

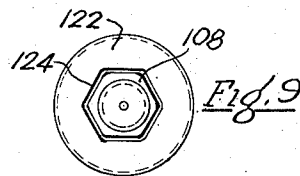
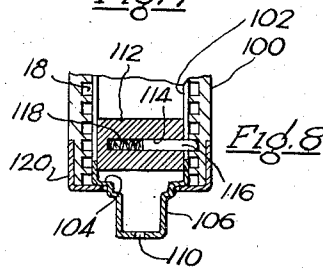
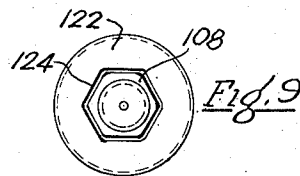
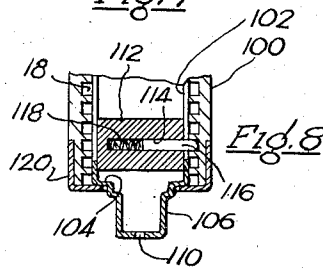
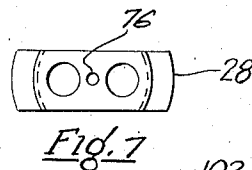
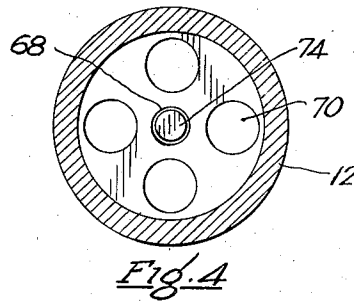
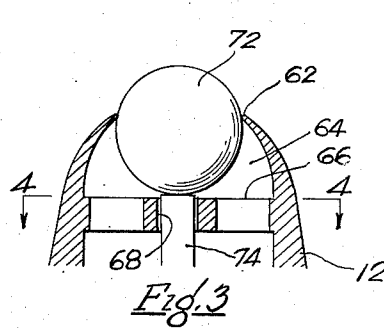
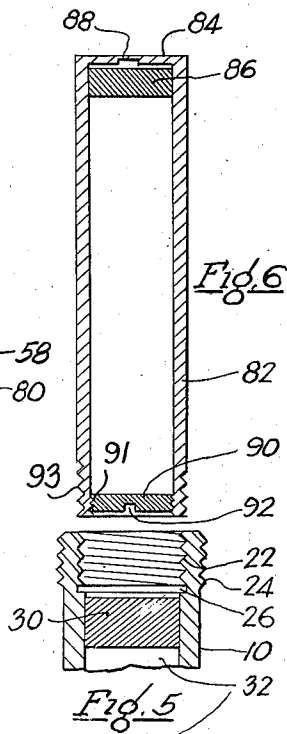
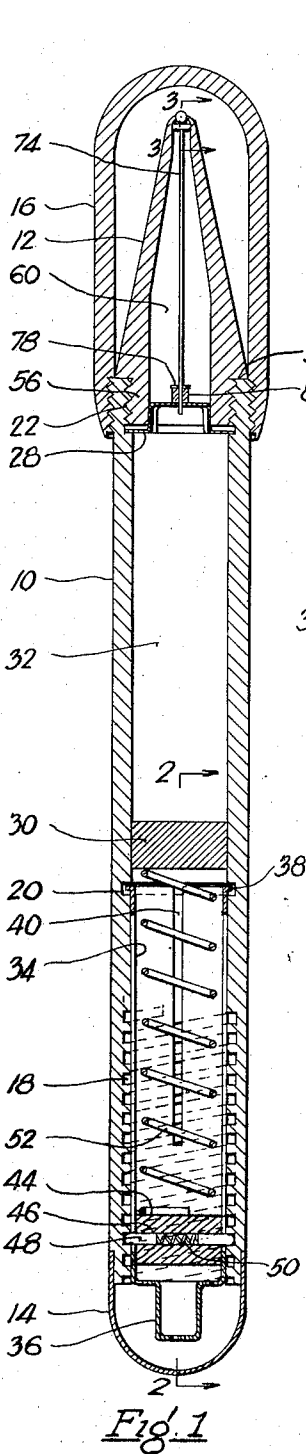
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WRITING INSTRUMENT

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UNITED STATES PATENT OFFICE

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1

This invention relates to fountain pens and more particularly to fountain pens of the type using a writing material having a pasty consistency and a rotatable ball in the forward end of the pen for distributing the writing material to the writing paper.

