

UNITED STATES PATENT OFFICE

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PLUNGER TYPE PEN

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This invention relates to fountain pens and more especially to an improved construction of sackless or plunger type fountain pen.

One of the principal objects of this invention is to provide a construction of this character constructed of a minimum number of parts each of which is simple, thus enabling the parts to be quickly and economically produced, the several parts rendering themselves to facile assembly.

The several objects, advantages and novel details of construction of the invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawing, wherein

Figure 1 is a longitudinal sectional elevational view of a fountain pen constructed in accordance with my invention;

Figures 2 and 3 are transverse sectional views taken respectively on the planes indicated by lines 2—2 and 3—3 in Figure 1;

Figure 4 is a view similar to Figure 1 showing a slightly modified form of construction;

Figure 5 is a transverse sectional view taken substantially on the plane indicated by line 5—5 in Figure 4;

Figure 6 is an enlarged fragmentary longitudinal sectional view showing in detail the connection between the piston rod and the piston;

Figure 7 is a transverse sectional view taken substantially on the plane indicated by line 7—7 in Figure 6;

Figure 8 is a perspective view of one of the elements of the piston head structure, and

Figure 9 is a plan view of the piston rod.

Referring now more particularly to the drawing and especially to Figure 1 thereof, it will be noted that there is illustrated a pen barrel 10 the hollow interior of which provides an ink reservoir 11. This reservoir 11 is cylindrical and a piston, yet to be referred to, is adapted to reciprocate therein to draw ink thereinto to fill the fountain pen.

The reference character 12 indicates the conventional form of nib-end section threaded to the end of the barrel as indicated at 13, and the reference character 14 indicates the pen point carried by this nib-end section.

The reference character 15 indicates the piston rod, this part being illustrated in plan view in Figure 9. The piston rod is formed of light hexagonal tubing and is preferably formed of a non-corrosive material. The piston rod slidably telescopes within a sleeve 16 but is non-rotatably connected thereto by means of a reduced end portion 17 on the sleeve 16 which reduced portion is also hexagonal to fit the hexagonal cross section of the piston rod. The sleeve 16 has a tight threaded engagement with the barrel 10 as indicated at 18, the sleeve being inserted within the barrel from the right hand end thereof as viewed in Figure 1, in a manner to be more fully hereinafter referred to.

The piston stem 15 is reciprocated by means of a steep pitch threaded, preferably hollow, rod member 19 with which projections 20 formed on the inside of the hollow piston rod engage. The threaded rod member 19 is shouldered as indicated at 21, the reduced portion 22 thereof extending within a knob or head 23. Arranged between the reduced portion 22 and the knob 23 is a sleeve member 24, this sleeve member being provided with an annular flange 25 which overlies the adjacent end face of the knob member 23. A reinforcing sleeve 26 may be located within the reduced portion 22 of the threaded rod. The reduced portion 22 of the rod 19 extends through an aperture 27 in the closed end 28 of the sleeve member 16. A washer or the like 29 is arranged between this closed end 28 and the adjacent face of the flange 25 of sleeve 24. In a like manner, a washer 30 may be interposed between the shoulder 21 of the threaded rod 19 and the closed end 28 of the sleeve 16. In assembling these parts the reduced end 22 of the threaded member is inserted through the opening 27 in the sleeve 16 until the shoulder 21 thereof engages the closed end of this sleeve or the washer 30 interposed therebetween. The washer 29 is then slipped over this reduced end and the knob 23 together with the sleeve is slipped into place and the entire structure is secured together by means of pin 31. Thus the closed end portion 28 together with the shoulder 21 on the one

side and the flange 25 on the other take all end thrusts imparted to the threaded rod 19.

From the standpoint of assembly in the manufacture of these devices, it is important to note that the entire assembly consisting of the threaded rod member 19, sleeve 16, and the operating knob 23, are first assembled and then inserted as a unit into the open end of the barrel 10 and secured in place by the tightly engaging threads 18 formed on the barrel and sleeve. With the structure thus far described, it will be obvious that by rotating the knob 23 the threaded member 19 may be rotated and by reason of its engagement with the piston stem or rod 15, the latter will be reciprocated, the connection between the piston rod and reduced portion 17 of the sleeve permitting telescopic engagement between these parts but preventing rotation of the piston rod.

