

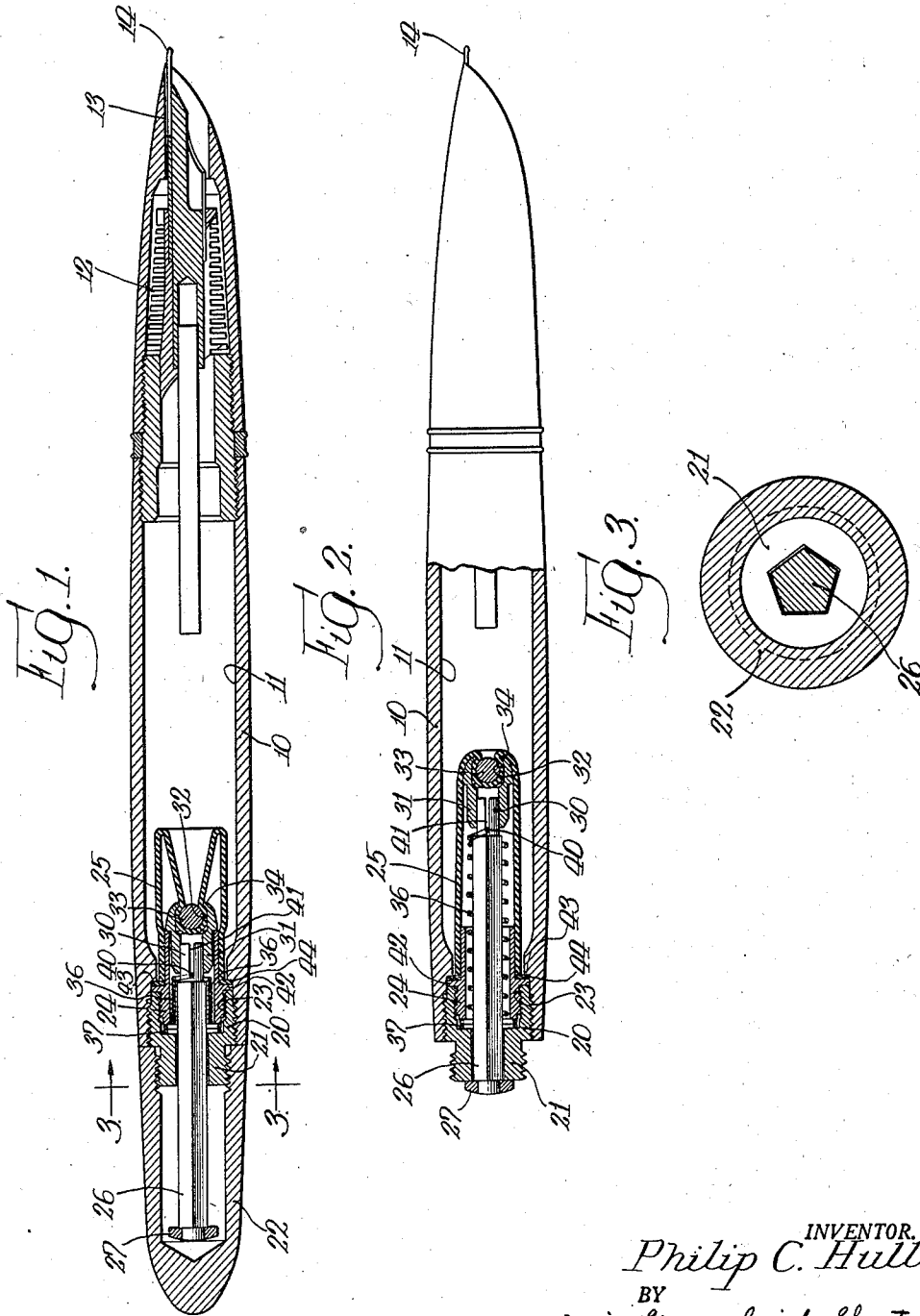
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FILLING MECHANISM FOR FOUNTAIN PENS

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FILLING MECHANISM FOR FOUNTAIN PENS

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The invention relates generally to filling mechanisms for fountain pens and more particularly to a filling mechanism of the type disclosed in the Dahlberg Patent No. 1,904,358 issued April 18, 1933.

This type of filling mechanism may be characterized generally as comprising a bulbous type diaphragm usually made of rubber and adapted to be alternately expanded and contracted within the ink reservoir of the pen to force air from the reservoir by expansion and to draw ink into the reservoir by contraction. A longitudinally reciprocable plunger is usually employed for actuating the mechanism, and the contraction of the diaphragm in certain forms of filling mechanisms of this type is effected by inverting a portion of the diaphragm, that is, by drawing a portion of the diaphragm into itself.

Since the diaphragm in such forms of the device is designed to be readily inverted as aforesaid, and is connected to the other parts of the mechanism in a manner best suited for such operation, any movement imparted to the diaphragm other than such inversion is detrimental to the diaphragm itself as well as to the securing thereof to the other parts of the device. Careless turning of the plunger may cause harmful twisting of the diaphragm as well as damage to other parts of the mechanism such as altering the tension of a coiled spring utilized to force the plunger in one direction.