An object of the invention is the provision of improved means for normally urging the writing material in the pen in a direction toward the writing ball, said means being adapted for manual adjustment as the amount of writing material in the pen decreases whereby a selective pressure may be maintained behind the writing material in the pen.

Another object is to provide a fountain pen having a barrel portion adapted to hold a larger supply of writing material than pens of the prior art having screws, rods or other mechanism extending through the supply of writing material in the barrel portion, thereby providing an improved pen capable of writing longer between refill periods.

A further object is to provide an improved pen of the type using a pasty writing material having few parts and being economical to manufacture.

Other objects, advantages and capabilities of my invention will be apparent from the following description when read in connection with the accompanying drawings, in which—

Figure 1 is an axial section through a pen embodying the invention.

Figure 2 is a fragmentary section along line 2—2 of Figure 1.

Figure 3 is an enlarged fragmentary section along line 3—3 of Figure 1.

Figure 4 is a transverse section along line 4—4 of Figure 3.

Figure 5 is a fragmentary axial section through the forward end portion of the main body portion of the pen shown in Figure 1, when the pen is in position for refilling.

Figure 6 is an axial section through the writing material container of the invention; this figure showing the container, with respect to the forward end of the body portion of Figure 5, in position for applying to said forward end.

Figure 7 is a plan view of one of the component parts of the means for normally holding the ball against its outer retaining rim.

Figure 8 is a fragmentary axial view through the rear end portion of a variation or alternate of the main body portion of the pen shown in Figures 1 and 2.

Figure 9 is an end view of the alternate structure of Figure 8.

2

Throughout this specification the words "forward end" and "rear end" are intended to mean the writing end and the opposite end of the pen, respectively. The "forward end" of any of the component parts of the pen is intended to mean the end of such part or parts facing the writing end of the assembled pen.

Referring to the form of my invention shown in Fig. 1 of the drawings, the main body portion of the pen may comprise a cylindrical tube 10 formed of metal, plastic material or the like. A tip member 12 may be removably secured to the forward end of the tube. A removable cap 14 may be secured to the rear end of the tube. A removable cap 16 may be secured to the forward end of the tube in enclosing relation with the tip member 12. The rear end portion of the tube may be interiorly threaded with a preferably square-cut thread 18. An annular groove 20 may be provided in the bore of the tube intermediate its opposed ends. The forward end of the tube may have an inner threaded portion 22 and an outer threaded portion 24. An annular groove 26 may be formed in the bore of the tube adjacent the inner margin of the threaded portion 22 adapted to receive and support the opposed ends of a bridge member 28 hereinafter described. A piston 30 may be slidably disposed within the bore of the tube 10 intermediate the spaced annular grooves 20 and 26. Viewing Fig. 1, the piston 30 is shown in the approximate position it may assume when the pen is fully charged with writing material, the space intermediate the forward surface of the piston 30 and the groove 26 providing an elongated cavity 32 adapted to hold the bulk of said writing material. A cylindrical sleeve 34 may be telescopically disposed within the bore of the tube 10 adjacent the rear end thereof provided with an open forward end and an opposed end formed with an axially disposed projecting end portion 36 of preferably reduced diameter. The open end of the sleeve may be provided with laterally and outwardly extending opposed lugs 38 adapted to register with and interlock with the annular groove 20 whereby to restrict the telescoping movement of the sleeve longitudinally of the bore of the tube 10.

