

UNITED STATES PATENT OFFICE

2,387,001

FOUNTAIN PEN

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Application June 2, 1944, Serial No. 538,359

7 Claims. (Cl. 120-47)

The invention relates generally to fountain pens and more particularly to a fountain pen having an ink collecting governor of the type shown in the Baker Patent No. 2,223,541, issued December 3, 1940, and provided with a filling mechanism of the type disclosed in the Dahlberg Patent No. 1,904,358, issued April 18, 1933, the governor including a so-called breather tube having one end connected with the feeding end of the pen and the other end projecting into the barrel or reservoir for the discharge of air during filling of the pen.

The general object of the invention is to provide a fountain pen of the foregoing type which permits free venting of air from the barrel or reservoir of the pen when the pen is carried into high altitudes, as in airplane travel, and which provides for the discharge of air from the barrel or reservoir by the operation of the filling mechanism.

More specifically, it is an object to provide a fountain pen of the foregoing type having an opening from the barrel or reservoir to the governor structure, which permits free flow of air from the barrel or reservoir when the pen is carried with the point up and the pressure within the barrel becomes higher than the atmosphere, as in the case of airplane travel, and which opening is adapted to be closed when the pumping device of the pen is actuated to fill the pen, so that air may be forced from the pen.

Another object is to provide in a fountain pen having a governor structure provided with a slitted shank portion forming part of a capillary ink feed channel connecting with the ink reservoir, novel means to maintain the width of the slit in the shank.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a longitudinal sectional view of a fountain pen embodying the features of the invention;

Fig. 2 is a transverse sectional view taken on the line 2-2 of Fig. 1;

Fig. 3 is a transverse sectional view taken on the line 3-3 of Fig. 1; and

Fig. 4 is a view similar to Fig. 1 but showing the position of the parts during actuation of the pumping or filling device.

When a fountain pen is carried in a pocket with the point end up and the pressure within the barrel becomes higher than atmospheric pressure, as occurs during airplane travel, the air within the

barrel must be freely vented to equalize the pressures. Such venting is provided for in most pen constructions, since the air when the pen is so carried is at the point or front end of the barrel and venting can take place through the feed structure.

In a pen of the type having an ink collecting governor and a multiple stroke filling device in the rear end of the barrel or reservoir, the so-called breather tube extends into the barrel or reservoir for such a distance that its rear open end is frequently below the level of the ink when the pen is carried with the point up. Thus, if the pen were being carried during airplane travel in this position, as when carried in a pocket, the excess pressure in the barrel would cause ink to be forced through the breather tube and out through the point of the pen.

If the breather tube were shortened so that its rear end would be above the level of the ink in the barrel or reservoir when carried with the point up, the barrel or reservoir could only be partially filled by the filling device. The reason for this is that, since the point is down during filling, the barrel or reservoir cannot be filled above the end of the breather tube, since further action of the filling device after the ink has reached that level would merely force out as much ink on a pressure stroke of the filling device as could be drawn in on the suction stroke. Thus, if the end of the breather tube is to be positioned so that air may vent therethrough when carried with the point up, the barrel or reservoir cannot be filled to anywhere near its capacity. In fact, with a barrel of uniform diameter throughout its length, it could be filled only to slightly less than one half its capacity.

In the present structure, the breather tube is so constructed as to provide an opening at the front end of the barrel or reservoir, which end is uppermost when the pen is carried in the pocket. Free venting of air is thereby provided upon a change in pressure. However, when the pumping device is actuated, the front opening in the breather tube is substantially closed, as an incident to the operation of the pumping device, so that the ink cannot be forced through the opening and into the breather tube in any substantial quantity. The air in the barrel will then be discharged through the rear end of the breather tube and any ink previously drawn into the barrel will be retained. In the preferred embodiment, the breather tube is carried by the governor structure, and a second tube serving as a means to close the opening in the front end of

the breather tube is carried by a movable part of the filling device. When the filling device is idle, the opening in the breather tube is free to vent air, but upon actuation of the filling device, the second tube, which is in telescopic relation with the breather tube, closes the opening in the latter and air from the barrel enters the second tube at the rear end thereof to be discharged through the two tubes.

