptacles are made by inserting a smaller receptacle within a larger one and then sealing together their upper edges. The inner surface of the outer vessel and the outer surface of the inner one are then coated with a reflecting material such as a deposit of silver, and the space intervening between said vessels or receptacles is then exhausted of air. The ordinary method of doing this is to subject the bottles to heat while pumping out the air. This merely makes them hot without driving out, to any great extent, the moisture and the gases. The result is to prolong the pumping operation at considerable expense of time and power, without giving uniform and satisfactory results. I have found that a large part of the time consumed in pumping out the air is owing to the fact that the receptacles have not been properly dried before the pumping operation is effected, and the object of the present invention is to shorten this step in the manufacture of such articles.

The invention consists in a method of procedure and an apparatus for carrying out such method. Briefly stated, I drive off the moisture by subjecting the receptacles to a vacuum and to hot dried air alternately, these operations being repeated at regular intervals. I find in actual practice that I can cut down the time from sixty or seventy minutes to about thirty minutes, thus doubling the production in a given period.

The apparatus which I have invented to carry out this method comprises an oven containing suitable racks to hold the bottles or other receptacles, with means for heating said oven quickly to a temperature of about six hundred degrees Fahrenheit. This is a greater temperature than that to which they are subjected in the final pumping operation. In other words, I subject the bottles to a greater heat while they are being dried, and drive off the gases at this high heat, so that such gases will not be given off later in the final pumping oven where the temperature is lower. In this way, I do work outside of the final pumping oven which does not properly belong to it, and thereby increase the output of the apparatus.

In the accompanying drawing, Figure 1 is a longitudinal section of my pre-pumping oven, Fig. 2 is a cross section of the same, Fig. 3 is a diagram of the piping and the controlling valve, and Fig. 4 is a cross section of a pipe.

The oven consists of a suitable box 1 mounted on a framework 2 and capable of being opened for the purpose of inserting and removing the bottles. The box is preferably made of sheet metal with a lining 3 of refractory material, such as asbestos. I prefer to divide the box on a diagonal plane, so that the front 4 and top 5 are secured to triangular end portions 6. This part of the box is hinged at 7 at the lower edge of the front, and can be opened outwardly, resting when open upon brackets 8 forming part of the framework.

Along the middle of the bottom of the box extends a gas burner consisting preferably of two pipes 9 terminating near the center of the box and each provided on its upper side with a row of small orifices, which may be provided with tips 10. A gas pipe 11 is connected with the outer end of each pipe, the supply of gas being regulated by a cock 12, while the air is controlled by a rotary inlet valve 13.

One or more racks run lengthwise of the box, preferably one on either side of the gas burners, each rack consisting of longitudinal side bars 14 mounted on uprights 15 and connected at intervals by cross bars 16. The spaces between the side bars in each rack are the same as between the cross bars, so that a plurality of square openings are formed, each opening being of a size to receive easily a bottle 17. In the vertical central axis of each space a hole 18 is formed in the bottom of the oven to receive the tubulature 19 which projects from the lower end of the outer vessel. Under each row of holes is a tube 20 having a series of nipples 21 which receive the projecting ends of said tubulatures and make a gas-tight joint therewith. The tubes 20 are preferably in-

clined so that the moisture extracted from the bottles can be drained off through drip cocks 22 at their lower ends. A cross pipe 23 connects the tubes 20 and both tubes are connected by a pipe 24 with a three-way cock hereinafter described.

A source of chemically dried air is connected to a pipe 25. I prefer to use calcium chlorid and anhydrous phosphoric acid to dry the air, and it then passes to a heating device, preferably a set of pipes 26 connected to headers 27 and located in a vertical tier at the back of the oven. The air passes back and forth through this heater and finally flows through a pipe 28 to the three-way cock. The tubes 20, nipples 21, and the pipes 23, 24, 25 and 28 are preferably jacketed with an insulating covering 29 as shown in Fig. 4, to prevent radiation.