The opposed longitudinal walls of the sleeve 34 may be formed with longitudinally extending slots 40 terminating short of the rear end of the sleeve and extending through the edge of the forward end thereof, adapted to permit the lugs 38 to be sprung into the groove 20 when the sleeve is moved into operative position. While I prefer to limit the movement of the sleeve 34 lengthwise

3

of the tube 10 by means of the lugs 38 and cooperating groove 20, I contemplate the use of a sleeve having frictional engagement with the inner walls of the tube 10 for this purpose. Opposed longitudinal walls of the sleeve 34 may be formed with opposed longitudinally extending closed-ended slots 42 disposed in a plane at right angle to the the plane of the aligned slots 40. A piston-like block 44 may be disposed within the sleeve 34 adapted for longitudinal movement therein formed with a bore 46 extending laterally through the block. A pair of preferably round rods 48 may be slidably disposed within the bore 46 and may be separated by a coil spring 50 adapted to normally urge the rods 48 in a direction away from each other. The outer ends of the rods 48 may extend through the slots 42 adapted to be urged by the spring 50 into the thread 18 of the tube 10. A coil spring 52 or other suitable resilient member may be disposed longitudinally within the sleeve 34 with one end portion engaging the block 44 and the other end engaging the piston 30. The end wall of the projecting end portion 35 may be provided with an orifice 54 for purposes hereinafter described.

The tip member 12 may comprise an elongated member provided with a rear threaded portion 55 adapted to screw into the threaded portion 22 of the tube 10 and may be provided with an annular shoulder portion 53 adapted to engage the forward end of the tube 10 when the tip member is screwed into operative position.

The outer surface of the tip member 12 may taper forwardly and inwardly from the outer periphery of the shoulder portion 53 terminating in a reduced sized rounded forward end. The tip member 12 may be formed with an axial bore 60 tapering forwardly and inwardly and converging with the tapered outer surface thereof to form an extreme forward axial aperture defined by a thin peripheral edge 62, said edge 62 being turned inwardly to define a substantially bell-like cavity 64 therebeneath. The lower extremity of the cavity 64 may be defined by a laterally disposed wall 66 within the bore 60 and preferably integrally formed with the walls thereof. The wall 66 may be provided with an axial aperture 68 and a plurality of apertures 70 intermediate the aperture 68 and the walls of the bore 60. A ball 72 of larger diameter than the diameter of the aperture formed by the inwardly turned edge 62 may be disposed within the cavity 64 in rotatable relation therewith. An elongated rod 74 may be axially disposed within the bore 60 with its forward end portion extending through the aperture 68 and normally engaging the ball 72 and urging said ball into closing engagement with the aperture formed by the inwardly turned edge 62; the other end portion of the rod 74 extending through an axial aperture 75 in the bridge member 28. The rod 74 may be provided with an affixed washer 78 in spaced relation with the bridge member 28. A cylindrical sleeve 80 of rubber or other resilient material may be disposed on the rod 74 intermediate the washer 78 and the bridge member 28 adapted to normally urge the washer 78 and the associated rod 74 in a direction toward the ball 72. It will be obvious that a coil spring may be substituted for the resilient sleeve 80.

In Figure 5, I show the upper end portion of the tube 10 with tip portion 12 and cap 16 removed therefrom, and the piston 30 in the approximate position it will assume when the pen is ready to refill with writing material.

In Figure 6 is shown a cartridge 82 adapted

4

to hold sufficient writing material to refill the pen; the cartridge of Fig. 6 being shown, with relation to the upper end of the tube of Fig. 5, in the approximate position it may assume when ready for attachment to the tube 10, for refilling the latter.

The cartridge 82 may comprise an elongated cylinder of metal, plastic or other suitable material, closed at one end by a wall portion 84 and open at its opposite end. A piston 86 may be disposed in the bore of the cartridge adjacent the wall portion 84 when the cartridge is filled with writing material and the wall portion 84 may be formed with a centrally located indented portion 88 preferably very thin in section. The open end of the cartridge may be fitted with a circular closure 90 of disc-like configuration and may be threaded around its periphery and may be provided with a centrally located slot 92 extending across one outer surface of the closure 90 adapted to provide means for screwing the closure into and out of the cartridge, as by means of a tool similar to a screw-driver. The open end of the cartridge may be threaded internally with threads 91 adapted to register with the peripheral threading on the closure 90 and may be threaded externally with threads 93 to match the threaded portion 22 of the tube 10. As shown in Fig. 6, the outer surface of the closure 90 may be inwardly spaced from the end of the cartridge 82, when the closure 90 is in final closing position, and I propose to apply a suitable sealing compound between the closure and the adjacent end of the cartridge adapted to provide an air seal and being of material which may be readily removed when the closure 90 is to be removed.

