Aug. 20, 1929. M. P. WETMORE 1,725,035

MACHINE USED IN SILVERING DOUBLE WALLED VACUUM BOTTLES

Filed July 30, 1927. 2 Sheets-Sheet 1

FIG. 1.

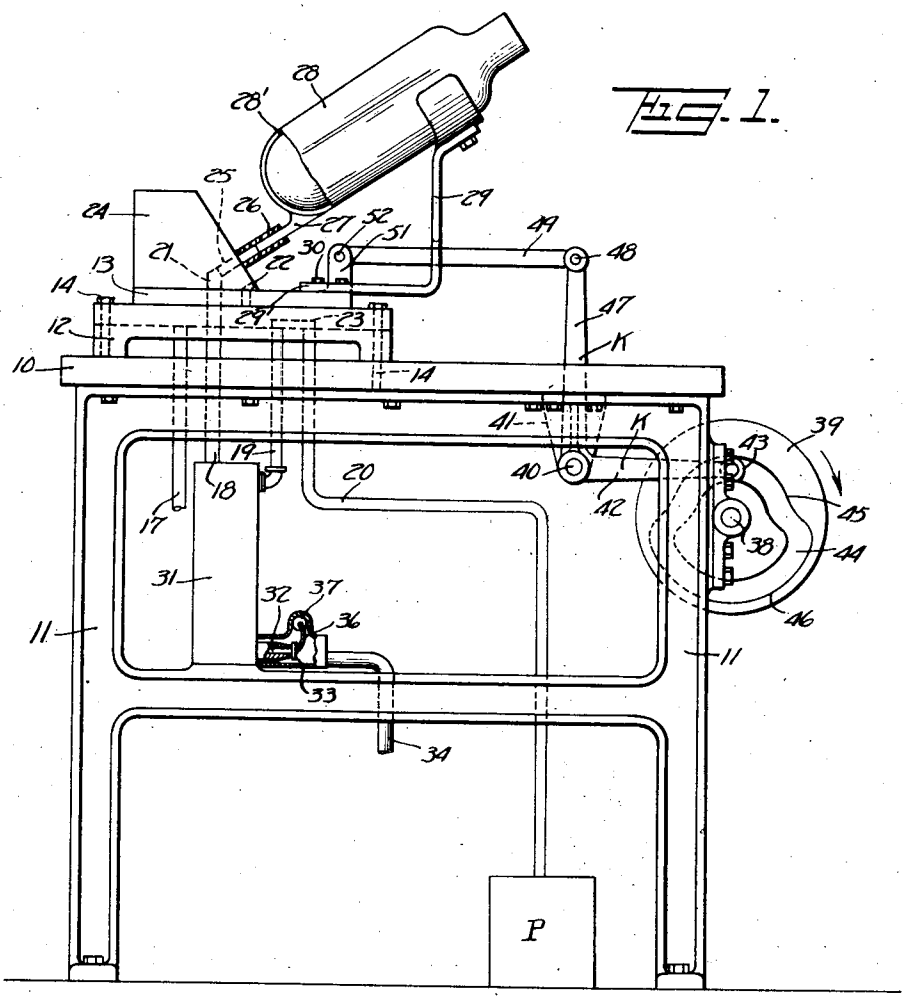

FIG. 2.

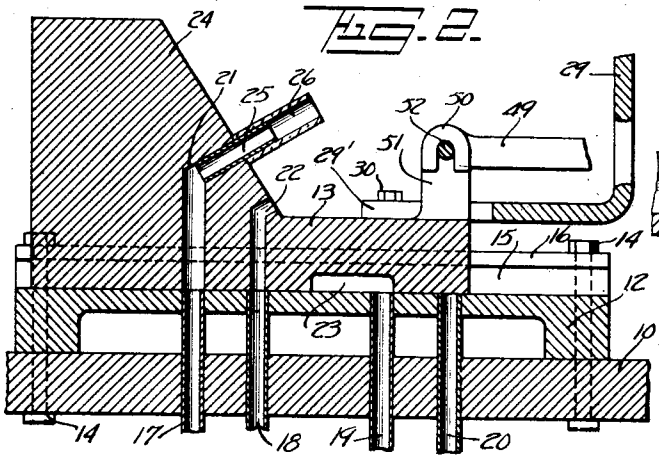

FIG. 5.

