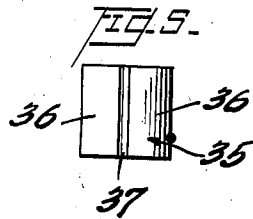
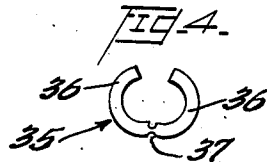
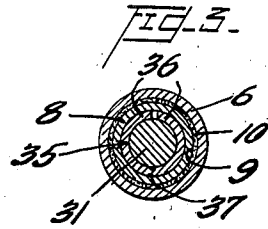
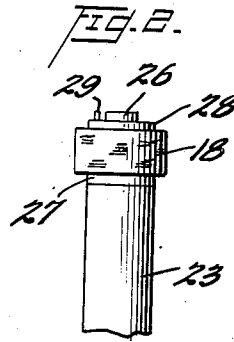
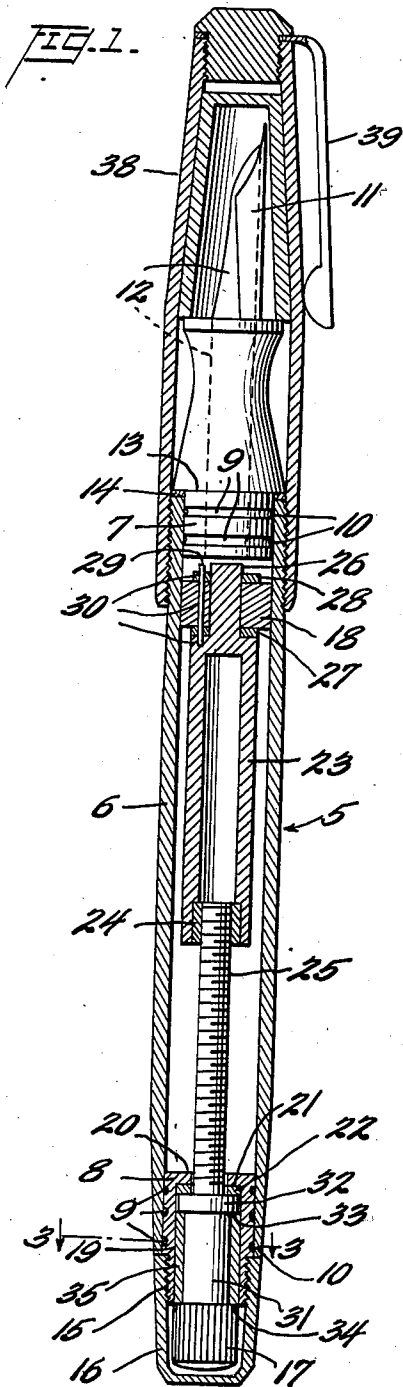


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FOUNTAIN PEN

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FOUNTAIN PEN

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The present invention relates to a new and improved fountain pen, more particularly the present invention relates to a fountain pen of the general type in which pen-filling is effected by rearward movement of a piston in the pen barrel.

Although fountain pens of this general type have been known in the art for some time, they were subject to a number of faults. In general, in pens of this type no rubber sac is provided and the barrel itself is designed to hold the ink. While this method of construction results in relatively large capacity, it is extremely difficult to prevent leaks in the lower and upper ends of the barrel reservoir. In particular, the rear end or upper end of the barrel has been especially difficult to liquid-proof. This latter was particularly true because the operating means for the piston extended through any closure means for the upper or rear end of the barrel. It is quite understandable that in a construction of a small size, as in a fountain pen, it is difficult to provide a suitable packing or other means about an operating stem, which must necessarily be provided in this type of pen. Since the parts of the pen are relatively small, it has been the usual practice to make these parts of metal, which presented another source of difficulty. In other words, it has been found very difficult to produce a leak-proof joint between the various metal parts and the barrel which has been conventionally made of plastic material.

It is one of the objects of the present invention therefore to provide a novel construction for a fountain pen or the like wherein substantially all the members thereof are formed from plastic material suitably bonded by compatible plastic cement.

A second object of the present invention is to provide means for mounting a manually-rotatable piston-operating member in the rear end of the pen barrel and to make effective provision for sealing the mounting means against leakage.

