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FOUNTAIN PEN

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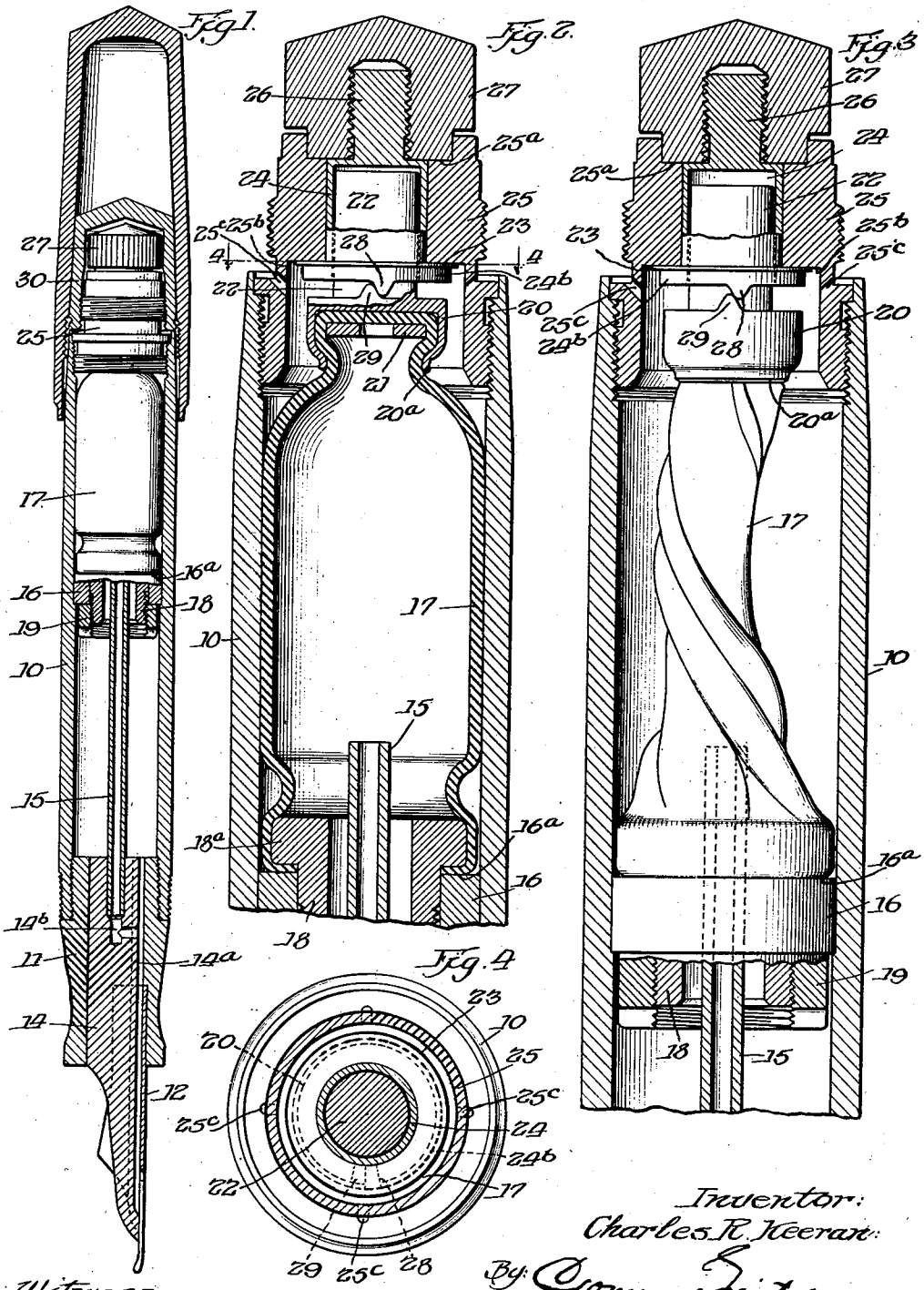

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FOUNTAIN PEN

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14 Claims. (Cl. 120—46)

This invention relates to fountain pens of the self-filling type.

