

(No Model.)

J. D. HALL.

THERMOMETER TUBE FILLING APPARATUS.

No. 449,443.

Patented Mar. 31, 1891.

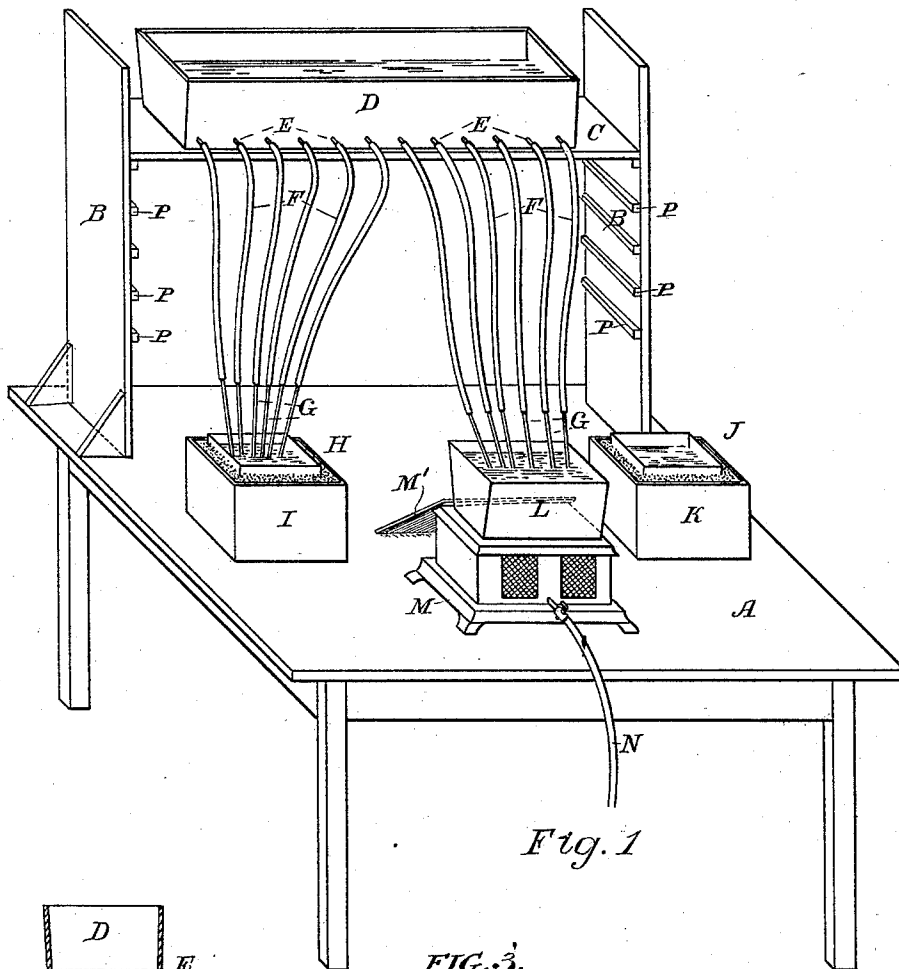


Fig. 1

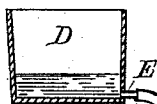


FIG. 3.

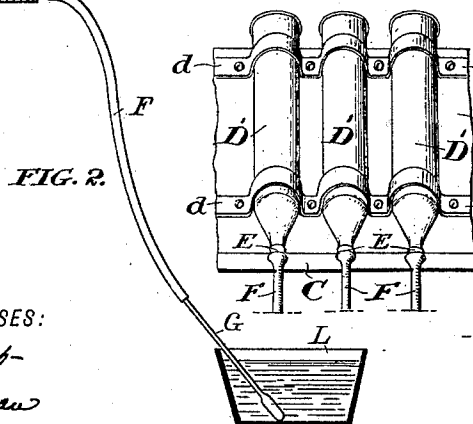


FIG. 2.

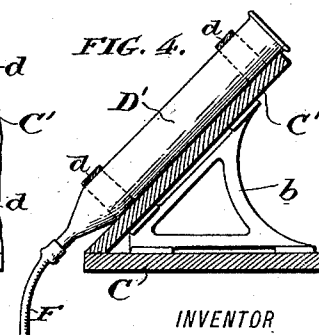


FIG. 4.

WITNESSES:

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JOHN D. HALL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THOMAS C. BALDERSTON, OF SAME PLACE.

THERMOMETER-TUBE-FILLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 449,443, dated March 31, 1891.

Application filed December 19, 1890. Serial No. 375,228. (No model.)

To all whom it may concern:

Be it known that I, JOHN D. HALL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Thermometer-Tube-Filling Machines, of which the following is a specification.

The ordinary method of displacing the air and filling thermometer-tubes with either alcohol or mercury is to force out the air (a portion at a time) by heating the bulb and then quickly inverting the tube and inserting the open end into a vessel of alcohol or mercury.

The object of my invention is to produce a machine or apparatus by the use of which thermometer-tubes may be filled with either alcohol or mercury with greater rapidity and less cost and waste than by methods heretofore in practice.

Referring to the drawings, which illustrate my invention, Figure 1 is a perspective view of my complete machine or apparatus. Fig. 2 is a sectional view of the water-containing vessel and the spirit or mercury containing vessel, including a side view of the thermometer-tube and its flexible hose-connections. Fig. 3 is a front view of several detached spirit-containing vessels with their connections, and Fig. 4 is the side of the same.

This machine or apparatus is cheaply and simply constructed and consists, mainly, of a common low table A, one or more spirit or mercury holders D or D', two or more water-containing vessels I L K, and a heating device M.