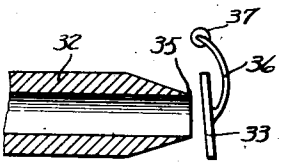

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FIG. 3.

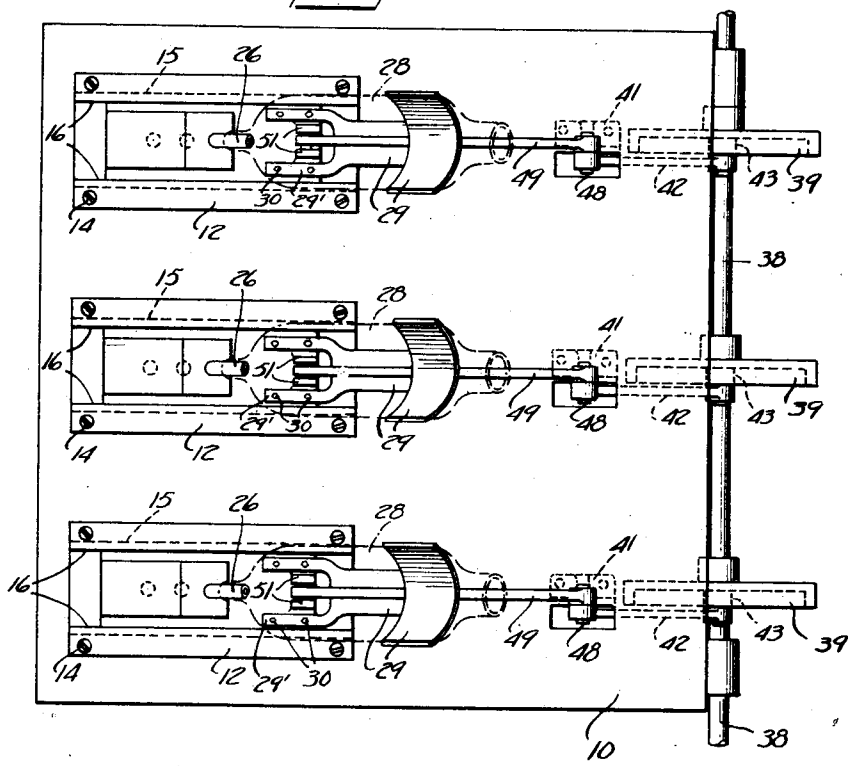
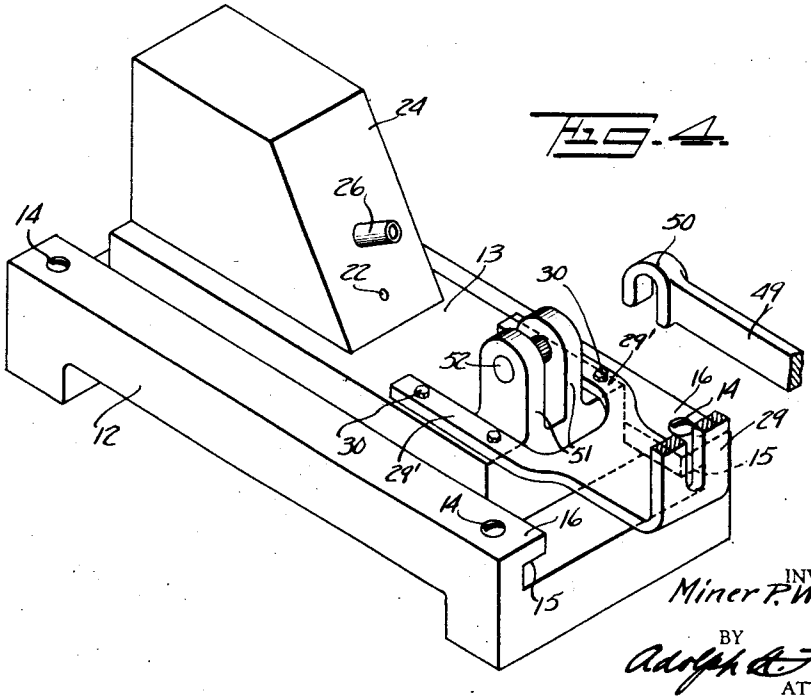


FIG. 4.