A general object of the invention is the provision of improved construction for fountain pens which may be manufactured economically, which will afford the pen a large ink capacity for its size, and which is operable with facility to fill the pen rapidly and with certainty without subjecting the hands of the manipulator to soiling by the ink.

A more particular object is the provision of a fountain pen construction having a filling mechanism which is leak proof and which, excepting for the parts which are intended to be manually grasped in the filling operation, is fully housed and protected within the pen barrel.

Another particular object is the provision of a fountain pen filling mechanism in which an elastic bulb is adapted to be compressed and expanded to produce the suction for drawing ink into the ink reservoir and wherein the arrangement is such that the bulb is safeguarded against excessive or injurious distortion or displacement from its operative connections.

Another particular object is the provision of a fountain pen construction wherein operation of the filling mechanism will produce audible indication of the progressive filling of the pen, whereby it may be ascertained when the pen is full.

Other and further objects will be pointed out or indicated hereinafter, or will be apparent upon an understanding of the invention or its employment in use.

For the purpose of aiding in an explanation of the invention, I disclose in the accompanying drawing forming a part of this specification, and hereinafter describe, one form of construction in which the invention is embodied; but it is to be understood that this is presented merely by way of illustration, as it is contemplated that the invention may be embodied in other structural forms. Hence, the illustrative disclosure herewith presented is not to be construed in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In the drawing,

Fig. 1 is a longitudinal sectional view of a fountain pen embodying the invention;

Fig. 2 is an enlarged longitudinal sectional view of the upper portion of the pen, showing the suction element of the filling mechanism in its normal or distended condition;

Fig. 3 is an enlarged sectional view of the upper portion of the pen, showing the suction element in a collapsed or tensioned condition; and

Fig. 4 is a cross-sectional view substantially along the line 4—4 of Fig. 2.

Described generally, the invention contemplates a construction wherein the pen barrel affords an ink reservoir of liberal capacity and houses a flexible elastic bulb in its upper portion, said bulb extending only a fraction of the length of the ink reservoir. This bulb forms a closure for the upper end of the ink reservoir and is adapted to contain a portion of the ink charge. The bulb is adapted to be twisted in either direction, whereby it is tensioned and collapsed to expel air from the ink reservoir, so that, upon release of the tensioned bulb, it will expand to its normal form under its inherent elasticity and produce inward suction through the ink inlet passages associated with the pen point. The bulb is adapted to be twisted by manipulation of a rotary element operably associated with its upper end, the operable connection between the two being such that the bulb is freed from the twisting element when the bulb has been twisted to a certain extent, whereupon the bulb is free to resume its normal distended condition without restraint. Incident to its expansion to normal or distended condition, the bulb cooperates with the barrel in a fashion such as to produce a sound, which sound varies in pitch or intensity according to the height of the ink column in the reservoir.

In the illustrative embodiment shown in the drawing, the pen barrel, designated by the reference numeral 10, has the pen section 11 screw-threaded into its lower end. The pen section carries the pen point 12 and the feed bar 14, the latter being provided with the ink channel 14^a which opens within the barrel at its upper end and extends downwardly under the pen point. The feed bar is provided with a by-pass 14^b which communicates with the ink channel below its upper end and leads into a by-pass tube 15, which is mounted in the feed bar and extends upwardly within the barrel cavity.

At a distance above the lower end of the barrel, an anchor ring 16 is fixedly secured in the barrel cavity, the same affording at its upper end an annular shoulder or seat 16^a. The bulb 17 is formed of a flexible elastic material, such as good rubber, and is positioned in the upper portion of the barrel cavity. The bulb is closed excepting at its lower end, said lower end portion being stretched over the annular flange 18^a of a clamping collar 18, which collar extends through the orifice of the ring 16 and is secured to the ring by the nut 19,

in the setting up of which the collar 18 is drawn downwardly so as to securely clamp the lower marginal portion of the bulb between the flange 18^a and the seat 16^a. Thus the lower end of the bulb is secured in fixed relationship to the barrel. The by-pass tube 15 extends upwardly through the collar 18 and its upper end projects for a short distance into the lower portion of the bulb. The major portion of the bulb is of such diameter that when in its normal or distended condition it contacts the encompassing portion of the barrel.