In practice I make the table A of common pine or other lumber, about two feet high and about three and a half feet square, and the other parts of my machine in suitable proportion thereto. The shelf C and the up-rights B are likewise conveniently made of common inch boards. The water-containing vessels I L K, I usually construct of galvanized sheet-iron, while the spirit or mercury holder or holders D or D' may be made of sheet-tin, galvanized sheet-iron or glass, porcelain, or pottery, and singly or in several separate parts D', as shown in Figs. 3 and 4.

When filling the tubes with alcohol, I use

hot water in the vessel L and cold water in the vessels I and K. As indicated in the drawings, these vessels I and K are set and bedded in boxes of sawdust or plaster-of-paris, the object being to keep the water they contain comparatively cool, while the water in the vessel L should be kept up to about boiling-heat. The object of the cleats P is to enable the adjustment of the shelf C to a higher or lower position to suit the various lengths of tubes to be filled.

For heating purposes I use an ordinary gas or oil cooking-stove or one or more Bunsen gas-burners. For the spirit or mercury containing vessels I sometimes use a single tank D, provided with several tubular outlets E, as shown in Fig. 1; but I prefer several separate vessels D', as shown in Figs. 3 and 4. These latter vessels I construct of glass tubing, the lower ends of which are drawn down to a suitable size to receive a piece of vulcanized-rubber tubing F, as shown in the drawings, and these vessels or bottles are conveniently attached to an inclined bracket-shelf C' by means of screws and two leather straps d, as shown in Figs. 3 and 4.

As will be readily understood, the thermometer-tube that is to be filled is attached to the liquid-containing vessel D or D' by means of a piece of vulcanized rubber tubing F.

For convenience in operating, and in order to diminish as much as possible the weight or back-pressure of the spirit or mercury upon the air that is to be forced out of the tube, I place the liquid-containing vessel D' at an inclination of about forty-five degrees, as shown in Fig. 4.

In Fig. 1, M' is a metallic safety-screen reaching from the table A to the hot-water vessel L to prevent any of the spirit reaching the fire in case of leakage from the hose-connections F.

Of course it will be understood that the hot-water-containing vessel must be dispensed with when we desire to fill the thermometer-tubes with mercury, as the temperature of the water cannot be raised to a sufficient height to vaporize mercury, which it is necessary to do to force the air from the tube. In this case I substitute a Bunsen burner or

other suitable heating-flame; also, when filling mercurial tubes the water in the vessels I and K must not be kept cool, but, on the contrary, quite hot; otherwise the immersion 5 of the tube-bulbs into it would cause considerable cracking or breaking, or, in fact, the water may also be dispensed with in these vessels and the tube-bulbs allowed to cool down in the air until the vapor of mercury 10 within is condensed; also, when filling tubes with mercury I sometimes substitute metallic jointed tubes in place of the vulcanized rubbers.

By the ordinary method of filling tubes 15 with mercury, as before stated, considerable vapor of mercury is thrown out into the air of the room of the operator, thus wasting considerable mercury and causing great injury to the health of the operator, while by the 20 use of my invention these objections are entirely obviated, as the vapor of mercury is all sure to be condensed when it reaches the comparatively cool body of mercury in the vessel D, and only the uncondensable air escapes from the tube up through said body of 25 mercury into the operator's room. It should also be noted that by the use of my invention there can be no waste of spirit through the escape of the vapor up through the body of the spirit in the vessel D or D' or by its escape directly from the tube, as is the case by 30 the old method.

I describe the filling of thermometer-tubes with spirit by the use of my invention as follows: 35

First. Attach several thermometer-tubes to the hose-connections F, as shown in Figs. 1 and 2.

Second. Heat the water in the vessel L to 40 nearly boiling temperature.

Third. Pour a supply of spirit into the vessel or vessels D or D'.

Fourth. Immerse the tubes of the several hose into the hot-water vessel by swinging 45 them to the right or left, as required. Then after the lapse of a few seconds immerse them into the cold-water vessels I and K by swinging them to the right or left, as required.

Fifth. Allow the bulbs to remain in the cold 50 water a sufficient time to condense any vapor they may contain and considerably reduce the bulk of their contents by the cooling process.

Sixth. Repeat the operation of shifting the bulbs from the hot to the cold water, and vice versa, until the air is all expelled and the 55 bulbs are completely filled with the spirit. When this is done, the filled tubes are readily removed and empty ones supplied without wasting the spirit by raising the lower ends of the rubber hose above the level of the spirit 60 in the vessels.

The process of filling tubes with mercury is the same as the above, with the exception that the water-vessels are dispensed with and the heating is done in a flame and the cooling in 65 the air, or possibly in hot water.

I claim as my invention—

1. The combination, in a thermometer-tube-filling machine or apparatus, of the hot and cold water containing vessels, the filling-liquid-holding vessel or vessels, the heating device, and the connecting-pipes, substantially 70 as and for the purpose set forth.

2. The combination, in a thermometer-tube-filling machine or apparatus, of the hot and cold water containing vessels, the filling-liquid-holding vessels, and the flexible tube-connections. 75

3. The combination, in a thermometer-tube-filling machine or apparatus, of the hot and cold water containing vessels and the flexible tube-connections with the filling-liquid-holding vessel or vessels provided with suitable hose-connecting nozzles E. 80

4. The combination, in a thermometer-tube-filling machine or apparatus, the hot and cold water containing vessels and the filling-liquid-holding vessel or vessels provided with the flexible tube-connections, and the shelf-adjusting standards B. 85 90

5. The combination, in a thermometer-tube-filling machine or apparatus, of the shelf-adjusting standards, the hot and cold water containing vessels, the filling-liquid-holding vessel or vessels, the heating device, and the safety-screen M, substantially as and for the 95 purposes set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN D. HALL.

Witnesses:

MORRIS R. BOCKIUS,
DANIEL E. BROGAN.