Aug. 14, 1945. O. J. HERB 2,382,314

FOUNTAIN BRUSH

Filed Feb. 11, 1943

FIG. 1.

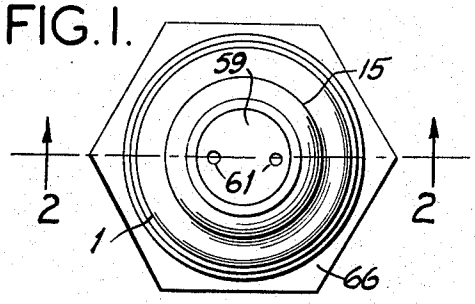


FIG. 2.

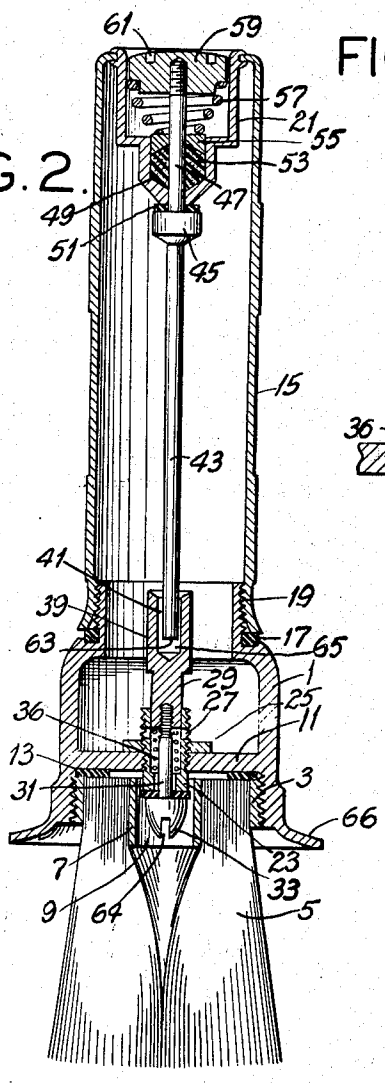


FIG. 3.

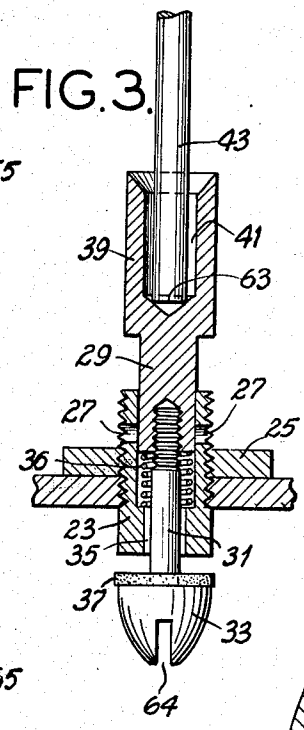


FIG. 5.