A third object of the present invention is to provide liquid-proof sealing means for the entire barrel of a fountain pen so as to convert said barrel into an effective reservoir for ink.

A further object of the present invention is to provide means for securing a piston to the front end of an operating member in a simple and effective manner so as to prevent relative rotation between the piston and its carrying member.

A fifth object of the present invention is to provide a novel closure plug for the rear end of a fountain pen barrel of the character de-

scribed, said closure plug being adapted to carry a bearing for an operating stem.

A sixth object of the present invention is to provide a novel sealing member for a piston-operated stem which is capable of being removed from the rear end of a fountain pen barrel.

A seventh object of the present invention is to provide a novel sealing arrangement in a pen of the character described, including a novel packing means for an operating member.

Other objects and advantages of the present invention will be apparent from the subsequent description and figures of the drawing, in which:

Fig. 1 is a central longitudinal sectional view, partly in elevation.

Fig. 2 is a detail side elevation showing the piston and a portion of its carrying member.

Fig. 3 is a transverse sectional view on line 3—3 of Fig. 1.

Fig. 4 is an end elevation of the bearing for the manually-rotatable piston-operating member, showing it in readiness to receive said member.

Fig. 5 is a side elevation of the aforesaid bearing.

Referring to the figures of the drawing and particularly Figure 1 thereof, a fountain pen according to the present invention is indicated in general at 5. Fountain pen 5 includes a pen barrel 6 of a suitable plastic tube, hereinafter set forth in detail.

The pen barrel 6 is provided with front and rear closure plugs 7 and 8 respectively, said plugs each having circumferential grooves 9 filled with cement 10 to secure them fluid-tightly in place. The front plug 7 projects forwardly from the barrel 6 and carries the pen point 11 and the customary feed means 12. As a safeguard against possible leak, this plug 7 is formed with a rearwardly facing shoulder 13 spaced slightly in advance of the barrel 6, and a cement sealing ring 14 is confined in the space between said shoulder and barrel.

The rear plug 8 projects slightly rearward from the barrel 6 and is threaded at 15 for detachably holding a cap 16 in place, said cap normally housing a knob 17 which is manually-rotatable to actuate a piston 18 in the barrel 6, to effect filling of said barrel.

The rear plug 8 is formed with a central opening or bore 19, the front portion 20 of which is of reduced diameter, providing said plug 8 with an internal rearwardly facing shoulder 21 directly behind said reduced front portion 20. Against this shoulder 21 a sealing ring 22 of paper or other

compressible material is seated, said ring 22, as hereinafter made clear, preventing any possible leakage of ink from the rear end of the barrel 6 should there be slight leakage past the piston 18. This piston however is preferably of cork to minimize danger of leakage.

A tubular member 23 carries the piston 18 and is provided with an embedded nut 24 at its rear end. Into this nut an operating screw 25 is threaded, said screw having the knob 17 formed integrally with its rear end. Rotation of this knob first in one direction and then in the other serves to move the piston 18 first forwardly and then rearwardly, allowing the rearward movement to draw ink into the barrel 6 through the feed. The threads of screw 25 and nut 24 are preferably rather steeply pitched to minimize the number of revolutions which must be given the knob 17.

The front end of the member 23 is provided with an integral forwardly projecting stub 26 located centrally thereof, said stub being surrounded by the piston 18. One washer 27, surrounding the stub 26, is preferably disposed between the piston 18 and the front end of the member 23, and a similar washer 28 snugly surrounds said stub and bears against the front side of said piston. This washer 28 may be cemented to the stub 26 or otherwise secured against removal therefrom. The piston 18 fits tightly upon the stub 26 and, as it is essential that said piston hold the member 23 against rotation with the screw 25, provision is made insuring this, even though the stub 26 should become somewhat loosened in said piston. This provision consists of a pin 29 tightly forced into aligned openings 30 in the elements 28, 18, 27 and 23, said pin being radially spaced from and preferably parallel with the stub 26. This pin may be cemented in place if desired.

The screw 25 is provided with a journal 31 within and of less diameter than the major portion of the bore 19, behind the shoulder 21. At the front end of this journal an integral enlargement 32 is formed on the screw 25. The shoulder formed by the front side of said enlargement being seated against the sealing ring 22 above described. At the rear end of the journal 31 is the aforementioned knob 17.