As shown in the drawing, the preferred embodiment comprises a barrel 10 provided at its front end with a governor structure indicated generally at 11. In the present instance, the barrel itself serves as a reservoir. The governor structure 11 is enclosed within a shell 12 and carries a point 13 protruding a short distance from the front end of the shell. The governor structure 11 has a shank portion 14 extending into the front end of the barrel 10 and having a frictional fit therein. As a part of the feed channel through the governor structure 11 is a slit 15 positioned transversely of the shank portion 14 and extending longitudinally thereof. The shank portion 14 also is provided with a central bore 16 in which is mounted a rearwardly extending breather tube 17 acting in conjunction with the slit 15 to permit the passage of ink and air through the governor structure 11 in normal operation.

The barrel 10 is adapted to be filled with ink by means of a pumping or filling device, indicated generally at 20, mounted in the rear end of the barrel. The filling device herein shown is of the multiple stroke type shown in the above-mentioned Dahlberg patent and in its present form includes a flexible diaphragm 21 secured at one end to a fixed portion of the filling device, as at 22, and having its other end attached as at 23 to a movable plunger 24 adapted to be actuated by a movement longitudinally of the barrel to reduce the effective volume of the barrel on a pressure stroke of the device.

In the specific form of filling mechanism shown in the drawing, the plunger 24 is in the form of a socket adapted to receive the end 23 of the diaphragm. To hold the end 23 within the socket, a plug 40 having a spherical end 41 is mounted within the end 23. The plunger 24 is secured to a plunger rod 42 which is slidably supported in a body structure 43 and which extends rearwardly from the barrel 10. A blind cap 44 is threaded on the body structure 43, when the filling mechanism is not in use, to conceal the plunger rod 42 and prevent accidental actuation thereof. The plunger rod 42 is adapted to be manually pressed inwardly of the barrel and a tension spring 45 is provided to move the rod outwardly.

When the pen is carried in the pocket of the user with the point uppermost, it is necessary to permit air in the barrel 10 to be freely vented through the governor structure 11 when the pressure within the barrel exceeds atmospheric pressure. Such circumstance occurs, for instance, during airplane travel. Because of the position of the pen when so carried, any air in the barrel will be at the front end thereof. Therefore, under such condition, it is necessary to provide an opening above the level of the ink. To this end, the breather tube 17 is provided with a lateral slot 25 which provides an opening from the barrel into the interior of the tube 17 so that air may flow freely through the governor structure.

In filling the pen, the point or front end of the pen is lowermost so that any ink remaining in the barrel will be located in the front end

thereof and could, if permitted, flow through the lateral slot 25 and into the tube 17. Upon a pressure stroke of the filling device 20, such ink would be forced out through the governor structure. The succeeding suction stroke of the filling device would, of course, draw in only ink. However, the amount drawn in on a suction stroke would equal the amount forced out on the next pressure stroke. The amount that the barrel could be filled would therefore be only the amount possible to draw in on a single suction stroke.

To permit the barrel to be filled by a succession of strokes of the filling device, it is necessary to close the front end of the barrel from communication with the interior of the breather tube 17 and permit air from the rear end of the barrel, which is uppermost at that time, to be forced out in preference to ink. To this end, I provide means which automatically closes the lateral slot 25 in the breather tube 17 as an incident to the operation of the filling device. Such means also provides a passage for air from the rear end of the barrel.