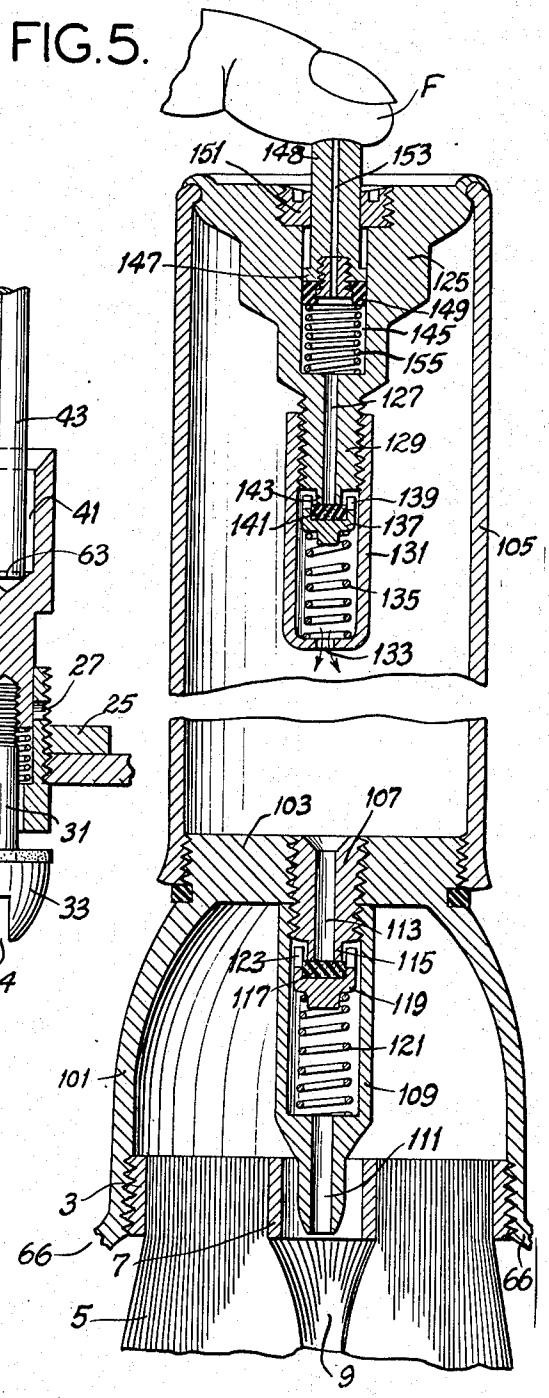
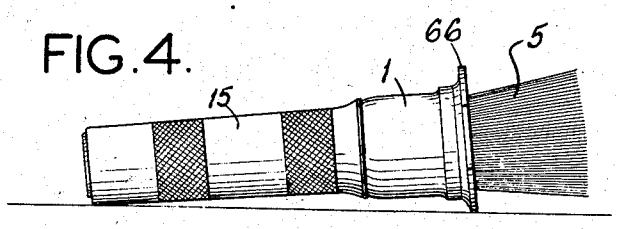


FIG. 4.



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UNITED STATES PATENT OFFICE

2,382,314

FOUNTAIN BRUSH

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1 Claim. (Cl. 15—138)

This invention relates to fountain brushes, and with regard to certain more specific features, to so-called fountain or reservoir brushes used for ink stenciling and similar operations.

Among the several objects of the invention may be noted the provision of a fountain brush having an improved form of valve and valve control, wherein the control button is in a much handier location and in which the control valve and its outlet have a better arrangement with respect to the bristle elements of the brush; the provision of a brush of this class wherein the fluid feed is metered as required, but which is definitely cut off without leakage when not required; and the provision of a brush of this class which is economical and easy to manufacture and assemble, and which is trouble proof in use. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claim.

In the accompanying drawing, in which are illustrated two of various possible embodiments of the invention,

Fig. 1 is a top plan view of one form of my new brush;

Fig. 2 is a vertical section taken on line 2—2 of Fig. 1, showing the valve closed;

Fig. 3 is an enlarged detail section of the valve forced open;

Fig. 4 is a side elevation showing the brush lying on its side; and,

Fig. 5 is an enlarged vertical section showing an alternative construction.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now more particularly to Figs. 1 and 2, there is shown at numeral 1 a body portion of my brush threaded to receive a ferrule 3 of a bristle brush assembly 5. Part of the brush assembly constitutes an inner bushing 7, which provides a space 9 in which the ink for the brush is received. The assembly of ferrule 3, bristles 5 and bushing 7 constitutes an integral brush unit which may be applied to and removed from the body 1.

At the lower end of the body 1 is a flange 66, which serves to locate the brush on an angle when laid down, as indicated in Fig. 4, whereby, to prevent smudging and the like, the bristles 5 are held clear of the supporting surface.

The body 1 is provided with a wall 11 between which and the brush assembly is located a gasket 13. This wall 11 constitutes a bottom forming part of the liquid reservoir of the brush.

Threaded to the upper end of the body 1 is a cylindric well 15 sealed by a gasket 17. The spreads are shown at 19. Fastened to and enclosing the upper end of the reservoir 15 is an enclosing cup-shaped head 21, permanently attached.

Threaded centrally into the bottom 11 is a cylinder 23 of a metering piston valve. This cylinder 23 is locked in position by a lock nut 25. Above the lock nut are inlet ports 27 which are traversed by the lower end of a piston 29, which slides in the cylinder 23.

Threaded into the end of the piston 29 is a valve stem 31 which carries a tapered valve head 33. This head has a screw-driver slot 64 for assembly purposes. This stem 31 reaches through an opening 35 spaced therefrom for permitting exit of ink from the cylinder 23. A spring 36 reacting from the lower end of the cylinder 23 and against the end of the piston 29 biases the latter up from the position shown in Fig. 3 toward the position shown in Fig. 2. That is, it biases the lower end of the piston 29 to cross the ports 27. At the same time it biases the valve head 33 toward closing the opening 35. A sealing gasket 37 seals off the opening 35 at the time that the piston 29 is up (ports 27 open).

