

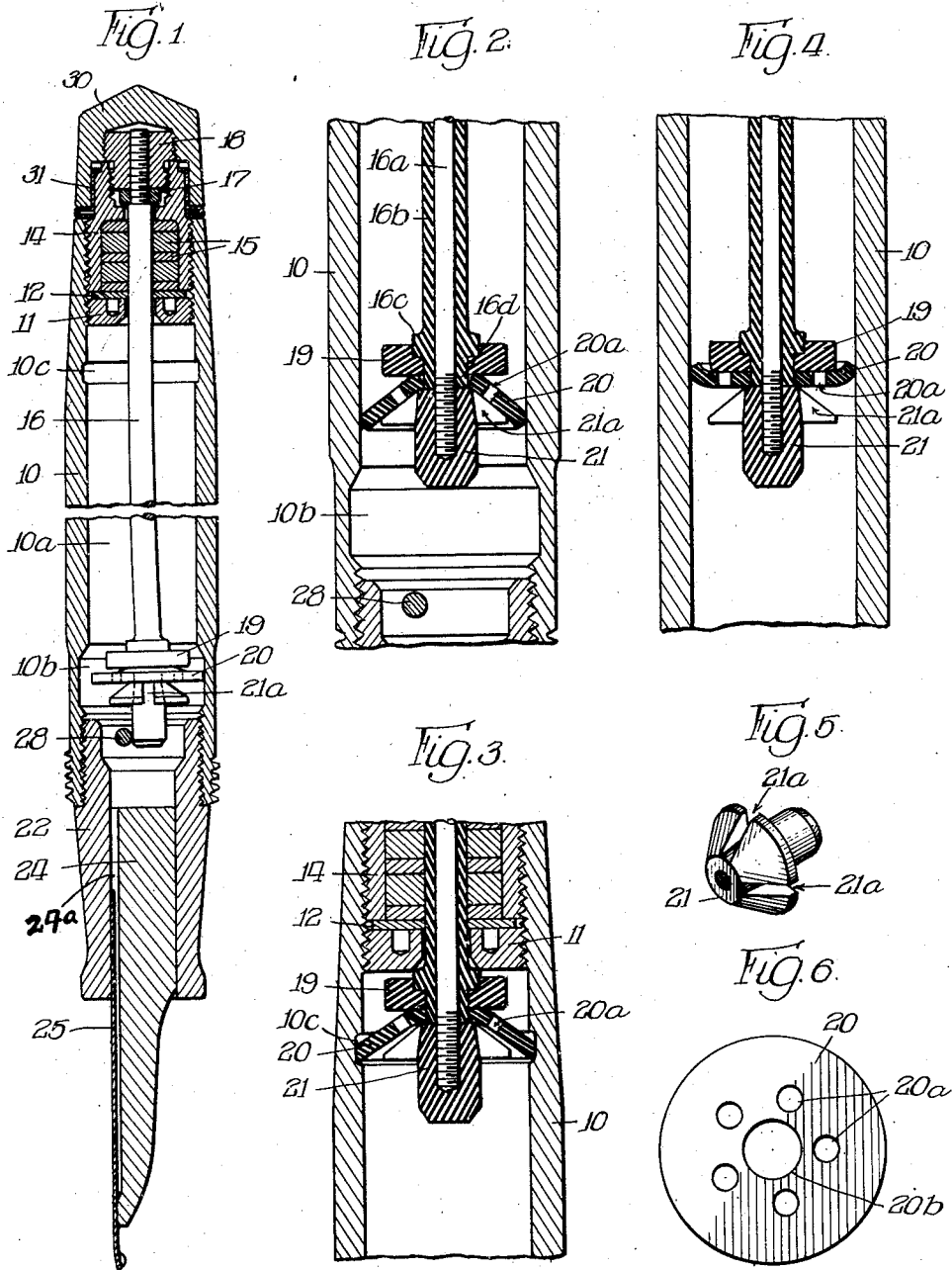
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FOUNTAIN PEN

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FOUNTAIN PEN

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This invention relates to fountain pens and pertains particularly to self-filling fountain pens of the piston type, i. e., the type having a piston operable in the pen barrel to effect the filling of the ink reservoir. The present application is a continuation in part of my copending application Serial No. 24,663, filed June 3, 1935.

One of the objects of the invention is the provision of an improved construction for the piston of a fountain pen of the sort above referred to which will have the necessary strength and desired durability and in which all metal portions are effectively protected against oxidation or deterioration under the action of the ink.

Another object is the provision of an improved construction for a fountain pen of the piston type which will reduce the possibility of leakage of ink through the packing gland in which the piston rod operates.

Another object is the provision of an improved construction for a fountain pen of the sort specified which will render the operation of the piston for the filling of the pen more certain.

