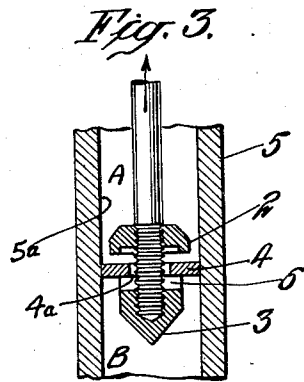
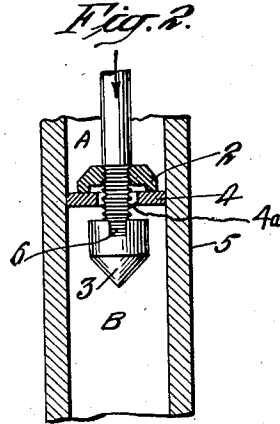
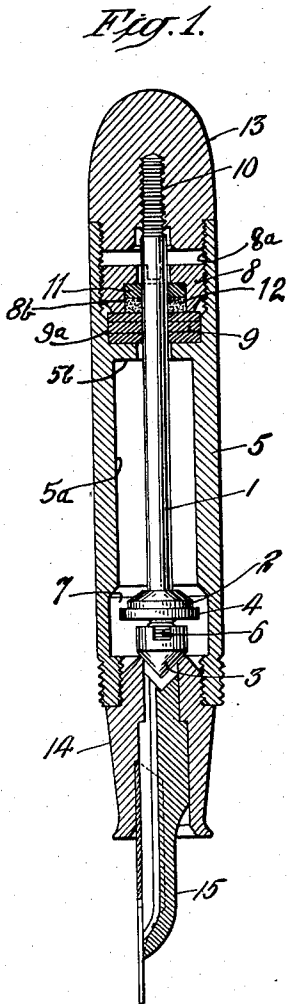


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PISTON FOUNTAIN PEN
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PISTON FOUNTAIN PEN

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1 Claim. (Cl. 120—47)

This improvement relates to a fountain pen in which a piston is reciprocated in the barrel of a fountain pen for establishing a vacuum for automatically filling the pen.

5 In piston fountain pens of this type, it is customary to provide a reciprocating piston cooperating with an enlarged by-pass chamber at the lower end of the barrel for breaking the vacuum which is established behind the piston during its downward movement, after it has first been drawn to the upper end of the barrel. The piston is accordingly suitably valved for the free passage of fluid therethrough while the piston is being drawn out or toward the upper end of the barrel, the valve arrangement automatically closing the passage through the piston on the downward stroke to establish a vacuum on the upper side of the piston and to expel any fluid in front of the piston.

20 Various types of pistons and various valve arrangements in connection therewith have been tried, but the main difficulty experienced is in establishing and maintaining a suitable vacuum during the downward thrust of the piston, and it is desirable to do this with the simplest possible construction. In the present improvement, this objection has been overcome by providing a piston formed of an annular soft rubber disc with a cylindrical periphery which closely engages the bore of the barrel and prevents leakage. The central opening in this piston disc is larger than the piston rod to provide for the passage of fluid therethrough and the soft rubber piston is located between two stop members, the upper one being provided with an annular flange for engaging the surface of the soft rubber piston disc during its downward movement to thereby seal the central opening tightly for establishing the vacuum back of the piston. The lower stop member on the piston rod is provided with a channel cooperating with the central opening of the annular piston disc to facilitate the discharge of fluid therethrough on the upward stroke of the piston.

45 The piston pen of the present improvement is more particularly shown in the accompanying drawing in which Fig. 1 is a longitudinal sectional view with the piston in normal position in the by-pass chamber; Fig. 2 is a broken away longitudinal section showing the piston on the down stroke in the barrel and Fig. 3 is a similar broken away sectional view showing the piston during the up stroke in the barrel.

55 Referring to the drawing, it will be seen that the pen barrel 5 is provided with a longitudinal

bore 5a, in which the piston 4 is arranged to reciprocate for filling the pen. The lower end of the bore of the barrel is enlarged at 7 to form a by-pass chamber in which the piston 4 is normally positioned and which permits the ink to flow into the barrel when the vacuum is broken.

The barrel at the upper end of the bore 5a is provided with a transverse annular partition 5b, through the opening of which the piston rod 1 is arranged to pass. The upper end of the pen barrel 5 is internally screw threaded at 8a and below the threaded portion is counter-bored at 9a, just above the annular partition 5b. In the counter bore 9a, there is preferably mounted a plurality of thin sheet rubber annular packing discs 9 which are clamped in position by a gland 8, the latter being threaded to engage the internal threads 8a of the barrel. The gland 8 by this arrangement is adapted by pressure upon the soft rubber packing discs 9 to radially expand the latter so as to make the joint between the rubber packing and the piston rod and at the wall of the counterbore leak proof; it being understood that the rubber packing discs 9 are of substantially the same diameter as the counter-bore 9a.