The upper end of the piston 29 is formed as an enlarged cup 39, having a relatively large recess 41 for loosely and easily receiving the lower end of a plunger 43. This plunger 43 near its upper end has a shoulder 45, beyond which is a continuous stem 47. This stem 47 passes through a packing gland 49, the latter forming an extension from the enclosing cup 21. Between the shoulder 45 and the gland 49 is located a washer 51 which seals the lower end of the gland when the head 45 is biased toward it.

Within the gland 45 is packing material 53 which is axially compressed by means of a metal washer 55. The washer is biased against the packing by a conical spring 57. The upper end of the spring reacts against a control button 59 threaded to the end of the stem 47. Recesses 61 are for a spanner wrench, whereby the button 59 may be applied to or removed from the stem 47.

As indicated in Fig. 2, the lower end 63 of the stem 43 is substantially spaced interiorly from the cup 39, both radially and endwise. The radial space allows for quick and easy assembly even

with some inadvertent eccentricity and the endwise space 65 provides some axial lost motion between the stem 43 and the piston 29, as indicated by comparing Figs. 2 and 3.

The head 21 is made cup-shaped so as to pocket the button 59 and the spring 57. Thus the top of the button 59 is flush with the end of the reservoir 15 so that the brush may be inverted and be stable when set on end.

Operation of the form of Figs. 1–3 is as follows:

In the position shown in Fig. 2, the spring 36 has biased the piston 29 upward so that the ports 27 are open; at the same time the valve head 33 has pushed up the gasket 37 to close the outlet 35. Ink from the reservoir flows through the openings 27 and into the cylinder 23, from which it cannot at this time escape. Any air theretofore entrained in the cylinder escapes from the openings 27 to provide atmospheric pressure above the ink upon the next release or at least to prevent a vacuum from forming in the reservoir. This part of the structure constitutes a vacuum breaker. It will be noted in this connection that the brush is not connected otherwise to the atmosphere, but nevertheless interior pressure is maintained at or near that of the atmosphere.

To charge the bristles 5 with ink, the operator presses a finger down axially upon the button 59 against the action of spring 57. This first drives down the stem 43 to take up the lost motion at 65, and then depresses the piston 29, as indicated in Fig. 3. The charge of ink in the cylinder 23 is then positively forced out of the then open port 35, since the head 33 is now down. The ink runs over the washer 37 and from the end of the inverted conical head 33. This particular form and position of valve and head is advantageous, since it favors the formation of droplets which easily release themselves to proceed axially to the bristles 5. One pressure operation results in delivering to the brush a metered charge of ink, regardless of the time normally involved in the operation. When more ink is desired, the button 59 is released and again pressed. It will be seen that the release action effects indrawing of air behind the released drops, this air being trapped upon closure of the openings 35. It is this air which proceeds upward through the ports 27 when these are open. At this time, ink is admitted for the next metering stroke.

While the packing 53 can be depended upon to give a normally good seal, the gasket 51 makes an additional seal whenever the button 59 is released.

One advantage of the invention is the positively metered charging of the ink into the brush by the piston 29. Another is the disassembly allowed between 1 and 15 for refilling. The loose fit and lost motion at 65 allow of transmitting motion from the button 59 to the piston 29 without requiring too high a degree of accuracy in the longitudinal and centric dimensions of the container 15 as related to the body 1. There is considerable dimensional variation here in quantity production, and the connection therefore enhances economy with which the construction may be manufactured. It also allows for easy assembly after a filling.

Another advantage of the invention is the axial disposition of parts constituting the valve mechanism, and the position of the operating parts at the upper end of the brush, taken as a whole. This allows of a much better grip of the brush than heretofore while daubing it, and simultaneous operation of the valve.