In the preferred construction, said means comprises a second tube 30 rigidly secured as at 31 to the plug 40. The tube 30 extends forwardly into and is guided by breather tube 17 extending from the shank 14 of the governor structure, and is of such length that, when the filling unit is idle, the front end of the tube 30 is located at or to the rear of the lateral slot 25 in the breather tube 17. Thus, when the pen is being carried with the pen point upright, the lateral slot 25 is open to perform its function. However, in filling the pen with the pen point down, and immediately upon actuation of the filling device 20, the tube 30 is moved forwardly within the tube 17 and substantially closes the lateral slot 25, the tube 30 being dimensioned so that it will slide freely within the breather tube 17 and still will effect a substantial closure of the lateral slot. To permit flow of air through the breather tube 17 at such time, the rear end of the tube 30 is provided with an aperture 32 which permits the air from the rear end of the barrel to pass through the tube 30, the breather tube, and thence through the governor structure 11. The filling device 20 can thereby be actuated to fill the barrel to the desired extent by a plurality of strokes, the ink drawn in on each suction stroke being substantially retained and air being forced out through the tubes 17 and 30 on each pressure stroke.

The breather tube 17 is of sufficient length so that it will be in telescopic relation with the second tube 30 at all times. To facilitate assembly of the parts, the rear end of the tube 17 is flared outwardly as at 33 so that the forward end of the tube 30 may be readily inserted therein in assembly of the pen.

Since the shank 14 of the governor 11 is provided with the slit 15 and the shank has a frictional fit within the barrel 10, the barrel tends to exert a squeezing action on the shank 14, which would tend to narrow the width of the slit 15. Narrowing of the slit 15 would tend to loosen the shank 14 in the barrel as well as to interfere with proper control of ink flow. It is therefore desirable to maintain the slit 15 at its proper width not only from the standpoint of enabling the slit to feed ink properly during writing but also to maintain the shank portion 14 firmly within the barrel. In the present construction, by mounting the breather tube 17 in the bore 16 of the shank portion, the tube 17 serves to prevent the shank from being squeezed together and thus

lessening the width of this slit 15. To accomplish this end, the tube 17 has a forced fit within the bore 16.

From the foregoing description, it is apparent that I have provided a novel fountain pen which permits free venting of air from the barrel when the pen is carried into high altitudes as in airplane travel, but which prevents ink from being forced from the barrel in any substantial quantities when the pumping or filling device 20 is actuated. The lateral slot 25 permits the air to freely pass into the breather tube and thence out through the governor structure when the point is uppermost and, as soon as the filling device is actuated, the slot 25 is substantially closed so that air from the rear end of the barrel or reservoir will be forced outwardly through the governor structure.

I claim:

1. A fountain pen comprising, in combination, a barrel, a point, a governor structure for feeding ink from the barrel to the point and having a shank extending into the front end of the barrel, a breather tube extending from said shank into the barrel and having a lateral slot opening into the barrel intermediate its ends, a pumping device mounted in the rear end of the barrel and operable by a longitudinal stroke to reduce the effective volume of the barrel, and a second tube movable by operation of the pumping device and provided with an opening into the barrel adjacent the rear end, said second tube extending into said breather tube and having its front end normally positioned rearwardly from said lateral slot to retain the same in open condition but being adapted to close said slot upon operation of said pumping device whereby air in the barrel will be forced out through the opening in the rear end of said second tube.

2. A fountain pen comprising, in combination, a barrel, a point, a governor structure for feeding ink from the barrel to the point and having a shank extending into the front end of the barrel, a breather tube extending from said shank into the barrel and having an opening into the barrel intermediate its ends, a pumping device mounted in the rear end of the barrel and operable with a longitudinal stroke to reduce the effective volume of the barrel, and means movable by operation of the pumping device to close said opening and thereby prevent ink in substantial quantity from being forced from the barrel on reduction of the effective volume of the barrel by said pumping device, said means being constructed to permit flow of air from the rear end of the barrel when said opening is closed.

3. A fountain pen comprising, in combination, a barrel, a point, a governor structure for feeding ink from the barrel to the point and provided with a shank having a frictional fit in the front end of the barrel, said shank having a longitudinal slit constituting a portion of the feed channel from the barrel, a breather tube fixed within a bore in said shank and extending rearwardly into said barrel, said breather tube having a lateral slot opening into said barrel, a pumping device in the rear end of the barrel and including a part movable forwardly in the barrel to reduce the effective volume thereof, and a second tube open adjacent its rear end and movable with said part, said second tube extending into said breather tube and being positioned to close said lateral slot when moved forwardly to prevent the flow of ink through said slot, said breather tube

maintaining said slit at a predetermined width.

