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FOUNTAIN PEN

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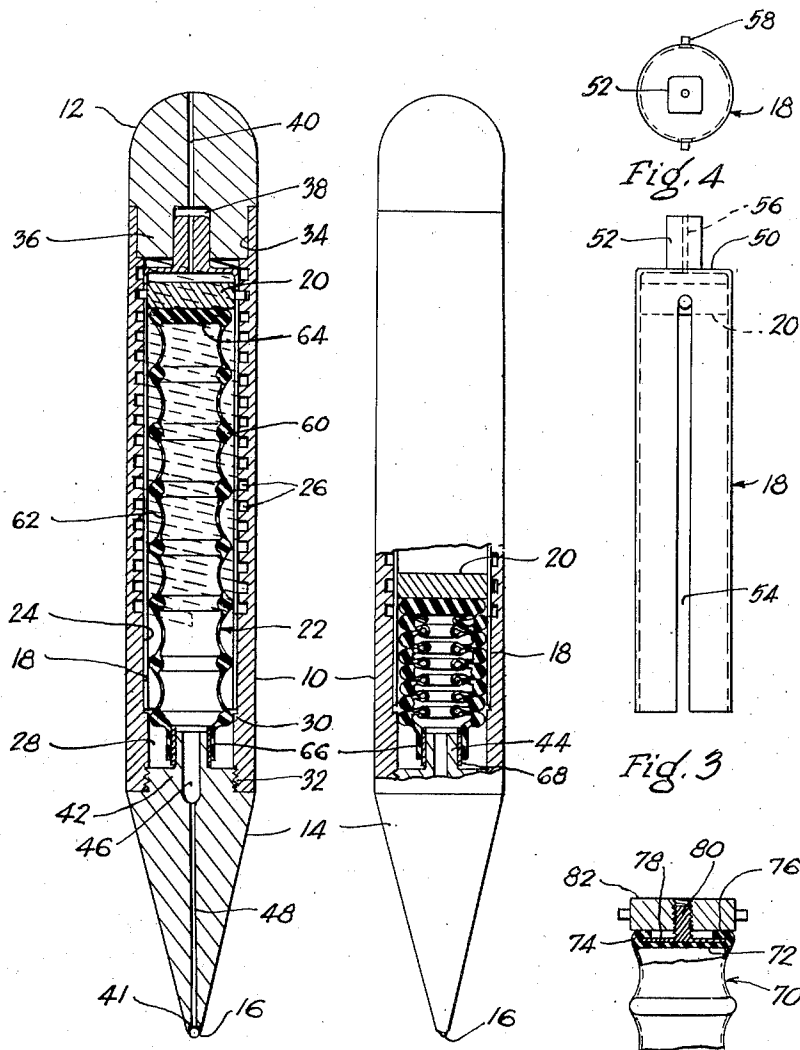


Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

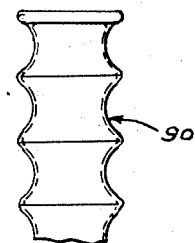


Fig. 6

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FOUNTAIN PEN

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2 Claims. (Cl. 120-46)

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The invention relates to fountain pens and more particularly to the force feed for ink in fountain pens of the type employing a dense or pasty ink and a rotatable writing ball for applying the ink to a writing surface. The invention is particularly adaptable for use in fountain pens employing the force feed mechanism disclosed in my copending application for Letters Patent Serial No. 660,737 filed April 9, 1946, now Patent No. 2,440,829, dated May 4, 1948. While the invention is particularly well adapted for use with fountain pens of the ball-point type, and its use with ball-point fountain pens is herein described and shown, it is also adaptable for other useful purposes in connection with conventional type fountain pens which use a fluid ink, as hereinafter explained.

An object is to provide new and novel means for selectively advancing the pasty ink in a pen of the ball-point type to the writing ball, as the ink adjacent the writing ball is used up.

Another object is to provide improved means for preventing leakage of the ink around the ink reservoir and insuring that the ink passing out of the reservoir can only emerge from the pen at the writing point.

A further object is to provide a new and novel type of ink containing sac or cartridge which may be readily removed when empty and replaced by a new ink-filled cartridge which is simple and inexpensive to manufacture.

Another object is to provide improved means whereby the pen user may selectively and positively control the flow of ink to the writing element.

A further object is to provide improved means whereby the pen user who may inadvertently manipulate the actuating mechanism to cause a superfluous supply of ink at the writing element may readily readjust the actuating mechanism to produce the desired flow of ink.

Other objects, advantages and capabilities of the invention will be apparent from the following description when read in conjunction with the accompanying drawings.

In the drawings, Fig. 1 is a longitudinal axial sectional view of a fountain pen embodying one form of the invention.

Fig. 2 is a similar view to that of Fig. 1, with a portion only being shown in longitudinal axial section.

Fig. 3 is an elevational view of two of the component parts of the invention shown in their operating relationship.

