

Feb. 18, 1936.

I. D. TEFFT

2,031,343

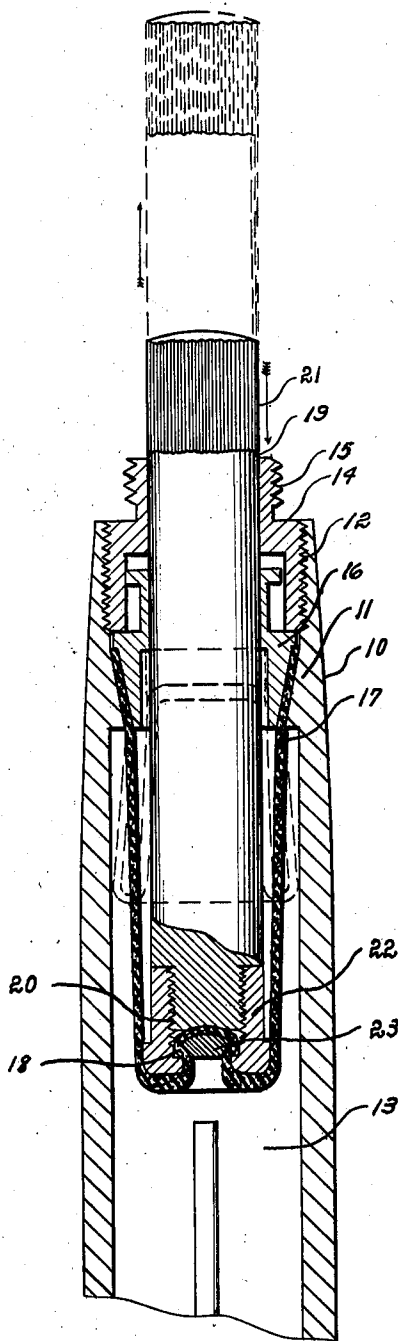
FOUNTAIN PEN

Filed Aug. 6, 1934

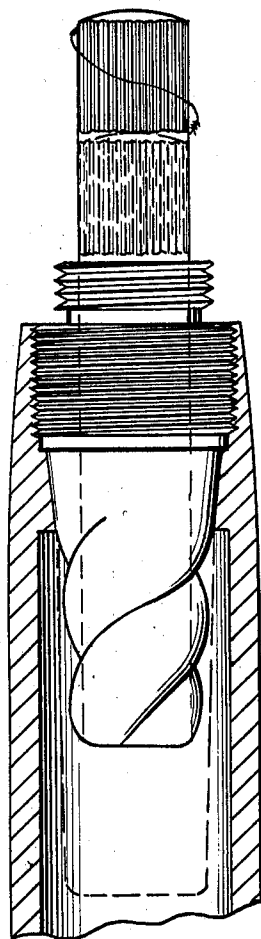
*Fig. 1*



*Fig. 2*



*Fig. 3*



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# UNITED STATES PATENT OFFICE

2,031,343

## FOUNTAIN PEN

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Application August 6, 1934, Serial No. 738,623

5 Claims. (Cl. 120—46)

My invention relates to fountain pens and particularly to that class generally designated as the pump filler type. More particularly it relates to the class of fountain pens which employ a rubber diaphragm which, when actuated, tends to create a partial vacuum within the barrel to draw ink thereinto through the apertured section. An analogous device is disclosed in the patent to Arthur O. Dahlberg, Number 1,904,358, April 18, 1933. However, in the instance of the Dahlberg device the plunger for actuating the diaphragm is returned to normal position through the medium of a spring whereas in my device no spring is employed.

Furthermore, in the Dahlberg structure the method of assembling the plunger of the filling structure is such that while the plunger may be reciprocated, it cannot be rotated.

In the instance of the device disclosed herein, the filling of the pen may be accomplished by either or both reciprocation and/or rotation of the plunger. In the instance of filling by reciprocation, the plunger rolls upon itself as in the Dahlberg structure, and when filling by rotation of the plunger, the diaphragm is twisted to accomplish the same result.

If in the twisting action the end of the plunger is held lightly between the fingers, the said plunger will reciprocate out of the retaining sleeve due to the natural action of the rubber diaphragm when twisted about the plunger stem.

The principal object of my invention is to provide a fountain pen of the pump fill type which may be filled by either reciprocation of the pump plunger or rotation thereof.

Another object is to provide a pump mechanism that may be readily assembled in the rear end of the barrel as a complete unit.

Another object is to provide a new and unique means for firmly affixing the end of the plunger to the lower closed end of the diaphragm.

In order to better understand the details of construction of my invention, attention is directed to the accompanying drawing in which:

Figure 1 discloses a pen assembly with the blind and outer caps removed from the rear and nib ends of the barrel;

Fig. 2 is a longitudinal sectional view of the rear end of a pen barrel with my improved pump fill mechanism mounted therein and disclosing the action of the diaphragm when the pen is filled by reciprocation of the plunger; and

Fig. 3 is a view partially fragmentary and partially in plan of the improved unit which discloses

the action of the diaphragm when the pump is actuated by rotation of the plunger.

In the drawing the numeral 10 is generally used to indicate a pen barrel, the top open end of which is milled to provide a tapered shoulder 11 and internally threaded as at 12. The said barrel 10 is axially drilled to provide an ink reservoir 13. The pump unit consists of an externally threaded nut 14, one end of which is reduced and threaded as at 15. The said nut 14 is adapted to be screwed into the internally threaded rear end of the barrel and bear against a circular wedge member 16 which, in turn, engages the skirt of an open-ended resilient diaphragm 17 and compresses it against the tapered shoulder 11.