The piston is of a construction which permits the same to be quickly and economically manufactured and also assembled with facility. For this purpose the left hand end of the piston rod as viewed in Figures 1 and 9, is provided with a plurality of spaced circumferentially arranged depressions 32 at the proper helix angle to engage threads 33 on the piston head member 34. These short thread-like depressions 32 carried by the piston rod are spaced from the end thereof so that the sleeve-like portion 35 between the threads and the end of the hollow piston rod may engage the unthreaded portion 36 of the piston head member 34 to align this piston head member.

The piston ring section 37 of the piston head is a sleeve-like member which is mounted on a slotted sleeve 38 illustrated in perspective view in Figure 8, this sleeve member being provided with an annular flange 39 which engages the ring member 37 at one end of the latter. This sleeve member 38 is provided with a plurality of longitudinally extending slots 40 preferably equal in number to the corners of the hexagonal piston rod and in assembling the sleeve member on the end of this rod 15, the slots are brought opposite or in registration with the corners of the rod. Thus the sleeve member 38 may collapse or spring inwardly slightly as the result of any undue radial inward pressure.

In its normal condition the sleeve is preferably slightly tapered and in assembling the ring member 37 therewith and the sub-assembly on the end of the piston rod, the sleeve member is somewhat compressed and placed under tension. It might also be noted here that this sleeve member is preferably formed of a very light non-corrosive material.

The piston head member 34 is provided with an annular flange portion 41 which engages the other end of the ring member 37. The member 34 is provided with a slot 42

so that it may be screwed into place and in doing so an annular radially inwardly extending flange 43 on the sleeve member 38 is clamped between the flange 41 and the end of the piston rod as clearly illustrated in Figure 6.

When thus assembled the tendency of the sleeve member 38 is to expand radially outwardly and this supplies sufficient resiliency to the piston head structure to hold the ring member 37 in intimate engagement with the inner surface of the barrel of the pen.

In Figures 4 and 5 a slightly modified form of construction is illustrated in which a thin metal tubular liner 44 is inserted in the barrel, the piston reciprocating within this liner. A space 45 is provided between the liner and the inner surface of the pen barrel 10 to provide an air chamber therebetween which will minimize the expansion and contraction of the liner due to atmospheric and climatic changes and conditions. The air chamber 45 is vented to the atmosphere by means of an aperture 46.

Another important feature of this form of construction is that the annular air chamber 45 retards the expansion and contraction of the ink contained in the barrel of the pen, so that if a fountain pen containing ink is relatively cold and is grasped by the hand of the user which is relatively warmer, the increase in temperature causes an expansion of the ink in the reservoir which causes ink to flow out of the nib of the pen. The annular air chamber 45 will materially retard this objectionable action.

In all of the constructions the space behind the piston is vented to the atmosphere, so that the piston may be retracted without compressing air therein, by means of an opening 47 arranged in the end of the knob 23, this opening communicating with the reservoir 11 back of the piston through the hollow threaded rod 19 into the hollow piston stem in back between the engaging portions of the rod and piston stem and then between the outer surface of the piston rod and the inner surface of sleeve 16. The tortuous nature of this passageway will prevent any ink which might leak past the piston from finding its way out through the aperture 47 at the end of the pen. In Figure 4, I have slightly modified the structure at the right hand end thereof by inserting a felt washer 48 between the end face of the knob 23 and the flange 25 of the sleeve member 24. This would insure against any leakage of ink past the threads 18 and out the open end of the barrel 10.

There are numerous advantages which are realized from a construction of this character. The parts may be quickly and economically manufactured because of their simplicity and because but a minimum number of parts are required. This also enables the

structure to be readily assembled. By reducing the number of parts and by using relatively light non-corrosive material the life of the pen is increased and the weight thereof is not in any manner objectionable.

While two slightly modified forms of construction of my invention are illustrated herein, it will be readily apparent to those skilled in this art that various other changes in many of the non-essential details of construction may be resorted to without departing from the spirit and scope of this invention and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. A fountain pen including in combination, a barrel presenting a tubular reservoir, a piston and piston rod reciprocable in said reservoir, a sleeve member mounted in said barrel, a screw member arranged within said sleeve member and swivelly mounted in said sleeve member at one end of the latter, means for operatively connecting said piston rod and screw member whereby said piston may be reciprocated upon rotation of said screw member, said piston rod being hollow to telescopically receive said screw member, and means presenting an extended bearing surface carried by said sleeve for slidably but non-rotatably supporting said piston rod, the latter telescoping within said sleeve.