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Fig. 4 is a top plan view of the structure of Fig. 3.

Fig. 5 is a fragmentary view of an alternate embodiment of the invention, partly in section.

Fig. 6 is a fragmentary view of an alternate type of ink sac to that shown in Figs. 1 and 2.

Throughout the following specification the words "forward end," "rear end" and their equivalents are intended to mean the writing end and the opposite of the pen, respectively.

In Figs. 1 and 2 are shown a pen of the ball-point type embodying one form of the invention. A main body portion or barrel 10 is shown, with a combined actuating and closure member 12 at its rear end and a tip member 14 at its forward end. A writing ball 16 may be rotatably mounted in the forward end of the tip member. A tubular member 18 is shown in telescoped relation with the bore of the barrel 10 and a plunger 20 is shown mounted in the member 18 adapted for movement lengthwise thereof. An elongated accordion-like ink sac 22 is shown within the member 18, with its forward end coupled to the tip member 14 and its opposed end in engagement with the plunger 20.

The barrel 10, as best shown in Fig. 1, comprises an elongated tubular member having an axial bore 24 therethrough formed with internal threads 26. The forward end of the bore 24 communicates with a forwardly disposed coaxial bore 28 of reduced diameter forming a shoulder portion 30. The forward portion of the bore 28 is shown internally threaded at 32. The rear end portion of the bore 24 terminates in an enlarged coaxial bore 34.

The actuating member 12 comprises an elongated cylindrical member rounded at its rear end and formed at its opposed end with a reduced diameter forwardly extending circular portion 36 adapted for telescoped rotating relation with the bore 34 of the barrel 10. As best shown in Fig. 1, the portion 36 is formed with an axial cavity 38 of non-circular cross-sectional configuration.

A reduced diameter bore 40 may be formed in the member 12 coaxial with and communicating with the cavity 38 to provide air communication between the cavity 38 and the extreme rear end of the member 12.

The tip member 14 is shown as an elongated cylindrical member tapering forwardly and inwardly, terminating at its forward end in a cavity 41 adapted for rotatably mounting the writing ball 16. The member 14 is shown with a centrally disposed portion 42 extending into the

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threaded portion 32 of the barrel; the periphery of the portion 42 being threaded whereby the tip member 14 may be screwed into and out of the forward end of the barrel. The portion 42 is shown terminating at its rear end in a rearwardly extending circular portion 44 of reduced diameter. The member 14 is formed with an axial bore 46 extending through the portion 44 terminating at the forward portion of the member 14 in a coaxial bore 48 of reduced diameter communicating with the cavity 41 and associated ball 16.

The member 18, as best shown in Fig. 3, comprises a tubular member adapted for rotatable telescoped relation with the bore 24 of the barrel 10 formed adjacent its rear end with a transverse wall 50 having a centrally disposed rearwardly extending reduced-size member 52 adapted for nested relation with and having a cross-sectional configuration corresponding with the cross-sectional configuration of the cavity 38. A pair of longitudinally extending slots 54 are shown in the opposed side walls of the member 18 extending from a point adjacent the end wall 50 to and through the forward circular edge of the member 18. The member 52 is shown formed with a central aperture 56 adapted to provide air communication between the interior of the member 18 and the bore 40 of the assembled pen.

The plunger 20 is shown as comprising a disc-like member having sufficient thickness to prevent its "cocking" in but permitting longitudinal sliding relation with the interior of the tubular member 18. A pair of laterally disposed pins 58 may be provided on the periphery of the plunger adapted to extend through the opposed slots 54 and into the threads 26 of the barrel, whereby upon rotation of the member 18 in the barrel the plunger will be caused to move lengthwise thereof. The plunger 20 is made preferably of a relatively hard material, with a smooth forward surface adapted to freely rotate against the rear wall 64 of the ink sac 22, as the plunger is moved longitudinally in the pen barrel.

The ink sac 22 is preferably molded of rubber in the elongated shape shown in Fig. 1 and is shown as comprising a series of shape-retaining rings 60 disposed in stacked spaced relation and integrated by relatively thin integral walls 62. The walls 62 are preferably arcuate in cross-section; the outer surface being concave and the inner surface being convex in vertical cross-section, viewing Fig. 1 of the drawings. The rear end of the sac 22 is shown closed by a transverse wall 64. The forward end of the sac is shown terminating in an axially disposed forwardly extending collar 66 of reduced diameter provided with an interiorly axially disposed ferrule 68 adapted to tightly fit around the periphery of the portion 44 of the tip member. If desired, the interior of the ferrule 68 and the periphery of the portion 44 may be formed with registering threads (not shown) as a means of screwing the ink sac onto the tip member. The ferrule 68 and the collar 66 may be integrated or bonded by any of the known methods of bonding rubber to unlike materials. The ferrule may be made of metal, hard fiber or vulcanized rubber. The wall 64 may be hardened, as by vulcanizing, whereby to provide a smooth frictionless surface against which the rotating plunger 20 may be moved lengthwise of the pen barrel.