Other and further objects of the invention will be pointed out or indicated hereinafter or will be apparent from the following description of the invention, or upon use of pens embodying it.

For purpose of aiding in an explanation of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter describe, certain structural forms in which the invention may be embodied. It is to be understood, however, that these are presented merely for purpose of illustration, and that they are not to be interpreted in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 represents a shortened longitudinal section of a fountain pen embodying the invention;

Fig. 2 is a part longitudinal section of the same but showing certain of the parts in positions which they assume in the upward movement of the piston;

Fig. 3 is a part longitudinal section of the upper end portion of the pen barrel showing positions assumed by parts of the piston at the end of its upward stroke;

Fig. 4 is a part longitudinal section showing positions occupied by parts of the piston during its downward stroke;

Fig. 5 is a perspective view of a nut and abutment member constituting a portion of the piston illustrated in the other figures; and

Fig. 6 is a face view of a flexible disk or washer which constitutes a portion of the piston.

This invention relates primarily to that type of self-filling fountain pens wherein the pen barrel affords a cylindrical ink reservoir in which a piston is operable to induce a negative pressure behind the piston on its downward stroke, the evacuated portion of the barrel being placed in communication with the pen section when the piston, at the end of its downward or inward stroke, reaches a clearance space at the lower end of the barrel, thereby permitting induction of ink through the ink-feeding passages of the pen section and into the reservoir above the piston.

Pens of this type heretofore employed have shown tendencies to leak through the packing gland in which the piston rod operates at the upper end of the barrel, such tendencies being increased by the necessity for forcing ink past the periphery of the piston in the course of the movement of the latter to its upper position in the barrel preliminary to the downward or evacuating stroke of the piston. One of the objects of the present invention is to remove causes which promote such leakage.

The manner in which these and various other objects and advantages of the present invention are obtained, as well as the nature and character of the invention, will be ascertained most readily by a detailed consideration of the illustrative embodiments shown in the accompanying drawing, which embodiments will now be described.

The pen includes a barrel 10 which affords a bore or internal cavity 10a of uniform cross-sectional size and contour, which cavity constitutes an ink reservoir. At its lower terminus, it merges into a cavity 10b of greater cross-sectional size such as to afford a clearance space for the piston as hereinafter described.

In the upper end of the barrel is fixed a bushing 11 which supports a washer 12, and also in the upper end of the barrel is secured a sleeve 14 having a cavity which houses a plurality of layers 15 of packing material, all or some of which may be flexible and compressible. This packing is compressed against the washer 12 by the screwing down of the sleeve 14. The bushing 11, washer 12, sleeve 14 and packing material 15 are provided with axial apertures which align to afford a passage for the piston rod 16.

The piston rod, as seen more particularly in Fig. 2, comprises a core 16a of metal wire and a sheath 16b of hard rubber vulcanized thereon. The upper end portion of the core extends beyond

the sheath and has a jamb nut 17 and a stepped nut 18 threaded thereon. A short distance from its lower end the sheath is formed with a peripherally projecting shoulder 16c. Fitted on the lower end portion of the sheath is a rigid collar 19, of hard rubber, which is counterbored to accommodate and abut the shoulder 16c. Centered on the portion 16d of the sheath below this collar 19 is a disk 20 of flexible rubber, said disk being of substantially greater diameter than the diameter of the barrel bore 10a and of somewhat lesser diameter than the diameter of the cavity 10b. This disk is provided with a plurality of port openings 20a and a central aperture 20b, the latter being somewhat smaller in diameter than the portion 16d of the sheath on which the disk is retained. Hence, in order to mount the disk on the sheath portion 16d, the central portion has to be stretched somewhat, which causes it to assume a slightly dished form as illustrated in Fig. 1. The lower end of the core 16a projects beyond the lower end of the sheath and has screw-threaded thereon a hard rubber spider nut 21, the upper face of which is frusto-conical in form and provided with a plurality of longitudinally extending slots 21a. Nut 21 is set up tightly against the lower end of the sheath 16b below disk 20.

It will be observed that by virtue of this construction all portions of the metal core 16a which enter the barrel are completely enshrouded in rubber, thus preventing access of ink to the metal.

The port apertures 20a of flexible disk 20 are of such size and arrangement that one or more of them will overlie or partly overlie one or more of the slots 21a of nut 21. Nut 21 and collar 19 are of approximately the same maximum diameter, which is substantially less than that of the barrel bore 10a. Collar 19, disk 20 and nut 21 constitute the piston. The form and proportions of the parts are such that when the piston is drawn upwardly in bore 10a, the marginal portion of disk 20 will rub against the bore wall of the barrel, with the result that the disk will be flexed downwardly against the upper conical surface of nut 21, and the disk will be supported by the flange of the nut in such position that the marginal portion of the disk will be held definitely in rubbing contact with the bore wall as illustrated in Fig. 2. With the disk in this position, fluid may flow freely from the portion of the bore 10a above the disk 20 through the apertures or ports 20a and the slots 21a. Consequently, as the piston is moved upwardly in the barrel, no material amount of pressure can be built up on air or such ink as may be in the barrel above the piston. Accordingly, there will be no pressure in the barrel effective to cause leakage through the packing gland. During such upward movement of the piston, the disk 20 and nut 21, by virtue of the bearing of the former upon the bore wall, form a centering guide for the lower end of the piston rod, guiding it in axial alignment with the aperture of the packing gland in which the piston rod slides, and maintaining the disk 20, about its entire circumference, in close contact with the wall of the barrel bore.