The space within the cartridge intermediate the piston 86 and the closure 90, viewing Figure 6, may be filled with writing material and when the tube 10 is to be refilled the closure 90 may be removed, the cartridge screwed into the tube 10 and the indented, preferably frangible, portion 88 may be punctured by a small diameter rod (not shown) and the piston 86 forced longitudinally of the cartridge by the last named rod, the piston 86 forcing the writing material ahead of it and forcing the piston 30 of Figure 5 back to its original position as indicated in Figures 1 and 2. As the writing material and the piston 86 are being moved lengthwise into the tube 10 the orifice 54 is adapted to permit the escape of any air which might otherwise be trapped in the lower portion of the tube 10.

While the tube 10, tip portion 12 and the cap 16 may be made of any suitable material, such as metal, vulcanized rubber, plastics, etc., I prefer that the tube be made of such material as one of the methyl methacrylates, such as "Lucite" whereby the action of the component parts within the tube may be seen through the tube and whereby the supply of writing material in the pen may be determined readily. The cap 14 may be frictionally secured to the tube 10, as shown, or may be threaded thereto if desired. The end portion 36 of the sleeve 34 may be used to rotate the sleeve in the tube, for desired adjustment of the spring tension against the piston 30 and may be knurled lengthwise whereby to provide suitable finger grip.

If desired the rod 74 may be formed with an axial bore extending longitudinally therethrough adapted to provide communication, through the bore, between the writing material-holding cavity 32 and the ball. The walls of the last named bore may be perforate adapted to permit the

writing material to enter the bore intermediate its opposed ends.

The assembled pen shown in Figure 1 illustrates the component parts thereof in their approximate relative positions when the pen is fully charged with the writing material. As the writing material is used up the piston 39 will move toward the ball; under pressure from the spring 52, tending to lessen the compression in the latter. The spring may be readily brought back under the desired compression by rotating the sleeve 34 in one direction. As the sleeve is rotated it will cause the block to move in the desired direction toward or away from the writing material in the cavity 32, through the action of the rods 48 and their cooperative sliding relation with the thread 18 of the tube 10. I propose that the walls of the sleeve 34 be in slight frictional engagement with the inner walls of the tube 10 adapted to maintain the sleeve against undesired rotation thereof after the block 44 has been moved to selected position. The thread 18 may be of a pitch adapted to receive the opposed outer ends of the aligned rods 48 (as shown in Figure 1).

In Figures 8 and 9 of the drawings I have shown a modification in the rear end portion of the pen illustrated in Figure 1. In Figure 8 I have shown the rear end portion of a cylindrical tube 100 which may be identical with the tube 10 of Figure 1. A sleeve 102 may be telescopically disposed within the rear end portion of the tube 100 and may be the same as the sleeve 34 except that the rear end thereof is modified. The rear end portion of the sleeve 102 may be formed with a lateral wall 104 and an axially disposed outwardly projecting portion 106 of reduced diameter connected by an offset boss portion 108 formed with a preferably hexagonal peripheral wall. The end wall of the projecting portion 106 may be formed with an orifice 110. A piston-like block 112 may be slidably disposed within the sleeve 102 provided with a closed-ended bore 114. A rod 116 may be slidably disposed within the bore 114. A coil spring 118 may be disposed within the bore 114 intermediate the closed end thereof and the adjacent end of the rod 116 adapted to normally urge the rod 116 in a direction away from said closed end of the bore. The outer end portion of the rod 116 may extend through the slot 42 and into cooperative guided relation with the thread 18. A cap 120 may be removably secured to the rear end portion of the tube 100 and may be formed with a transverse end wall 122 having a central aperture 124 of hexagonal configuration. The wall 122 may be in a common plane with the boss portion 108 with the periphery of the aperture 124 in registering interlocking relation with the hexagonal periphery of the boss portion 108. The sleeve 102 of Figure 8 may be rotated by rotating the cap 120 on the tube 100 and I propose that the fit between the cap 120 and the cooperating portion of the tube 100 be such that the cap 120 will be maintained in selective set positions by frictional engagement with the tube 100 adapted to maintain the sleeve 102 in predetermined set position until purposely moved therefrom.