The bulb is closed at its upper end and is fixedly clamped in a socket member 20, a rigid disk 21 being inserted within the upper end of the bulb and pressed into the socket member, and the encompassing flange of the socket member being pressed inwardly, as at 20^a, to hold the disk 21 and the upper portion of the bulb in place. The socket member 20 has an axially extending cylindrical guide journal 22 which is freely rotatable and slidable longitudinally in a rotary cylindrical sleeve 24. This sleeve is journalled upon the bushing 25, which is screw-threaded in the upper end of the barrel, so that the sleeve 24 and journal 22 are maintained coaxially with the barrel. The sleeve 24 is conjoined at its upper end to a spindle 26 to which is secured a button 27 which bears at its lower end on a shoulder 25^a of the bushing 25. At its lower end, the sleeve 24 is provided with an outwardly extending annular flange 24^b which rides on a washer 23 that bears against the shoulder 25^b of the bushing. By virtue of the construction, the sleeve 24 is rotatable in either direction in the bushing 25 by manual rotation of the button 27, but is held against movement longitudinally relative to the bushing, whereas the guide journal 22 and socket member 20 are rotatable in either direction relative to the sleeve 24 and movable longitudinally relative thereto, the socket member and journal normally being held by the bulb in approximately the position illustrated in Fig. 2.

For the twisting of the bulb, an operative connection between the sleeve 24 and the socket member 20 is afforded by the cooperating clutch elements 28 and 29, in the nature of lugs on the flange 24^b and socket member. In the normal position of the bulb, these clutch elements are adapted to make lateral contact with each other, approximately as illustrated in Fig. 2. Such contact may be made at either side of the lugs. Consequently, upon rotation of sleeve 24 by the button 27 in either direction, clutch element 28 will pick up clutch element 29 and impart rotary movement to socket member 20. In such rotation of socket member 20 bulb 17 will be twisted, and thereby collapsed to expel air from within it. Incident to such twisting of the bulb, it is tensioned and gradually shortened. Journal 22 maintains socket member 20 in proper coaxial relationship with sleeve 24, and with the shortening of the bulb incident to twisting, socket member 20 is drawn downwardly, such movement being accommodated by the sliding of the journal 22 in the sleeve 24. In Fig. 3 is illustrated the relative positions of the parts when the bulb has been thus twisted to a certain extent. It will be observed that the shortening of the bulb gradually withdraws the clutch element 29 from the path of element 28. Consequently, upon sufficient twisting of the bulb, which should be approximately one complete revolution, clutch element 29 will be withdrawn downwardly out of engagement with clutch element 28. Thereupon, the socket member 20 and the bulb will be freed from twisting pressure, and the tensioned elastic bulb will be free to untwist and restore itself to its normal distended condition.

In order to fill the pen, therefore, the lower projecting end of the feed bar is immersed in a body of ink and the button 27 is rotated to accomplish the above described bulb twisting and freeing operations a suitable number of times. With each twisting of the bulb, air is expelled through the tube 15 and through the ink channel 14^a, and with each distension of the bulb, ink will be forced into the ink reservoir by the superior external atmospheric pressure on the body of ink in which the feed bar is immersed. Since the capacity of the bulb is only a fraction of the total ink capacity of the pen, this pumping operation must be repeated a suitable number of times, depending upon the relative capacity of the bulb, in order to completely fill the pen, the filling thus being accomplished in stages. It will be observed that the bulb itself affords a portion of the ink capacity.

When the clutch elements 28 and 29 disengage, upon completion of each bulb twisting operation, the bulb is quite free to untwist, as the journal 22 moves freely in the sleeve 24 and the bulb is not subjected to any mechanical restraint by the manually operated parts. Hence the bulb, if of suitable elastic strength, can return to its distended position quite quickly. In the twisting of the bulb, its material is folded or convoluted, somewhat as illustrated in Fig. 3, and incident to its quick return to distended position, some of the folded bulb material snaps or rubs smartly against the encompassing portion of the barrel and produces a slight noise. The hollow pen barrel functions somewhat as a resonance column and intensifies or modifies the sound. Consequently, when the pen reservoir is empty the sound will be relatively louder or of a different character than when the barrel contains a quantity of ink, and the sound will differ in intensity or other characteristic with each succeeding operation as the charge of ink in the reservoir is progressively increased. Hence, by taking note of the sound, the operator may ascertain that the pen is being progressively filled and when it is filled to capacity. In order to decrease air resistance to the distension of the bulb and to render the sound more distinctly audible, the bushing may be provided with small apertures, as at 25^c.