A vacuum pump, conventionally represented at 30 in Fig. 3, is connected by a pipe 31 with the three-way cock 32. A suitable casing 33 incloses said cock and also a timing device for automatically operating the same at predetermined intervals. This device is preferably a cam 34 rotated by a pulley 35 and belt 36 from some suitable motor (not shown). The cam actuates a lever 37 whose free end is connected by a rod 38 with the arm 39 on the spindle of the cock. The barrel of the cock contains a port 40 which in one position connects the pipe 24 with the vacuum pipe 31 and in its other position with the hot dry air pipe 28; the pipe not so connected being shut off.

The operation is as follows:—The bottles are placed in the racks with their tubulatures projecting down through the holes 18 and making a tight joint with the nipples 21. The gas burners are lighted and the oven closed. The air inside quickly heats up to several hundred degrees Fahrenheit. The three-way cock is turned to the position shown in Fig. 3, connecting the bottles with the vacuum pump, which extracts a portion of the moisture and gases from the spaces between the inner and outer receptacles. At the end of a predetermined time the timing mechanism shifts the cock so that the vacuum is shut off and the pipe 28 connected to the bottles. A current of dry air is drawn, by the vacuum remaining in the bottles, through the hot heating pipes, filling the spaces between the receptacles with the hot dry air, which rapidly absorbs a portion of the moist gases left in such spaces. The timing mechanism presently shuts off the hot air and opens the spaces to the vacuum pump again, whereby the moisture laden hot air is sucked out. These alternate heatings and evacuatings are repeated for say half an hour at intervals of a few minutes, resulting in a thorough drying out of the bottles and preparing them for the final pumping and sealing off, which will occupy much less time than by the old method.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. Apparatus for preparing double walled vessels for final evacuation, comprising a support for said vessels, a tube having nipples adapted to make connection with said vessels, means for creating a vacuum in said tube, and means for heating air and admitting it to said tube.

2. Apparatus for preparing double walled vessels for final evacuation, comprising an oven having holes in its bottom, a tube having nipples in line with said holes, means for creating a vacuum in said tube, and means for heating air and admitting it to said tube.

3. Apparatus for preparing double walled vessels for final evacuation, which comprises an oven having holes in its bottom, a tube having nipples in line with said holes, means for connecting said tube with a source of vacuum, air heating pipes in said oven, and means for connecting said heating pipes with said tube.

4. Apparatus for preparing double walled vessels for final evacuation, which comprises an oven having holes in its bottom, a tube having nipples in line with said holes, means for connecting said tube with a source of vacuum, air heating pipes in said oven, means for connecting said heating pipes with said tube, and means for effecting said connections alternately.

5. Apparatus for preparing double walled vessels for final evacuation, which comprises an oven having holes in its bottom, a tube having nipples in line with said holes, means for connecting said tube with a source of vacuum, air heating pipes in said oven, means for connecting said heating pipes with said tubes, and means for automatically effecting said connections alternately.

6. Apparatus for preparing double walled vessels for final evacuation, which comprises an oven having holes in its bottom, a tube having nipples in line with said holes, a pipe leading from a source of vacuum, a pipe leading from a source of hot dry air, and a three-way cock for connecting said pipes alternately with said tube.

7. Apparatus for preparing double walled vessels for final evacuation, which comprises an oven having holes in its bottom, a tube having nipples in line with said holes, a

pipe leading from a source of vacuum, a pipe leading from a source of hot dry air, a three-way cock for connecting said pipes alternately with said tube, and an automatic timing device for actuating said cock.

8. Apparatus for preparing double walled vessels for final evacuation, comprising a box having holes in its bottom, a rack extending lengthwise of said box in line with said holes, a gas burner along the bottom of said box, heating pipes at one side of said box, a tube underneath said box having nipples in line with said holes, a pipe leading from a source of vacuum, and a three-way cock for connecting said pipe and said heating pipes alternately with said tube.

9. Apparatus for preparing double walled vessels for final evacuation, comprising a box having holes in its bottom, a rack extending lengthwise of said box in line with said holes, a gas burner along the bottom of said box, heating pipes at one side of said box, a tube underneath said box having nipples in line with said holes, a pipe leading from a source of vacuum, a three-way cock for connecting said pipe and said heating pipes alternately with said tubes, and a power-driven cam for actuating said cock at predetermined intervals.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK W. BARTLETT.

Witnesses:
ARTHUR D. CAEN,
JOSEPH N. TUTTLE.