2. A fountain pen including in combination, a barrel presenting a tubular reservoir, a piston reciprocable within said reservoir, a piston rod of hexagonal cross section connected to said piston, a screw member telescoping within said piston rod and operatively connected thereto so that rotation of said screw member reciprocates said piston, a sleeve member mounted within said barrel, means for swivelly supporting said screw member in said sleeve member, said sleeve member having a longitudinally extending portion of hexagonal cross section engaging said piston rod to slidably but non-rotatably support said piston rod, said piston rod telescoping within said sleeve.

3. A plunger type fountain pen including in combination, a barrel presenting a tubular reservoir, a piston reciprocable in said reservoir, said piston including a hollow rod provided with thread-like depressions adjacent one end thereof, a piston sleeve surrounding the said end of said rod, a piston ring carried by said sleeve and a head member provided with a threaded portion engaging said thread-like depressions, and acting to secure said sleeve and ring onto said rod.

4. In a fountain pen of the class described, a barrel presenting a tubular reservoir, a piston reciprocable in said reservoir, said piston comprising a hollow rod provided with thread-like depressions adjacent one end thereof, a longitudinally slotted sleeve

member, a ring member carried on said sleeve member, said sleeve member being telescoped onto the said end of said piston rod, and a piston head member having a threaded portion engaging said thread-like depressions for securing said sleeve member and ring member onto said piston rod.

5. In a fountain pen of the class described, a barrel presenting a tubular reservoir, a piston reciprocable therein, said piston comprising a hollow piston rod provided with thread-like depressions spaced from one end thereof, a piston ring sleeve formed of resilient material and longitudinally slotted, a piston ring carried on said sleeve, said sleeve normally exerting a radial outward pressure, a piston head member having a threaded portion extending into said piston rod and threadedly engaging said thread-like depressions, said piston head member having an annular flange engaging the adjacent end face of said piston ring and a flange on said sleeve to secure said sleeve onto said piston rod.

6. In a fountain pen of the class described, a barrel presenting a tubular reservoir, a piston reciprocable therein, said piston comprising a hollow rod hexagonal in cross section and provided with thread-like depressions spaced from one end thereof, a piston ring sleeve, a piston ring member carried by said sleeve, said piston ring sleeve being provided with longitudinally extending slots, said sleeve being located on the end of said piston rod with the slots thereof opposite the corners formed by the hexagonal cross section of said rod, said sleeve normally exerting a radial outward pressure to hold said piston ring in engagement with the wall of said reservoir, a piston head member provided with a threaded portion extending into the end of said piston rod and engaging said thread-like depressions, said projecting portion also having an unthreaded portion engaging an unthreaded portion of the piston rod to center said piston head member and rod, said piston head member having an annular flange coacting with said piston rod to clamp said piston ring sleeve in place.

7. A fountain pen including in combination, a barrel presenting a tubular reservoir, a piston reciprocable in said reservoir, a piston rod connected thereto, a screw member operatively connected to said rod, a sleeve member fixed in said barrel and having a closed and an open end, means for swivelly mounting said screw member on the closed end of said sleeve member, and means at the open end of said sleeve for non-rotatably supporting said piston rod.

8. A fountain pen including in combination, a barrel presenting a tubular reservoir, a piston reciprocable in said reservoir, a piston rod of angular cross section connected thereto, a screw member operatively connected to said piston rod, a sleeve member fixed in

said barrel and provided with closed and open ends, means for swivelly mounting said screw member on the closed end of said sleeve, the open end of said sleeve embracing said piston rod to slidably and non-rotatably support the same.

9. A fountain pen including in combination, a barrel presenting a tubular reservoir, a piston reciprocable in said reservoir, a piston rod therefor, a screw member operatively connected to said piston rod for reciprocating said piston, a sleeve member carried by said barrel and having closed and open ends respectively, means for swivelly mounting said screw member in said sleeve at the closed end thereof, said piston rod telescoping with said sleeve through the open end of the latter, the engaging portions of said piston rod and the open end of said sleeve being of angular cross section whereby said piston rod is slidably and non-rotatably supported.

In testimony whereof I affix my signature.
ANDREAS BIENENSTEIN.

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