4. A fountain pen comprising, in combination, a barrel, a point, a governor structure for feeding ink from the barrel to the point and including a shank frictionally fitting in the front end of the barrel and having a slit constituting a portion of the feed channel in the governor structure, a breather tube fixed in said shank and extending rearwardly therefrom, said breather tube having an opening into the barrel intermediate its ends, a pumping device mounted in the rear end of the barrel and operable with a longitudinal stroke to reduce the effective volume of the barrel, and means movable by operation of the pumping device to close said opening and thereby prevent ink in substantial quantity from being forced from the barrel on reduction of the effective volume of the barrel by said pumping device, said breather tube maintaining said slit at a predetermined width.

5. A fountain pen comprising a barrel having an ink reservoir, a pen nib, ink feed means, a breather tube connected at its front end with said feed means and extending backwardly therefrom within said reservoir, said breather tube having a lateral aperture intermediate its ends and connecting the bore thereof with said reservoir, an ink pumping device carried by said barrel and manually operable repetitively to reduce the effective volume of said reservoir and including an element movable longitudinally of said barrel, and a second tube in telescopic slidable engagement with said breather tube and having its front end normally positioned rearwardly from said aperture whereby said aperture is normally open, said second tube being movable forwardly, lengthwise, in response to each volume-reducing actuation of said element and effective during the first part of each such forward movement to close said aperture and further effective to maintain said aperture closed throughout the remainder of each such forward movement, said second tube having an opening near its rear end providing a passageway from the bore thereof to said reservoir whereby air is dischargeable from said reservoir through said tubes and thence through said feed means to the exterior of the pen during each volume-reducing actuation of said pumping device.

6. A fountain pen comprising a barrel having an ink reservoir, a pen nib, ink feed means, a breather tube connected at its front end with said feed means and extending backwardly therefrom within said reservoir, said breather tube having a lateral aperture intermediate its ends and connecting the bore thereof with said reservoir, a pumping device mounted in the rear end of said barrel and operable by a longitudinal stroke to reduce the effective volume of said reservoir, and a second tube in telescopic slidable engagement with said breather tube and having its front end normally positioned rearwardly from said aperture whereby said aperture is normally open, said second tube being movable forwardly, lengthwise, in response to each volume-reducing actuation of said pumping device and effective during the first part of each such forward movement to close said aperture and further effective to maintain said aperture closed throughout the remainder of each such forward movement, said second tube having an opening near its rear end and providing a passageway from the bore thereof to said reservoir whereby air is dischargeable from said reservoir through said tubes and thence through said feed means

to the exterior of the pen during each volume-reducing actuation of said pumping device.

7. A fountain pen comprising a barrel having an ink reservoir, a pen nib, ink feed means, a breather tube connected at its front end with said feed means and extending backwardly therefrom within said reservoir, said breather tube having a lateral aperture intermediate its ends and connecting the bore thereof with said reservoir, a pumping device mounted in the rear end of said barrel and operable by a longitudinal stroke to reduce the effective volume of said reservoir, and an elongate member in telescopic slidable engagement with said breather tube and having its front end normally positioned rearwardly from said aperture whereby said aperture

is normally open, said elongate member being movable forwardly, lengthwise, in response to each volume-reducing actuation of said pumping device and effective during the first part of each such forward movement to close said aperture and further effective to maintain said aperture closed throughout the remainder of each such forward movement, said elongate member and breather tube, jointly having a continuously open, laterally confined passageway extending from a point near the rear end of said elongate member to said feed means and thence to the exterior atmosphere whereby air is dischargeable from said reservoir through said passageway to the exterior of the pen.

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