In Fig. 5 is shown a pneumatic form of the invention, in which is avoided the necessity for the stem 43 and the lost motion connection. In this case, like numerals indicate like brush assembly parts. In this case the body 101 carries a bottom 103 to which is fastened a container 105, all forming a reservoir. Threaded into the bottom 103 is an outlet plug 107 to which is threaded a nozzle 109 having a tapered nozzle drip end 111. Formed around the lower end of the outlet 113 is a seat 115 upon which seats a gasket 117 carried in the pocket of a valve cap 119, the latter being biased by means of a spring 121 toward the seat 115. Crenelations 123 in the edge of the cap 119 allow flow around the cap when the outlet 113 is open. Flow then proceeds through the drip outlet 111.

At the upper end of the container 105 is a permanently enclosing head 125 which at its bottom has an outlet 127, located in a threaded tip 129. Threaded onto the tip 129 is a check valve holder 131 having an outlet 133 and containing a spring 135 pressing against a valve cup 137, also crenelated at 139 for permitting flow when open. The cup 137 contains a packing gasket 141, which when the cup 137 is biased up by spring 135 closes off ports 127 by seating on lip 143.

The upper end of the inlet 127 communicates with an air cylinder 145, in which is a piston 147 carrying at its end a packing 149. Assembly and guiding of the piston is accomplished by means of a bushing 151. Through the piston 147 is formed an opening 153 leading to atmosphere through a control button extension 148. The assembly of piston 147 and packing 149 is normally biased upward by means of a compression spring 155.

The assembly of lower parts 109, 121, 119 and 117 below the outlet 113 forms a check valve allowing outward ink flow but checking inward flow. The assembly of separate upper parts 131, 135, 137 and 141 below the inlet 127 forms a check valve opening for flow of air into the reservoir and closing against outward flow.

Operation of the embodiment of Fig. 5 is as follows:

The respective check valves below inlet 127 and outlet 113 are normally biased shut. Normally the extension 148 is up. The operator then simply presses down the extension 148. The finger F automatically closes the opening 153. Therefore, a charge of air is trapped beneath the descending piston and forced through the inlet 127 to open the valve 137, 141. Air under pressure flows around the crenelations 139 and into the reservoir through the port 133. This places pressure upon the ink in the reservoir.

The ink under pressure biases open the valve 119, 117. The resulting discharge supplies a drop or so of ink from nozzle 111 which drips into the brush 5, and at the same time the pressure inside the reservoir is relieved, whereupon the valve 117, 119 closes. The operator releases the extension 148 whereupon the spring 155 biases it upward and a fresh charge of air is drawn into the cylinder 145 which, upon the next operation as above described, is injected into the reservoir to force out another drop or so of ink. Thus upon each pressure stroke, air is supplied to the reservoir and a substantially metered charge of ink is supplied to the brush.

When the finger is drawn back after a stroke, the delayed action of the piston 149, due to in-

cipient vacuum therebeneath, tends to separate the extension 148 from the finger F, thereby automatically effecting opening of the inlet port 153. Thus a minimum of instruction is required for the operator.

The invention shown in Fig. 5 provides the same advantages in regard to independence of fine tolerances required for assembly. That is, the entire separation of the operating elements at the upper end connected with the member 25 allows of latitude in positioning of these with respect to the operated elements on the diaphragm 103. This is an equivalent of the lost-motion connection 65 shown in Fig. 2.

By thus mounting the operating portions of the valve in the removable tube 15 or 105 and the operated portions in the body 1 or 101, as the case may be, provision is made for easily separating these upon separating the tube 15 or 105 for refilling with ink.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

A fountain brush comprising a body portion forming an enclosing bottom, a brush assembly removably threaded to said body portion outside of said bottom, said bottom having a passage forming a cylindric outlet, a lateral connection to said passage within the bottom, a valve piston in said cylindric passage and traversing said connection, means biasing the piston to uncover the inlet connection, an auxiliary valve extending from said piston through said outlet adapted to cooperate with the end of the outlet to close it when the piston is biased to uncover said lateral connection and to open the outlet when the piston is biased to close said connection for ejection of fluid, a cylinder removably attached to said body portion to complete the reservoir, a reciprocating operating button pocketed at the end of the cylinder which is oppositely located with respect to the body portion, a stem extending from said button to said piston, said piston being formed to provide a lost-motion engagement between it and said extension, whereby said extension and piston may automatically be separated upon removing the cylindric portion of the reservoir from the body portion thereof, radial packing means in a gland between said extension and the enclosing end of the cylindric portion, a collar on said extension within the reservoir, and packing means between the collar and said packing gland operable to form an endwise seal with said gland when the button is released.

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