As shown in Figs. 1 and 3, the barrel is provided with a shallow internal circumferential groove 10c located at a suitable distance below the bushing 11 to receive the marginal portion of the disk 20 when the piston is in its upper limit position. This is for the purpose of momentarily retaining the marginal portion of

the disk 20 at the start of the downward movement of the piston, to insure the disk being positively flexed upwardly against the collar 19.

During the downward or inward stroke of the piston the flexible disk 20 is supported by the collar 19 in a position such that its outer portion is held in sealing contact with the bore wall, as illustrated in Fig. 4, and in which position the ports 20a are closed against the lower face of the collar 19. This prevents passage of air into the bore above the piston during the time the latter is moving downwardly in said bore. As a result, a partial vacuum is created in the bore above the piston. As the piston passes into the cavity 10b, this vacuum is broken when the marginal portion of the disk passes the upper end of the cavity.

The lower end of the barrel is fitted with a suitable pen section, as shown in Fig. 1, which includes a pen section sleeve 22 screw threaded in the lower end of the barrel, and an ink feed bar 24 and pen point 25 which are mounted in the lower portion of said sleeve. The ink feed bar has the conventional ink feed channel 24a for feeding ink to the pen point, and which also serves as a channel for admission of ink into the barrel in the filling operation.

In the construction illustrated in Figs. 1 and 2 the sleeve 22 may be provided adjacent its upper end with a transversely extending pin 28, to act as a deflector for the piston. This deflector is arranged in such position that as the piston reaches the end of the downward or inward stroke, the beveled lower end of nut 21 will engage the deflector, and cam the piston laterally, as to the position illustrated in Fig. 1. This movement is accommodated by a slight flexing of the piston rod. This lateral displacement of the piston increases the clearance between the margin of the disk 20 and the wall of the cavity 10b at one side of the piston.

The piston rod is equipped at its upper end with a small cap 30 having an external form and finish appropriate for the barrel, said cap being molded onto, or otherwise affixed to, the nut 18. The lower threaded portion of this nut is adapted to screw into the threaded female portion at the upper end of the sleeve 14. The nut 18 is fixedly secured to the piston rod. A suitable finish ferrule 31 is mounted on the upper end of the sleeve 14 to provide a seat for the skirt portion of the cap 30 and an appropriate finish for the joint between the cap and the upper end of the barrel.

In operation of the device to accomplish the filling of the pen, the cap 30 is rotated to unscrew the nut 18 from the sleeve 14. The piston is then drawn upwardly in the barrel by traction on the cap 30. Incident to this operation, the disk 20 is flexed downwardly as seen in Fig. 2, and the ports 20a opened, so that ink and air in the bore 10a find free outlet therethrough, the marginal portion of the disk being held in contact with the bore wall by the flange of nut 21. When the piston has been thus drawn upwardly to the limit of its upward or outward stroke, the margin of the disk 20 springs into the shallow groove 10c, where it is retained until it is pushed downwardly in the barrel by pressure on the cap 30. At the start of this downward movement of the piston, the disk 20 is flexed into engagement with the collar 19, so that the ports 20a are closed and the marginal portion of the disk is maintained firmly in contact with the bore wall, as illustrated in Fig. 4, during the downward movement of the piston in the bore 10a. Before the piston reaches the lower end of the bore 10a, the

protruding portions of the pen point and feed bar and the lower extremity of the pen section sleeve 22 are immersed in a body of ink. Downward movement of the piston then being continued, disk 20 enters cavity 10b, the bore cavity 10a being thus placed in communication with the pen section, whereupon ink will be forced into the reservoir through ink channel 24a and past disk 20. Then nut 18 is screwed home in sleeve 14, thus securing the piston in the position shown in Fig. 1.

What I claim is:

1. In a fountain pen filling device, a piston rod having a metal core with a sheath of ink-resistant material, said sheath having an outwardly projecting shoulder, a collar encircling the sheath and abutting said shoulder, a nut threaded on the core and abutting the end of the sheath, and a piston disk encircling the sheath and retained thereon between the collar and nut.