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UNITED STATES PATENT OFFICE.

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MACHINE USED IN SILVERING DOUBLE-WALLED VACUUM BOTTLES.

Application filed July 30, 1927. Serial No. 209,606.

My invention relates to the manufacture of double-walled vacuum bottles, and its object is to provide novel apparatus for subjecting the bottles to certain necessary treatment during the silvering operation.

It is generally understood that vacuum bottles comprise a pair of concentric glass cylinders united at the top and spaced by a narrow annular chamber which has been evacuated to act as a heat-insulating medium. The inside walls of this chamber are silvered to improve the temperature-retaining property of the bottle. The common practice of producing a silver coating is to draw a suitable silver solution into the vacuum chamber and allow the solution to remain there until a film of metallic silver is precipitated on the surrounding glass walls. The spent solution must then be removed and the silvered chamber thoroughly rinsed with water.

The subject-matter of this invention is a machine for quickly and efficiently carrying out the last-mentioned step in the silvering process. Briefly stated, my new machine has a movable valve for connecting the silvered vacuum chamber of a bottle with a vacuum pump to draw off the spent solution and then connecting the evacuated chamber with a source of water supply to fill it with clean water. These draining and flushing operations take place automatically after the bottle is placed on the machine, and they require no more than a few seconds. In a preferred embodiment of my invention, the bottle is supported on a slide valve which is operated by a cam to connect the bottle successively with a vacuum pump and a water pipe. Several bottles may be treated on the machine at the same time.

The novel features and practical advantages of my invention will be fully understood from a detailed description of the accompanying drawings, in which—

Fig. 1 shows a side elevation of a machine constructed in accordance with my invention, the bottle being connected with a vacuum pump;

Fig. 2 represents an enlarged cross-section through the slide valve that supports the bottle, the valve ports being in position to connect the bottle with a water supply;

Fig. 3 is a plan view of the machine;

Fig. 4 shows the slide valve and its mounting in perspective; and

Fig. 5 is a fragmentary detail view, partly in section, showing a preferred form of check-valve in the drain line of the trap or tank into which the solution runs.

On a suitable arm or table 10 supported on legs 11 is mounted valve mechanism consisting of a fixed member 12 and a slidable member 13. Fig. 3 shows three valve mechanisms mounted on the table, but a description of one will suffice for all. The member 12 is secured to the table by screws or bolts 14, or in any other practical way.

The valve member 13 is slidably mounted on member 12, being guided in its movements by engaging in side grooves or channels 15 formed by overhanging flanges 16. For convenience I shall refer to the stationary member 12 as the valve seat. Through the table top 10 extend pipes 17, 18, 19 and 20 which terminate in valve seat 12, as best shown in Fig. 2. Pipe 17 is connected with a source of water supply under pressure, and it may therefore be called the water inlet pipe. Pipe 20 is connected to a source of vacuum, such as a vacuum pump P, which is supposed to be in continuous operation. The slidable valve 13 is provided with ports 21, 22 and 23. The ports or passages 21 and 22 extend through a bevelled block 24 provided on valve 13. The port 22 is an air vent, the purpose of which will presently be explained. The port 23 is an undercut passage for connecting the pipes 19 and 20 when the valve 13 is in the position shown in Fig. 1. A short pipe 25 is inserted in the outer end of port 21 for supporting a piece of rubber tubing 26 adapted to receive the tubular extension 27 of a double-walled glass filler or bottle 28. This is clear from Fig. 1. The connection between the parts 26 and 27 is supposed to be airtight. It is hardly necessary to explain that the tubular extension 27 communicates with the annular vacuum chamber 28′ of bottle 28. The bottles are supported on a suitable bracket 29 having extensions 29′ secured to the slide valve 13 by bolts or screws 30.