The rear surface of the enlargement 32 forms a rearwardly facing shoulder 33 at the front end of the journal 31. Similarly the forwardly-facing surface of the knob 17 forms a forwardly-facing shoulder 34 at the rear end of the journal 31. Surrounding the journal 31 is a bearing 35 which is preferably frictionally secured in the major portion of the bore 19. The front end of this bearing abuts the shoulder 33 and the rear end of the bearing abuts the shoulder 34 so that these shoulders form end thrust surfaces for preventing longitudinal sliding movement of the screw 25, longitudinally relative to the pen barrel. The bearing 35 consists of two semi-cylindrical halves 36 (see Figures 4 and 5) and a reduced bendable web 37, integrally uniting one longitudinal edge of one of said halves with the corresponding longitudinal edge of the other of said halves. As best seen in Fig. 4 the two halves 36 of the bearing member 35 before assembly occupy relatively open positions in readiness to receive the journal 31.

The fountain pen filling mechanism is assembled in the following manner: The journal 31 is placed between the two halves of the bearing

member 35. The two halves of the bearing member are then closed sufficiently to allow the bearing member to be wedged into the bore 19 of the plug 8. Since the bearing member normally tends to spring apart, the bearing will be held immovably relative to the plug 8. It is to be understood however that even when the two halves 36 of the bearing member are in a closed position within the bore 19 the bearing member fits rather loosely about the journal 31, so that the journal may be rotated relative to the bearing. The assembly consisting of the plug 8, journal 31 and screw 25, is then placed within the rear end of the fountain pen barrel 6, cement having been previously placed within the grooves 9. Upon the solidification of the cement, the plug 8 is firmly held within the rear end of the barrel and no ink can leak past the cement in the sealing grooves. No leakage can take place around the screw 25 since the sealing member 22 is held between the shoulder 21 and the forward end of the enlargement 32 and effectively seals the opening 20. The piston assembly is then placed in the barrel from the front end while the knob 17 is being rotated until the threads on the screw 25 mesh with the threads in the nut 24. Thereafter the front plug 7 is cemented into the front end of the barrel so as to form a leak-proof closure for this end. It is to be noted that prior to assembling the front plug, cement is placed in the grooves 10 and on the rearwardly-facing shoulder 13. A suitable cap 38 and clip 39 have been illustrated and may be of any well-known construction.

All of the parts of the fountain pen, according to the present invention, are preferably made from plastic materials. It is to be noted that if both the plugs at each end of the barrel and the barrel are formed from these materials, it is much easier to form a leak-proof bond between the plugs and the barrel. The various parts can also be easily molded if they are formed from the various types of thermoplastic material.

Thermoplastic materials which are suitable for use in accordance with the present invention are:

1. *Phenol-formaldehyde resins, as for example Bakelite which is thermosetting in character.*—In other words, if Bakelite were used for molding or forming the fountain pen of the present invention, the molding composition in its incompletely set form would be molded into shape and then heated to produce the final product by polymerization.

2. *Furfural resins.*—These resins are also thermosetting in character and would be subsequently heated for complete polymerization after forming.

3. *Urea and thiurea resins.*—Resins of this character are also thermosetting in character.

4. *Glyptal.*—Some of the glyptal resins are thermosetting, while others are thermoplastic. In other words, the thermoplastic resins and glyptal resins when used can be shaped by applying heat to the desired form herein disclosed after having been initially supplied in bars or tubes.

5. *Vinyl and styrene resins.*—These resins are generally produced by polymerizing styrene or vinyl-benzene. They are highly thermoplastic in character and easily molded by the application of heat. In many forms they are clear or colorless and are sufficiently tough and elastic for the purpose of the present invention.

6. *Acrolein and acrylic acid resins.*—An example of this type of resin is that known as "Leucite." The acryl or acrolein resins are optically clear and have a high index of refraction. They

present an extremely attractive appearance for a pen of this character for this reason.

7. *Cellulose esters and others.*—Examples of this type of plastic are cellulose acetate and cellulose nitrate. These plastics are thermo-softening, in other words, they soften when heated and can be formed by suitable dies into a pen as set forth.

