



# UNITED STATES PATENT OFFICE

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## FOUNTAIN PEN

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6 Claims. (Cl. 120-47)

This invention relates to fountain pens, particularly those of the vacuum filling piston type.

The object of the invention is to provide a fountain pen having a large ink capacity and provided with a piston of novel construction which is loosely mounted upon an operating rod free to be reciprocated loosely therethrough, said piston having a frusto-conical valve seat embodied therein which is arranged to engage with and be disengaged from a co-operating frusto-conical valve seat provided upon a valve member which is rigidly fastened to said rod, there being an open passage provided between the seat of said valve member and seat of the piston during an outward stroke of said piston, thereby providing a free exit for air confined within the barrel of the pen and relieving the packing at the top of the barrel from excessive pressure and consequent strain, and said valve member seating tightly against the seat of the piston and closing said passage during the inward stroke of said piston, thereby making it possible to create an effective vacuum within the barrel and ink reservoir of the pen.

The invention consists in a fountain pen as set forth in the following specification and particularly as pointed out in the claims.

Referring to the drawing:

Fig. 1 is an enlarged longitudinal sectional view of a fountain pen embodying my invention, the piston being illustrated in its innermost position.

Fig. 2 is an enlarged detail sectional view of a portion of the pen barrel together with the piston and associated parts in the positions they occupy during an outward stroke of the piston.

Fig. 3 is a view similar to Fig. 2 but illustrating the relative positions of the piston and associated parts during the inward stroke of the piston.

Like numerals refer to like parts throughout the several views of the drawing.

In the drawing, 5 represents a pen barrel provided with an ink reservoir 6 therein the diameter of which is increased slightly at 7 to provide a bypass for said ink. Mounted at one extremity of the barrel 5 is a nozzle 8 carrying a feed plug 9 and pen point 10 of well known construction, said plug being provided with a feed duct 11. Mounted within the barrel 5 at the other end thereof between washers 12 which have threaded engagement with the interior of said barrel is a stuffing box 13 including a suitable packing material 14.

Slidably mounted in the stuffing box 13 is a rod 15 having a handle 16 rigidly secured thereto at its outer extremity which has a screw threaded connection with the barrel 5 at 17. The inner end

portion of the rod 15 which is located within the reservoir 6 is screw threaded at 18 to receive a valve member 19 which is rigidly secured thereto at the top of said screw threaded portion. The valve member 19 is recessed at 20 to provide an internal frusto-conical valve seat 21. Rigidly secured at the inner extremity of the rod 15 is a stop member 22 having a groove 23 extending transversely across the face thereof which contacts with the valve member 19, thereby forming a passage therebetween when said members are in contact. The valve member 19 and stop member 22 are separated by a suitable space 24.

Loosely mounted upon the rod 15 in the space between the valve member 19 and the stop member 22 is a piston 25 formed of a suitable flexible material as, for example, rubber. A lower portion 26 of the piston 25 engages the wall of the reservoir 6 with a snug yielding contact. Projecting upwardly from the portion 26 of the piston 25 is a frusto-conical extension 27 providing an external valve seat 28 which projects into the recess 20 of the valve member 19 and co-operates with the seat 21 therein to form a passage 29 therebetween during certain conditions of operation hereinafter to be more fully described. The piston 25 is of such loose fit upon the rod 15 that a passage 30 is formed through said piston around said rod, said passage providing a means whereby air may pass from the recess 20 through the piston into the passage 23 of the stop member 22 to the portion of the reservoir 6 which is located beneath said piston during its upward movement, at which time the parts are positioned as illustrated in Fig. 2. When the piston is forced downwardly, or, as in the direction of the arrow *b* Fig. 3, the co-operating frusto-conical seat portions 21 and 28 are forced tightly together to close the passage 29 and prevent air from flowing through the piston. During this movement of the piston air is discharged from the reservoir 6 through the duct 11, and a partial vacuum is created within the reservoir above the piston, and this action continues until the piston enters the enlarged portion 7 of said reservoir when the vacuum is broken.