Below the frame or table 10 is supported a trap 31, which is a closed tank of suitable construction and size. The pipes 18 and 19 are permanently connected to trap 31 at the top. From the bottom of the trap leads an outlet 32 controlled by a check-valve 33 and connected with a drain pipe 34. In actual prac-

tice I prefer a check-valve in the form of a brass disk plated with chromium or other acid-resisting metal. The end of outlet 32 is tapered, as indicated at 35 in Fig. 5, to form a slightly resilient or yieldable seat for the check-valve 33, so that an airtight closure is instantly formed when the vacuum in trap 31 closes valve 33. An arm 36 pivoted at 37 allows the valve disk 33 to hang normally in open position, as indicated in Fig. 5 on an exaggerated scale. The instant that the pressure in trap 31 goes below atmospheric, the valve disk 33 swings into airtight contact with the tapered end 35 of outlet 32. As soon as the underpressure in the trap ceases, the valve disk 33 swings automatically to open position.

The slide valve 13 is operated from a driving shaft 38 and is controlled through a cam 39. In the machine as actually constructed, the shaft 38 rotates continuously and the cam 39 is mounted loosely on the shaft. Clutch mechanism controlled by foot power connects the cam 39 with the power shaft when desired. Since my present invention is not concerned with any particular means for operating or controlling the cam 39, I need not show or describe any foot-controlled or hand-controlled clutch for the cam. Below the table 10 is pivoted a bellcrank K on a pin 40 supported in a bracket 41, which is fixed below the table top. The horizontal arm 42 of the bellcrank carries a roller 43 arranged to engage in the groove 44 of cam 39. As shown in Fig. 1, the cam groove 44 consists of a low track 45 and a high track 46. The vertical arm 47 of the bellcrank has pivoted thereto at 48 a link 49, which terminates in a hook 50. The slide valve 13 is provided with a pair of ears or lugs 51 carrying a pin 52 for receiving the hooked end 50 of link 49. In this way a readily separable connection is established between the slide valve 13 and the bellcrank K, thereby allowing the slide valve to be easily removed when necessary or desired. In the broad view of my invention, any other practical connections may be employed for operating the slide valve 13.

When the cam roller 43 of the bellcrank K is in the low cam track 45, the slide valve 13 connects the bottle 28 with the vacuum pump. This is evident from Fig. 1, where it will be seen that the port 21 connects with pipe 18 leading to the trap 31. At the same time, the pipes 19 and 20 are connected through the undercut port 23. Since pipe 20 is connected to a vacuum pump, the contents in the vacuum chamber of bottle 28 are drawn off into trap 31. The valve occupies this drawing-off position for approximately half a revolution of cam 39. When the cam roller 43 engages the high cam track 46, the bellcrank K is rocked counterclockwise (as viewed in Fig. 1) and the slide valve 13 is moved toward the left into the position shown in Fig. 2. The port 21 is now in connection with pipe 17 and the pipe 18 is connected with the air port 22. The evacuated chamber 28′ of bottle 28 is instantly filled with water from pipe 17. The water rushes into the bottle chamber with a swirling motion which has a rinsing and cleansing effect. The trap 31 being now open to the atmosphere through air-inlet 22, the solution previously drawn into the trap is now free to run out through the drain pipe 34. It will be understood from what was previously said about check-valve 33 that, when the trap 31 is open to the air through vent 22, the valve 33 automatically swings to open position and allows the trap to drain.

After the bottle 28 has been filled with water through pipe 17, the operator removes the bottle and closes the tubular extension 27. The water-filled bottle is then subjected to further treatment, which need not be gone into here, since it forms no part of this case. Before or as the slide valve 13 moves back to drawing-off position, the attendant puts another bottle on support 29 and connects it with the rubber tube 26, whereupon the operations above described are automatically repeated. I have found that one operator can easily take care of three bottles at the same time, the cams 29 being so arranged that when one slide valve is in drawing off position, another valve is in flushing position. It takes only a few seconds to empty a bottle and fill it with fresh water.