It will be seen that the pen of the present invention has a writing material-holding cavity free from rods, screws and similar members which reduce the capacity of the cavity and which, in the prior art structures, are so complicated that the pen owner is required to send

the pen back to the factory for refilling. The larger capacity of the pen of the present invention provides a pen which will function as a writing instrument for longer periods, between refillings, than the pens of the prior art.

It will be obvious to those skilled in the art that various modifications may be made in the illustrated embodiment of the invention without departing from the scope of my invention and it is understood that I do not limit same to the precise structure shown and described.

I claim:

1. In a fountain pen having a main body portion formed with an axial bore therethrough, the rear end portion of the bore being internally threaded, a tip member secured to the forward end of said bore, a ball mounted rotatably in the forward end of the tip member, a duct in said tip member adapted to provide communication between the forward end of said bore and said ball, said duct and the forward portion of said bore being adapted to be normally filled with a pasty writing material; the combination of a piston in said bore, a rotatable sleeve in telescoped relation with the rear end portion of said bore formed with an open forward end, a longitudinal slot in the side wall of the sleeve, a longitudinally slidable block in said sleeve, a pin extending outwardly from the periphery of said block through said slot and into cooperative engagement with one of the internal threads in the bore of said body portion whereby upon rotation of the sleeve said pin and associated block will be moved forwardly in said sleeve into forwardly moving relation with said piston whereby said piston will move said writing material toward said ball.

2. The structure of claim 1, wherein the rear end portion of the sleeve is provided with a transverse wall formed with a centrally projecting portion of reduced diameter preferably non-circular in cross-section, a cap comprising a tubular portion open at one end and formed at its other end with a transverse wall formed with an aperture non-circular in configuration, said tubular portion being adapted to embrace the outer wall of the main body portion of the pen, said last named transverse wall being disposed transversely of said projecting portion with its aperture in registering relation therewith, said cap being adapted to be manually rotated upon said body portion whereby to rotate said sleeve and being adapted to maintain its manually set position on the body portion by means of frictional engagement therebetween.

3. The structure of claim 1, wherein the rear end portion of the sleeve is provided with a transverse wall formed with a projecting portion of reduced diameter polygonal in cross-section, said projecting portion being formed with an axially projecting portion of reduced diameter, a cap comprising a tubular portion open at one end and formed at its other end with a transverse wall formed with an aperture of polygonal configuration therethrough, said tubular portion being adapted to embrace the outer wall of the main body portion of the pen, said last named transverse wall being disposed transversely of said first named projecting portion with its aperture in registering non-rotating relation therewith, said cap being adapted to be manually rotated upon said body portion whereby to rotate said sleeve and being adapted to maintain its manually set position on the body portion through frictional engagement therewith.

7

4. The structure of claim 1, wherein the sleeve is formed with opposed longitudinal slots in the side walls thereof, said block having a lateral bore extending therethrough, a pair of pins slidably mounted in said lateral bore and separated from each other by a resilient member adapted to normally urge the pins in a direction away from each other, the outer end portions of the opposed pins being adapted to extend through the slots and into cooperative engagement with the threaded portion of said axial bore.

5. The structure of claim 1, wherein the rear end portion of the sleeve is formed with an axially disposed longitudinally projecting portion of reduced size adapted to be manually rotated whereby to rotate the sleeve in the body portion of the pen.

6. The structure of claim 1, wherein the axial bore of the body portion of the pen is formed with an annular groove, the sleeve being formed with a laterally and outwardly projecting portion adapted to interlock with said groove whereby to limit the movement of the sleeve longitudinally of the body portion.

7. The structure of claim 1, wherein the axial bore of the body portion of the pen is formed with an annular groove, the sleeve being formed with a laterally projecting detent adjacent its forward edge adapted to interlock with said

8

groove, a longitudinal slot in the longitudinal wall of said sleeve extending through the forward edge thereof adapted to permit said last named forward edge to be sprung inwardly adjacent said detent as the sleeve is being moved into the body portion, said last named edge being adapted to spring outwardly when the sleeve reaches its operative position whereby to move said detent into cooperative relation with said groove.

8. The structure of claim 1 wherein a resilient member is disposed intermediate the block and the piston adapted to yieldably urge the piston forwardly as said block is moved forwardly, said resilient member being maintained under selective compression by the rotation of said sleeve and the resulting selective position of said block in said sleeve.

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