The general operation of the pen structure hereinbefore specifically described is as follows: In filling an empty pen barrel or reservoir with ink the handle 16 of the rod 15 is grasped and unscrewed from the barrel and then pulled outwardly, or, in the direction of the arrow *a* in Fig. 2. During this outward movement of the rod the upper extremity of the stop member 22 contacts with the lower extremity of the piston 25 and

said piston is forced upwardly with its periphery in tight engagement with the bore of the barrel, and the passage 29 between the internal valve seat 21 and external seat 27 is open permitting air from above the piston to pass therethrough and into and through the passage 30 of the piston and passage 23 of the stop member 22 to the under side of said piston. With the air thus substantially all discharged from above the piston during its upward movement, the nozzle 8 of the pen is submerged in a supply of ink and the rod 15 is forced inwardly, or, in the direction of the arrow *b* in Fig. 3. During the first part of the inward movement of the rod 15 the piston 25 remains stationary until the valve member 19 contacts with the extension 27 of said piston and wedges tightly thereagainst closing the passage 29 between the seat portions 21 and 28. A continued movement of the rod 15 then causes the piston to move inwardly in unison therewith causing a partial vacuum to be created within said reservoir above said piston which continues to exist until the piston reaches the enlarged portion 7 provided within the barrel when the vacuum will be broken thereby permitting a supply of ink to be forced upwardly within the reservoir by atmospheric pressure in a well known manner, said ink passing between the periphery of the piston and the wall of the barrel at the enlarged portion thereof. When the ink has reached the highest level attainable within the reservoir the handle 16 is screwed tightly into the barrel and the pen is then ready for use.

I claim:

1. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and having a frusto-conical seat embodied therein, a stop fast to the rod within the reservoir, and a valve member constituting a piston loosely mounted upon the rod between said first named valve member and stop and having a frusto-conical seat embodied therein arranged to co-operate with said first named seat to prevent a flow of air therebetween and through the piston during an inward movement of the rod while permitting a flow of air during an outward movement of the rod.

2. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and having an internal seat formed therein, a stop fast to the rod within the reservoir, and a piston loosely mounted upon the rod between said valve member and stop, said piston having an external seat formed thereon arranged to co-operate with said internal seat to prevent a flow of air therebetween and through the piston during an inward stroke of said piston while permitting a flow of air during an outward stroke.

3. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and having an internal seat formed therein, a stop fast to the rod within the reservoir, and a piston having a passage extending therethrough loosely mounted upon the rod between said valve member and stop, said piston having an external seat formed thereon arranged to co-operate with said internal seat to prevent a flow of air through said passage during an inward stroke of the piston while permitting a flow of air therethrough during an outward stroke.

4. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and provided with a recess therein, a stop fast to the rod within the reservoir, and a piston having a passage extending therethrough loosely mounted upon the rod between said valve member and stop, said piston being provided with an extension projecting into said recess and arranged to seat therein to prevent a flow of air through said passage during an inward stroke of the piston while permitting a flow of air therethrough during an outward stroke.

5. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and having a frusto-conical seat formed therein, a stop fast to said rod within the reservoir, and a piston having a passage extending therethrough loosely mounted upon the rod between said valve member and stop, said piston being provided with a frusto-conical extension projecting into said valve member and arranged to contact with said seat to prevent a flow of air through said passage during an inward stroke of the piston while permitting a flow of air therethrough during an outward stroke.

6. A fountain pen having, in combination, a barrel provided with a reservoir for ink therein, a rod mounted upon said barrel, a valve member fast to said rod within said reservoir and having a frusto-conical seat formed therein, a stop fast to the rod within the reservoir and provided with a vent passage for air therein, and a piston loosely mounted upon the rod between said valve member and stop, said piston having a passage extending therethrough around the rod communicating with said vent passage, and a frusto-conical extension projecting from said piston into said valve member and arranged to contact with said seat to prevent a flow of air through the passage in the piston during an inward stroke thereof while permitting a flow of air therethrough during an outward stroke.

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