For the purpose of explaining my invention so that those skilled in the art may fully understand and use the same, I have described and illustrated a machine that I actually built and successfully operated. I want it understood, however, that my invention is not limited to the construction herein set forth, for it is manifest that changes and modifications may be resorted to without deviating from the scope of the invention as defined in the appended claims.

I claim as my invention:

1. In a machine of the class described, a movable valve adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, means for operating said valve, means for successively connecting said valve port with a vacuum pump and with a source of water supply and a self-draining trap in the connections leading to the vacuum pump.

2. In a machine of the class described, a horizontally reciprocable support for a double-walled vacuum bottle and means for connecting the vacuum chamber of a supported bottle successively with a source of vacuum and with a source of water supply, whereby the contents of the vacuum chamber are first drawn off and then the evacuated chamber is filled with water.

3. In a machine of the class described, a horizontally slidable valve adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, an inlet pipe, connections leading to a vacuum pump, and means for reciprocating said valve for periodically connecting said port first with said vacuum connections and then with said inlet pipe.

4. In a machine for treating double-walled vacuum bottles containing a solution in the vacuum chamber between the cylinders, a bottle support having a passage adapted to communicate with the vacuum chamber of a supported bottle, a water inlet pipe, connections leading to a vacuum pump, a trap included in said vacuum connections, movable valve mechanism for successively connecting said passage with said trap and with said water inlet pipe, whereby a bottle on said support is first emptied of its solution and then filled with water, means for operating said valve mechanism, and means whereby said trap is automatically drained when said valve port is disconnected from the vacuum pump.

5. In a machine of the class described, a supporting frame or table, a valve seat fixed on said table, an inlet pipe and a vacuum pipe leading to said valve seat, a horizontally slidable valve mounted on said valve seat and adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, a second port in said valve, said valve ports being so arranged that movement of the valve successively connects said passage with the vacuum pipe and the inlet pipe, and means for reciprocating said valve.

6. In a machine of the class described, a a slide valve adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, a water inlet pipe, connections leading to a vacuum pump, said connections including a trap, means for operating said valve for successively connecting said port with said vacuum connections and with said water inlet pipe, means for automatically opening said trap to the atmosphere when said valve port communicates with the water inlet pipe, and means whereby said trap is automatically drained when open to the atmosphere.

7. In a machine of the class described, a horizontally movable valve member carrying a bracket for supporting a double-walled vacuum bottle in an inclined position, a passage provided in said member, a tube projecting at an angle from said member and permanently connected with said passage, said tube being adapted to receive the tubular extension of a vacuum bottle in an airtight fit, connections for reciprocating said valve member and means for successively connecting said passage with a source of vacuum and with a source of water supply.

8. In a machine of the class described, a slide valve carrying a bracket for supporting a double-walled vacuum bottle in an inclined position, a passage provided in said valve, a tube projecting from said valve and permanently connected with said passage, said tube being adapted to receive the tubular extension of a vacuum bottle in an airtight fit, a stationary seat on which said valve is slidably mounted, an inlet pipe and a vacuum pipe leading to said valve seat, and mechanism for reciprocating said valve to connect the supported bottle successively with said vacuum pipe and said inlet pipe.

9. In a machine of the class described, a supporting frame, a valve seat fixed on said frame, an inlet pipe and a vacuum pipe leading to said valve seat, a slide valve mounted on said valve seat and adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, a second port in said valve, said valve ports being so arranged that movement of the valve successively connects said passage with the vacuum pipe and the inlet pipe, a bellcrank pivoted on said frame, means for connecting one arm of said bellcrank with said slide valve, and an operating member connected to the other arm of said bellcrank.