For smooth easy action of the piston rod, as it is reciprocated in the hole in the packing discs 9, in filling the pen, suitable lubrication is preferable and, in the present instance, this is accomplished by providing a cup-like bore 8b in the gland 8 and mounting therein a gasket 11 of soft rubber closely fitting the piston rod 1, as indicated in Fig. 1. This gasket seals the hole in the upper end of the gland through which the piston rod moves; and between the gasket 11 and the packing discs 9 the lubricant is placed, preferably by inserting a felt washer 12 saturated with oil or other suitable lubricant, the cup shaped cavity 8b being sealed by the engagement of the lower annular face of the gland with the rubber packing discs 9; by which means there can be no escape of the oil and the piston rod is for an indefinite period effectively lubricated in its reciprocating movement.

The upper end of the piston rod 1 is screw threaded at 10 and a knob 13 is tightly secured thereto by the threads. The lower end of this knob, as will be seen in Fig. 1, is of reduced diameter and provided with screw threads to cooperate with the upper end of the threads 8a, so as to close the upper end of the barrel and maintain the piston in the by-pass chamber during normal use of the pen. This action also closes the feed outlet as explained later.

The lower end of the piston rod 1 is provided with an upper stop member 2 for limiting upward movement of the rubber disc piston 4 and a lower stop member 3 for limiting downward movement thereof, these stop members being preferably mounted on the piston rod by screw threads as indicated in Fig. 3. It will also be seen in Fig. 3 that the annular piston disc 4 which is of soft rubber is provided at its outer periphery with a cylindrical surface adapted to closely engage the bore 5a of the barrel so as to provide an air-tight joint and insure, as nearly as possible, a complete vacuum on the upper side A of the piston, the vacuum being developed on the down stroke, as indicated in Fig. 2. The central opening 4a of the annular piston disc 4 is larger than the piston rod, as will be seen in Figs. 2 and 3, so that, with the piston in the position shown in Fig. 3, fluid, that is, air and/or ink will readily flow therethrough during the up stroke of the piston, the fluid thereby passing freely to the lower side B of the piston; it being noted that the lower stop member 3 is provided with a cross channel 6 cooperating with the hole in the piston for this purpose. Preferably the upper stop member 2 is undercut slightly to provide an annular flat surface to engage the upper surface of the soft rubber piston disc 4 on the down stroke of the piston (Fig. 2) to seal the opening 4a and establish the vacuum in the barrel on the upper side A of the piston.

The lower end of the barrel 5 is internally screw-threaded in the usual manner and provided with a nozzle 4 for supporting the pen nib 16 which is arranged to cooperate in the usual manner with a feed bar 15 extending into the nozzle 14 as shown in Fig. 1.

The central feed opening in the upper end of the nozzle 14 cooperates with the valve-like, cone-shaped lower end of the lower stop member 3 to close the opening to the feed bar channel when the piston knob 13 is screwed down tight, thus preventing leakage when the pen is not in use.

To fill the pen the piston knob 13 is unscrewed from the barrel 5 and the piston drawn out or upward, in the direction indicated in Fig. 3, during which time the air or ink remaining in the barrel passes from the upper side A to the lower side B of the piston through the central opening 4a thereof and the radial channels 6 in the lower stop member, the position of the parts during withdrawal of the piston being shown in Fig. 3.

When the piston rod is drawn out fully at the upper end of the piston movement, it will be noted that the stop member 2 engages the partition 5b and effectively prevents further outward movement of the piston and prevents injury to the delicate parts.

The piston is now moved inward toward the nib end of the pen and, as indicated in Fig. 2, the annular flange surface of the upper stop member 2 engages the upper surface of the soft rubber disc of the piston 4 and seals the opening 4a so as to create a more or less complete vacuum in the part A back of the piston, this vacuum being maintained until the piston reaches the by-pass chamber 7, thus breaking the vacuum and permitting the ink to pass in through the feed channel if the lower end of the pen is inserted in a reservoir of ink.

During this reciprocating movement of the piston, the piston rod will be effectively lubricated by the oil in the packing gland 8; and because of the arrangement of the gland 8 and the compression of the soft rubber packing discs 9, there will be no leakage of air, ink or oil at the joints and a substantially perfect vacuum is assured.

It will be understood that the preferred form of the improvement has been shown and described, but various modifications therein may be made without departing from the spirit and scope of the invention.

I claim:—

In a piston fountain pen, a piston rod provided at its lower end with two longitudinally spaced stop members, the upper member being recessed on its underside to provide a continuous annular flange and the lower member having radial discharge grooves on its upper face and a piston comprising an annular disc of soft rubber located between said stop members and limited thereby to a predetermined amount of longitudinal movement, said soft rubber disc being adapted to cooperate with the annular flange of said upper member to form an airtight joint when the upper member is forced downward with the piston rod, the central opening in said piston disc being larger than the piston rod and adapted to cooperate with the radial grooves in said lower member to permit the passage of fluid therethrough when the lower member is moved upward by the piston rod.

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