Upon the nut 14 being screwed against the wedge member 16, the skirt of the diaphragm is compressed against the tapered portion of the barrel 11 and thus firmly affixes the diaphragm within the barrel and effects an ink tight joint.

Inasmuch as the construction of the nut and diaphragm unit is similar to that disclosed in the Dahlberg patent heretofore mentioned, it is not thought necessary to describe the said parts in detail.

The diaphragm 17 is conical in shape and closed at one end, the said closed end being restricted to form a nipple 18. The plunger 19 is formed of hard rubber reduced and threaded as at 20 at its lower extremity and knurled at its upper end as at 21 to provide a gripping surface for the finger when the filler is actuated. An axially drilled sleeve 22 is adapted to be screwed onto the threaded end of the plunger to affix the diaphragm to the said plunger. The said sleeve throughout most of its length is the same diameter as the plunger. However, the diameter of the lower extremity is greater as to provide a shoulder over which the end of the diaphragm is stretched when the said diaphragm is assembled onto the plunger. The lower end of the sleeve is axially drilled, the aperture formed being of lesser diameter than the threaded portion of the interior wall, the function of which will be explained hereafter.

In assembling the diaphragm onto the plunger, the nipple 18 is forced through the opening in the aperture in the lowermost end of the sleeve, and a soft rubber plug 23 inserted through the said opening to the bottom of the nipple. The threaded extension of the plunger is then screwed into the upper open end of the sleeve, its length being such that when the top edge of the sleeve contacts the shoulder on the threaded extension, the rubber plug 23

will be compressed as to compress the nipple on the diaphragm (and inserted resilient plug 23), thus causing it to expand outwardly and lock against the shoulder on the interior of the lower end of the sleeve. In this manner the diaphragm is assembled to the plunger and the method of so affixing it is such that when the plunger is rotated, the lower end of the diaphragm will twist with it.

10 As may be seen, the plunger, locking nut, wedge member and diaphragm form a complete unit when assembled, thus when the diaphragm is rolled onto the said plunger as to cause the skirt to bear against the tapered face of the wedge member, and the unit is inserted into the open rear end of the barrel and the nut screwed thereinto, the skirt of the diaphragm will be wedged against the tapered shoulder in the barrel, thus forming an ink tight joint.

20 The front or nib end of the barrel has the usual nib, feed and air tube assembly such as disclosed in the Dahlberg patent heretofore mentioned, the relation of the parts being such that upon actuation, either by reciprocation or rotation, of the plunger, a partial vacuum will be created within the reservoir 13 and thus ink will be drawn thereinto. If the diaphragm be actuated through reciprocation of the plunger, on the downstroke air and a small portion of the ink drawn into the barrel on the upstroke will be forced out of the air and ink channels, and thus by continued reciprocation of the plunger the reservoir will be filled.

35 The ink reservoir may also be filled by rotation of the plunger, which action will cause the diaphragm to twist on the lower end of the said plunger, causing air surrounding the plunger within the diaphragm to be expelled around the plunger, wedge and nut, and also reduce the area of the diaphragm within the reservoir and thus create a partial vacuum within the said reservoir, whereupon the air pressure within the reservoir being less than the exterior air pressure ink will be drawn into the said reservoir.

45 The user will then release the plunger and the diaphragm will return to normal position due to its natural elasticity and, upon continued rotation and release of the plunger member, the barrel will be filled.

50 When the diaphragm twists due to the actuation of the plunger, it naturally tends to shorten and as the plunger recedes from the interior of the barrel simultaneously with the shortening of the diaphragm, the combined twisting and shortening of the diaphragm will cause a greater air displacement to be had within the barrel than were the plunger to be rotated in the same plane. The fact that greater displacement is effected will increase the vacuum within the pen barrel

60 and more ink will be drawn thereinto and thus

it will necessitate fewer actuations of the plunger to complete the filling of the reservoir.

Although I have shown and described certain specific embodiments of my invention, I am fully aware that many modifications thereof are possible. My invention, therefore, is not to be restricted except insofar as is necessitated by the prior art and by the spirit of the appended claims.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In a fountain pen, an ink reservoir barrel, having at one end passages for ink and air, combined with a twist-sac located within, supported at, and vented toward the other end of the barrel, and having an impervious wall extending into the reservoir; and a rotatable element engaging torsionally a deep part of the sac, thereby by twisting the sac to change displacement of the reservoir.

2. In a fountain pen, an ink reservoir barrel, having at one end passages for ink and air, combined with a twist-sac located within, supported at, and vented toward the other end of the barrel, and having an impervious wall extending into the reservoir; and a rod reaching endwise into and engaging torsionally a deep part of the sac, thereby by twisting the sac to change displacement of the reservoir.

3. In a fountain pen, an ink reservoir barrel, having at one end passages for ink and air, combined with a twist-sac located within, supported at, and vented toward the other end of the barrel, and having an impervious wall extending into the reservoir; and a rotating and/or reciprocating element engaging torsionally a deep part of the sac, thereby by twisting and/or reciprocation of the said sac to change displacement of the reservoir.

4. In a fountain pen, an ink reservoir barrel, having at one end passages for ink and air, combined with a twist-sac located within, supported at, and vented toward the other end of the barrel, and having an impervious wall extending into the reservoir; a reciprocable and/or rotatable plunger engaging torsionally a deep portion of the sac thereby by twisting and/or rotating the said plunger to change displacement of the reservoir.

5. In a fountain pen, an ink reservoir barrel, having at one end passages for ink and air, combined with a twist-sac located within, supported at, and vented toward the other end of the barrel, and having an impervious wall extending into the reservoir; a rotatable element engaging a deep part of the sac and extending from the rear end of the barrel thereby by twisting and/or reciprocating the sac to change displacement of the reservoir.

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