10. In a machine for treating double-walled vacuum bottles containing a solution in the vacuum chamber between the cylinders, a bottle support having a passage adapted to communicate with the vacuum chamber of a supported bottle, a water inlet pipe, connections leading to a vacuum pump, a trap included in said vacuum connections, movable valve mechanism for successively connecting said passage with said trap and with said water inlet pipe, whereby a bottle on said support is first emptied of its solution and then filled with water, means for operating said valve mechanism, and means for automatically draining said trap when said valve passage is connected with the water inlet pipe.

11. In a machine for treating double-walled vacuum bottles containing a solution in the vacuum chamber between the cylinders, a bottle support having a passage adapted to communicate with the vacuum chamber of a supported bottle, a water inlet pipe, connections leading to a vacuum pump, a trap included in said vacuum connections, movable valve mechanism for successively connecting said passage with said trap and with said water inlet pipe, whereby a bottle on said support is first emptied of its solution and then filled with water, means for operating said valve mechanism, and means whereby said trap is automatically cut off from the vacuum pump and opened to the atmosphere when said valve

passage is connected with the water inlet pipe.

12. In a machine of the class described, a supporting frame, a valve seat fixed on said frame, an inlet pipe and a vacuum pipe leading to said valve seat, a trap inserted in the vacuum pipe connections, a slide valve mounted on said valve seat and adapted to support a double-walled vacuum bottle, said valve having a port communicating with the vacuum chamber of a supported bottle, a second port in said valve, said valve ports being so arranged that movement of the valve successively connects said passage with the vacuum pipe and the inlet pipe, means for reciprocating said valve, and means for automatically draining said trap when the supported bottle is connected to the inlet pipe.

13. In a machine of the class described, a slide valve carrying a bracket for supporting a double-walled vacuum bottle, a passage provided in said valve, a tube projecting from said valve and permanently connected with said passage, said tube being adapted to receive the tubular extension of a vacuum bottle in an airtight fit, a stationary seat on which said valve is slidably mounted, an inlet pipe and a vacuum pipe leading to said valve seat, mechanism for reciprocating said valve to connect the supported bottle successively with said vacuum pipe and said inlet pipe, a trap for receiving the contents of the bottles drawn off by the vacuum connections, and means controlled by said valve for draining said trap when the supported bottle is connected to the inlet pipe.

14. In a machine of the class described, vacuum connections for drawing off the contents of the vacuum chamber of a double-walled bottle, a trap in said vacuum connections for receiving the drawn-off contents, an outlet pipe for said trap, said pipe terminating in a bevelled end adapted to form a yieldable valve seat, and a valve disk operatively supported adjacent said valve seat, said disk forming a sealed joint with said yieldable seat during the evacuating operation.

15. In a machine of the class described, a trap adapted to be connected with a vacuum pump, an outlet pipe for said trap, said trap terminating in a bevelled end adapted to form a yieldable valve seat, and a metal valve disk operatively supported adjacent said valve seat, said disk forming a sealed joint with said yieldable seat when said trap is connected with the vacuum pump, the sealing face of said disk being plated with acid-resisting metal.

16. In a machine of the class described, means for connecting a fluid-containing bottle with a source of vacuum to withdraw the fluid therefrom, a trap in the connections between the bottle and the vacuum pump, and means whereby said trap is automatically drained when the bottle is disconnected from the vacuum pump.

17. In a machine of the class described, a valve having a port adapted to communicate with the vacuum chamber of a double-walled bottle, means for operating said valve, means for successively connecting said valve port with a vacuum pump and with a source of rinsing fluid, and a self-draining trap in the connections leading to the vacuum pump.

18. In a machine of the class described, a reciprocable valve comprising a plate provided with a block having a bevelled face, a seat on which said plate is slidably mounted, a passage in said block, a tube projecting at an angle from said bevelled face and permanently connected with said passage, a bracket mounted on said plate for supporting a double-walled vacuum bottle whose tubular extension is inserted into said tube, connections for reciprocating said valve, and means for successively connecting said passage with a vacuum pump and a rinsing fluid.

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