A cap 30 is provided for housing the button 27, same being screwed on a projecting threaded portion of the bushing 25 so as to be removable when it is desired to fill the pen.

What I claim is:

1. In a fountain pen, in combination, a barrel, a flexible elastic bulb having its lower end fixed to the barrel and in communication therewith, a manually rotatable operating member mounted on the barrel, and a clutch device for operably connecting said operating member with the bulb to effect twisting of the latter and adapted to be disengaged automatically consequent upon the twisting of the bulb to a substantial extent.

2. In a fountain pen, in combination, a barrel, a flexible elastic bulb having one end fixed to the barrel, a manually operable member attached to the barrel, and means affording an operative connection between said member and bulb whereby the latter may be flexed by operation of the former, said means being automatically disengageable to permit reflexion of the bulb independently of said member.

3. In a fountain pen, in combination, a hollow

barrel, a flexible elastic pumping member connected thereto and operable to vary the air pressure therein, an operating member mounted on the barrel and manually operable to actuate the pumping member, and a clutch device for operatively connecting said operating and pumping members and adapted to disengage automatically upon movement of the pumping member to a substantial extent.

4. In a fountain pen, a combination as specified in claim 3 and wherein the clutch device is disengaged as a consequence of distortion of the pumping member, to free the latter from the tensioning restraint of the operating member.

5. In a fountain pen, a combination as specified in claim 3 and wherein the pumping member is in the form of a bulb susceptible of being elastically deformed by twisting, and the operating member is operable to twist the bulb in each direction about its axis.

6. In a fountain pen, in combination, a barrel, a flexible elastic bulb having its lower end affixed thereto, a bearing on the barrel, an operating member journaled in the bearing and rotatable relative to the bulb, a clutch device affording an operative connection between the operating member and the upper end of the bulb, said clutch device being disengageable by downward displacement of the upper end of the bulb, and means for maintaining the upper end of the bulb against displacement laterally.

7. In a fountain pen, in combination, a barrel, a flexible elastic bulb having its lower end fixed in the barrel, a rotatable member affixed to the upper end of the bulb, a bearing on the barrel, an operating member rotatably guided on the bearing, a clutch element carried by said operating member, and another clutch element carried by said rotatable member for operative engagement with said first mentioned clutch element and disengagement automatically upon movement of the bulb by the operating member to a substantial extent.

8. In a fountain pen, a combination as specified in claim 7 and wherein said rotatable member is movable axially into and out of position for engagement of said clutch elements during its rotative movements.

9. In a fountain pen, a combination as specified in claim 7 and wherein the bulb, in its undistorted condition, supports the rotatable member in position permitting operative engagement of said clutch elements.

10. In a fountain pen, a combination as specified in claim 7 and wherein said rotatable member is moved axially to change the relationship of said clutch elements as a consequence of elastic distortion and return of the bulb.

11. In a fountain pen, a filler device comprising a flexible elastic bulb and means manually operable to distort the bulb, said means including cooperative axial guide elements and a pressure transmitting device which disengages automatically as a consequence of distortion of the bulb.

12. In a fountain pen, in combination, a barrel affording an ink reservoir, and manually operable means cooperative with the barrel to draw liquid into the reservoir and produce audible sounds which are variable in character by the relative quantity of liquid in the reservoir.

13. In a fountain pen, in combination, a barrel affording an ink reservoir, and manually operable means cooperative with the barrel to fill the reservoir by stages and produce sounds which are different at different stages of the filling.

14. In a fountain pen, in combination, a barrel affording a reservoir for holding a charge of ink, and manually operable means cooperative with the barrel to charge the reservoir by stages and produce varying audible sounds relatively indicative of the progressive charging of the reservoir.

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