2. In a fountain pen filling device, a piston rod having a metal core with a sheath of ink-resistant material, a collar on the sheath, a nut of ink-resistant material retentively engaged with the core and abutting the end of the sheath, and a piston disk retained on the sheath between the collar and nut.

3. In a fountain pen having a barrel with a cylindrical bore, a filling device comprising a piston rod reciprocable longitudinally in the bore, a flexible piston disk carried on the rod and of greater diameter than the bore, said disk being provided with a port therethrough located eccentrically thereof, a collar on the rod for abutment with one side of the disk to close said port, and a stop member on the rod at the other side of the disk for cooperation therewith to limit its flexure away from the collar but hold its marginal portion in contact with the bore wall of the barrel.

4. In a fountain pen filling device, a construction as specified in claim 3 and wherein the stop member is provided with a passage arranged to communicate with the port of the disk when the latter is against the stop member.

5. A fountain pen with filling device as specified in claim 3 and wherein the barrel bore is circumferentially enlarged adjacent each of its ends to accommodate the peripheral portion of the flexible piston disk for the purpose described.

6. A fountain pen with filling device as specified in claim 3 and wherein the barrel is provided adjacent each end of its bore with a portion for restraining engagement with the peripheral portion of the flexible piston disk, for the purpose described.

7. In a fountain pen, in combination, a barrel having a bore for receiving ink and an ink passage communicating with the lower end of said bore, a piston rod movable longitudinally in the bore, a flexible disk carried by the piston rod and having a diameter greater than the bore, said disk being provided with an aperture therethrough constituting a port for passage of fluid, a collar carried on the rod above the disk and adapted to support the marginal portion of the latter in rubbing contact with the bore wall during movement of the piston downwardly in the bore and having a portion for cooperation with the disk to close the port against passage of fluid during such downward movement of the piston, and an abutment member carried on the rod below the disk and adapted to support the marginal portion thereof in rubbing contact with the bore wall during upward movement of the piston

in the bore, said abutment member being formed to accommodate flexure of the disk downwardly away from the collar to open the port to flow of fluid therethrough during such upward movement of the piston.

8. A fountain pen construction as specified in claim 7 and wherein said abutment member is provided with an ink flow passage arranged for communication with the port when the port is spaced away from the collar.

9. A fountain pen construction as specified in claim 7 and wherein said ink passage of the barrel is of size and form such as to permit the disk to assume a position normal to the rod after the disk has been moved beyond the lower end of the bore.

10. In a fountain pen having a barrel formed with an ink-receiving bore, a piston adapted for movement longitudinally in the bore, said piston including a rod, a flexible elastic disk mounted on said rod, said disk being of greater diameter than the barrel bore and being provided with an aperture therethrough affording a port for passage of fluid, a collar on the rod above the disk and adapted to support the marginal portion thereof in rubbing contact with the bore wall and to close the port against passage of fluid, and an abutment member on the rod below the disk and adapted to support the marginal portion thereof in rubbing contact with the bore wall, said abutment member being formed to accommodate flexure of the disk away from the collar to un-stop the port.

11. In a fountain pen, a construction as specified in claim 10 and wherein the bore wall of the barrel is provided with a shallow circumferentially extending groove in position to receive the marginal portion of the disk when the piston is in its upper limit position.

12. In a fountain pen, a construction as specified in claim 10 and including also means for restraining the marginal portion of the disk at the beginning of the downward movement of the piston from its upper limit position.

13. In a fountain pen, a construction as specified in claim 10 and wherein the flexible piston disk is of elastic material and centrally apertured to receive the rod and its central portion around the aperture is held somewhat expanded radially by the rod portion on which it is mounted, so that the disk assumes a slightly dished form.

14. In a fountain pen having a barrel with a cylindrical bore and an enlarged cavity at the lower end of the bore, a filling device comprising a piston rod reciprocable longitudinally in the bore, a collar fixed on the rod adjacent its lower end, a radially slotted nut on the rod below the collar, and a flexible piston disk of larger diameter than the barrel bore retained on the rod between the collar and nut and bearing at its margin on the bore wall, said piston disk being apertured to form a port and being flexible upwardly into abutment with the collar to close the port and downwardly into abutment with the nut to open the port and place it in communication with the slot of the nut, said piston disk being movable into the enlarged cavity of the barrel near the end of the downward movement of the piston rod.

15. In a fountain pen having a barrel with a cylindrical bore and an enlarged cavity at the lower end of the bore, a filling device comprising a piston rod reciprocable longitudinally in the bore, an over-size flexible elastic piston disk car-

ried on the rod adjacent its lower end, said piston disk being apertured to afford a port there-through, and a collar fixed on the rod above the piston disk in position for engagement by the disk to close said port and support the marginal portion of the disk in rubbing engagement with the bore wall, said piston disk being elastically restrained in dished form so that it will move away from the collar to un-stop the port when the disk is in said enlarged cavity of the barrel.

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