8. *Hard rubber.*—Hard rubber differs from the soft flexible type of rubber in that it contains from 20% to 30% of sulphur. Hard rubber compositions in general are thermoplastic and can be molded to a suitable shape such as the pen of the present invention.

9. *Chlorinated rubber.*—This material is thermoplastic in character and in sufficient thickness represents a thermoplastic material within the range of this invention. A form of chlorinated rubber is that product sold in sheets under the trade name of "Pliofilm."

10. *Synthetic rubber compositions.*—These in general exhibit the same qualities as hard rubber and can be similarly used.

It is to be understood that mixtures of plastic materials may be suitable in the present invention and that stiffeners or fillers such as fibrous materials, as well as plasticizers may be essential to produce a material having the desired qualities.

The plastic materials as above set forth can be bonded by suitable cements, preferably a cement is used consisting of a compatible plastic material in a solvent which will affect, or partially dissolve, the material of the pen. For example, if the pen in general is formed from a cellulose nitrate material, the cement should preferably consist of cellulose nitrate together with suitable fillers in a solvent such as acetone, preferably in admixture with other solvents such as lower alcohols which are more or less volatile than the acetone. It is essential that the cement whatever its constitution be capable of drying so as to be completely impenetrable to any ordinary form of writing ink.

Referring to the sealing ring 22, this may be of any compressible material, such as paper, or paper impregnated with a synthetic resin, such as a phenol formaldehyde resin or a urea resin. The paper may be impregnated with any synthetic resin which will increase the sealing properties of the paper and prevent any possible leakage of the ink from the rear end of the valve should there be a slight leakage past the piston

18. While paper has been set forth as the preferred material, any compressible material may be used which will effect the desired result, including many cellulosic materials such as paper, paper board, finely matted wood pulp, leather, felt, and the like, and these may be impregnated, if desired, with a synthetic resin. Instead of using a paper sealing ring, the sealing ring may be made of a synthetic resin including any of the condensation products hereinbefore set forth as suitable for the production of the fountain pen barrel. These materials may be thermoplastic or may be thermosetting in character. The sealing ring may also be a compressible metal, as for example, Wood's metal and similar alloys.

What is claimed is:

1. In a fountain pen, a barrel having a rear end closure formed with a central opening, a piston in said barrel slidable rearwardly to fill the same, operating means for said piston including a central longitudinal manually-rotatable operating member having a journal within and

of less diameter than said opening, said operating member having an end-thrust surface adjacent said journal, and a bearing surrounding said journal and having an end-thrust surface abutting the aforesaid end-thrust surface, said bearing being tightly held in said opening.

2. In a fountain pen, a barrel having a rear end closure formed with a central opening, a piston in said barrel slidable rearwardly to fill the same, operating means for said piston including a central longitudinal manually-rotatable operating member having a journal within and of less diameter than said opening, said operating member having a rearwardly facing shoulder at the front end of said journal and a forwardly facing shoulder at the rear end of said journal, and a bearing surrounding said journal and having front and rear ends abutting said front and rear shoulders respectively, said bearing being tightly secured in said opening.

3. In a fountain pen, a barrel having a rear end closure formed with a central bore, said bore having a front portion of reduced diameter and a rearwardly facing shoulder immediately behind said reduced front portion; a piston in said barrel slidable rearwardly to fill the same, operating means for said piston including a central longitudinal manually rotatable operating member extending rearwardly through said bore, said operating member having a forwardly facing shoulder and a journal behind said forwardly facing shoulder, said journal being within and of smaller diameter than the major portion of said bore behind said reduced front portion, said forwardly facing shoulder being spaced behind said rearwardly facing shoulder, a sealing ring surrounding said operating member and abutting both of the aforesaid shoulders, and a bearing surrounding said journal and tightly secured in said major portion of said bore, said bearing and operating member having coacting end-thrust surfaces holding said operating member against sliding and thereby retaining said sealing ring against the aforesaid shoulders.