In Fig. 5 of the drawings I show an ink sac 70 which may be identical with ink sac 22 except in the structure of the end wall thereof. The sac

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70 is shown with a transverse end wall 72 formed with a rearwardly extending annular wall 74 terminating in an inwardly turned annular flange 76 in spaced parallel relation with the wall 72. A disc-like member 78 is shown in flatwise abutting relation with the wall 72 and is held in this position by the annular flange 76. The member 78 is provided with a centrally disposed rearwardly extending threaded rod 80. The plunger 82 is shown as being identical with the plunger 20 except that it is formed with a central threaded aperture coaxial with the rod 80 into which last named aperture the rod 80 is adapted to be screwed as a means of integrating the plunger 82 and the sac 70 for purposes hereinafter described.

Having described the parts separately, I will now describe the operation of the invention. Fig. 1 illustrates a pen of the ball-point type with the component parts shown in their respective positions when the pen is fully charged with ink. As the ink is used up at the writing ball, the supply of ink in the sac may be selectively advanced toward the writing ball by rotating the actuating member 12 in the proper direction, this feature of the invention representing a notable advance in the art, as evidenced by the large number of ball-point pens in use which have no positive or satisfactory means for feeding the pasty ink to the writing ball as the ink adjacent the ball is used up. The plunger may be progressively urged forwardly, as needed, until the sac is fully compressed or collapsed, as shown in Fig. 2.

If, for instance, an inexperienced person advanced the plunger 20 forwardly to the extent that a superfluous amount of ink were advanced to the writing ball, this may be corrected by rotating the actuating member 12 in a direction to relieve the pressure between the plunger 20 and the rear end of the sac 22, permitting the sac 22 to lengthen in its endeavor to return to its normal molded length.

While the present invention is particularly adaptable for use with ball-point pens using a pasty ink, it is to be understood that it is not limited to use in this particular type of pen.

While the ball-point pens of the prior art all use a dense, pasty ink, inasmuch as a more fluid ink would leak around the writing ball (due to the lack of any means to retard such leakage) I contemplate the use of an ink having the density of ordinary fountain pen ink in a pen embodying my invention. This will provide a smoother writing pen than any of the pens using pasty ink and the movement of ordinary writing ink in a pen embodying my invention will be controlled by the position of the plunger with respect to the rear end of the ink sac.

Viewing Fig. 1 of the drawings, it will be seen that the tubular member 18 will be limited in its forward movement in the barrel by the shoulder 30 and will be limited in its movement in the opposite direction by the actuating member 12. I contemplate a rotatable friction fit between the actuating member 12 and the barrel whereby the member 12 will be held frictionally in each of its set positions.

While I prefer to use the spaced rings 60 in the sac 22, for their shape-retaining properties, it will be understood that a circumferentially corrugated sac 90, as shown in Fig. 6 may be used. It will be understood that the replaceable ink cartridge does not include the tip member and writing point; the tip member and associated writing point being a permanent part of the pen holder or barrel and being temporarily removed

from the barrel only for the purpose of attaching the ink cartridge to the tip member.

I claim:

1. In a fountain pen having an elongate hollow barrel formed with an internal thread in its bore, a combined tip member and writing element mounted in the forward end and a rotatable actuating member mounted in the rear end of the barrel, a rotatable plunger in said bore formed with a peripheral portion extending into and having cooperative sliding relation with said thread, means intermediate and having non-rotating relation with said actuating member and said plunger adapted to rotate said plunger and cause it to move lengthwise of the bore when said actuating member is rotated; the combination of an elongate circumferentially corrugated axially compressible ink-containing cartridge disposed lengthwise of said bore intermediate said plunger and said tip member removably connected at its forward end with said tip member adapted to provide communication between the ink content of the cartridge and said writing element, said plunger being adapted for selective movement into and out of endwise compressive relation with said cartridge as said actuating member is rotated in opposite directions, respectively.

2. A fountain pen having a barrel formed with an internally threaded axial bore, a tip member at the forward end of the barrel formed with a duct providing communication between the bore and a writing element mounted in the forward end of the tip member, an actuating member rotatably mounted in the rear end of the barrel, a tubular member formed with a longitudinal slot

in its side wall in telescoped rotatable relation with the bore and having non-rotatable relation with said actuating member, a circumferentially corrugated elongated hollow flexible sac disposed in said tubular member formed at its forward end with an outlet communicatingly connected with said duct, a longitudinally slidable plunger in said tubular member rearwardly of said sac provided with a pin extending outwardly from its periphery through said slot and into nested sliding relation with the internal thread of the bore, the sac being adapted to be compressed axially and accordion-like when the actuating member and cooperating tubular member are rotated in one direction to cause the plunger to move forwardly in the barrel.

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