4. In a fountain pen, a barrel having a rear end closure formed with a central bore, said bore having a front portion of reduced diameter and a rearwardly facing shoulder immediately behind said reduced front portion, a piston in said barrel slidable rearwardly to fill the same, operating means for said piston including a central longitudinal manually rotatable operating member extending rearwardly through said bore, said operating member having a journal within and of less diameter than the major portion of said bore, an enlargement at the front end of said journal spaced behind the aforesaid rearwardly facing shoulder, and a knob at the rear of said journal disposed behind said closure, a sealing ring between said enlargement and said shoulder and abutting both thereof, and a bearing surrounding said journal and tightly secured in said major portion of said bore, the front and rear ends of said bearing abutting the rear side of said enlargement and the front end of said knob respectively and thereby holding said operating member against sliding.

5. In a fountain pen, a barrel having an internally cylindrical end, a closure plug tightly fitted into said end and having a peripheral groove, and a sealing cement filling said groove to secure said plug and prevent leakage, said plug having an external shoulder spaced outwardly from the adjacent extremity of said barrel, and a plastic

sealing ring tightly filling the space between said shoulder and said barrel extremity.

6. In a fountain pen, a bearing for a manually rotatable member to effect pen filling, said bearing consisting of two semi-cylindrical halves and a reduced bendable web integrally joining one longitudinal edge of one of said halves with the corresponding edge of the other of said halves, said halves normally occupying relatively open positions in readiness to receive the operative member and being then closable for insertion into the pen barrel.

7. In a fountain pen, a piston-carrying member having an integral forwardly projecting stub centrally located on its front end, a yieldable piston in abutting relation with said front end of said piston-carrying member and having a central opening snugly receiving said stub, a washer lying against the front side of said piston and snugly surrounding said stub, said washer, piston and piston-carrying member having aligned openings spaced radially from said stub, and a pin secured in said aligned openings to prevent rotation of said piston-carrying member with respect to said piston.

8. In a fountain pen, including a barrel, a piston mounted within said barrel for reciprocating movement longitudinally thereof, a closure plug in the rear end of said barrel, means extending through said closure plug and movable relative thereto for operating said piston, a split bearing member frictionally held in an immovable manner within said closure plug and coating means on said bearing member and said operating means for said piston to prevent longitudinal movement of said operating means relative to said barrel.

9. In a fountain pen, including a barrel, a piston mounted within said barrel for reciprocating movement longitudinally thereof, a closure plug in the rear end of said barrel, means extending through said closure plug and movable relative thereto for operating said piston, a split bearing member frictionally held in an immovable manner within said closure plug and coating means on said bearing member and said operating means for said piston to prevent longitudinal movement of said operating means relative to said barrel, and sealing means adjacent the inner end of said closure plug and surrounding said piston operating member to inhibit ink leakage through said closure member.

10. In a fountain pen, including a barrel, a piston mounted within said barrel for reciprocating movement longitudinally thereof, a thermoplastic closure plug in the rear end of said barrel, means extending through said closure plug and movable relative thereto for operating said piston, a split bearing member frictionally held in an immovable manner within said closure plug and coating means on said bearing member and said operating means for said piston to prevent longitudinal movement of said operating means relative to said barrel, sealing means adjacent the inner end of said closure plug and surrounding said piston operating member to inhibit ink leakage through said closure member; and cementing means uniting said closure plug to the barrel member comprising a dried, solidified, thermoplastic cement produced by the drying of a solution of a thermoplastic cement in a solvent which, prior to drying, softens the barrel member.

11. In a fountain pen, including a barrel, a piston mounted within said barrel for reciprocating movement longitudinally thereof, a closure plug in the rear end of said barrel, means extending through said closure plug and movable relative thereto for operating said piston, including a piston-carrying member, means to prevent rotation of said piston-carrying member with respect to the piston, a split bearing member frictionally held in an immovable manner within said closure plug and coating means on said bearing member and said operating means for said piston to prevent longitudinal movement of said operating means relative to said barrel.

12. In a fountain pen, including a barrel, a piston mounted within said barrel for reciprocating movement longitudinally thereof, a closure plug in the rear end of said barrel, means extending through said closure plug and movable relative thereto for operating said piston, including a piston-carrying member, washers adjacent the front and rear surfaces of said piston and surrounding said piston-carrying member, means to prevent rotation of said piston-carrying member with respect to the piston, a split bearing member frictionally held in an immovable manner within said closure plug and coating means on said bearing member and said operating means for said piston to prevent longitudinal movement of said operating means relative to said barrel.

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