The general object of the invention is therefore to provide a novel filling mechanism of the above-mentioned type in which the plunger for effecting contraction and expansion of the diaphragm may be freely reciprocated without rotation and twisting thereof.

Another object is to provide a filling mechanism of the foregoing type having a diaphragm actuating plunger operated in one direction by a novel spring means connected to the plunger, the plunger being held against turning movement to prevent the spring from being damaged by uncoiling or coiling too tightly.

A further object is to provide a filling mechanism of the foregoing type in which the parts of the mechanism are held together in a simple and effective manner, and in which the manually operable plunger is confined to a reciprocatory movement.

Still another object is to provide a novel filling mechanism of the foregoing type, which is of self-contained unitary construction readily insertable in and removable from the barrel of

the pen without chance of damaging any of the parts of the mechanism.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a longitudinal sectional view of a fountain pen having a filling mechanism embodying the features of the invention and showing the filling mechanism in its idle or at rest position.

Fig. 2 is a view similar to Fig. 1 but showing the filling mechanism with its parts extended to force air from the reservoir of the pen.

Fig. 3 is an enlarged transverse section taken on the line 3—3 of Fig. 1.

A filling unit embodying the features of the invention is adapted for use with a fountain pen having a barrel constituting a reservoir to hold ink. The fountain pen shown in the drawing for illustrative purposes comprises a barrel 10, the interior of which serves as an ink reservoir 11. Secured to the front end of the barrel is any desired feed structure of a type which is suitable for use with a multiple stroke filling mechanism such as herein disclosed. The feed structure, indicated generally at 12, is adapted to control the feeding of ink from the reservoir 11 to a pen point 13 provided with a writing nib 14, the particular feed structure herein shown being of the type disclosed in the Baker Patent No. 2,223,541 issued December 3, 1940. The front end of the pen is provided with a cap (not shown) to protect the nib 14 when not in use.

A filling mechanism embodying the features of the invention is of the multiple-stroke type which is adapted to be operated a plurality of times in order to fill the reservoir of the pen to the desired level. As mentioned above a filling device of this character includes usually a flexible diaphragm adapted to be expanded and contracted to discharge air from the reservoir and to draw ink into the reservoir. With a diaphragm which is expanded and contracted by an inverting movement, it is desirable, in order to avoid damage to the diaphragm, to prevent it from being twisted, or flexed in any other manner than in the intended manner. With a plunger which is manually operable and part of which is exposed so that it may be grasped, users of the pens frequently subject the filling mechanism to mistreatment by rotating or twisting the plunger when it is intended to be operated solely by reciprocation. The present filling mechanism is so constructed that the plunger cannot be twisted

and can only be operated reciprocally, so that the diaphragm is thereby flexed only in the manner in which it is intended. Furthermore, in the present filling mechanism a spring, which is provided to move the plunger in one direction so that it may be operated only by pressure of the finger, is prevented from being twisted by such misuse of the plunger. The filling mechanism herein shown is of a self-contained unitary construction so that it may be completely assembled before being inserted in the barrel of the pen and may be readily removed from the barrel in case of repair.

As shown in the drawing, the preferred form of my filling mechanism comprises a body member 20 which is externally threaded for securing it in the end of the barrel 10. The body member 20 has a reduced portion 21 at its outer end threaded externally to receive a closure cap 22. The body member 20 supports the other parts of the mechanism and to this end has an internal bore 23 at its front or inner end to receive a sleeve member 24 which extends forwardly into the barrel of the pen from the body member 20. A flexible diaphragm 25 is carried by the body structure and is of elongated bulbous form opened at one end so that it may fit over the forward end of the sleeve member 24. The other end of the diaphragm 25 is closed and is adapted to be alternately pulled out to substantially its full length and inverted to effect the pumping action.

To move the closed end of the diaphragm in this manner, a plunger 26 is provided, which is in the form of an elongated shank slidably supported by the body member 20 and provided at its outer end with a small head 27 so that it may be readily reciprocated by pressure of the finger against said head. The plunger 26 extends forwardly through the body member 20 and the sleeve member 24 and has a reduced portion 30 on its forward end. The reduced forward end 30 of the plunger is adapted to be connected to the closed end of the diaphragm by means of a connector 31 which is provided with a central bore fitting over the reduced portion 30 and cemented thereto. The forward end of the connector 30 is provided with a socket portion 32 to receive the closed end of the diaphragm 25. To secure the diaphragm therein, a small ball 33 is inserted within an inverted portion of the closed end of the diaphragm and the two are then positioned within the socket 32, the diaphragm at such time being inside out and extending forwardly from the connector. The forward edge of the socket 32 is then turned inwardly as shown at 34 to a sufficient extent to prevent withdrawal of the ball 33 and the surrounding portion of the diaphragm. The diaphragm is then reversed and fitted over the sleeve member 24 to secure it in place.

The plunger 26 is adapted to be moved outwardly by spring pressure so that operation of the filling device may be performed merely by intermittently pressing against the head 27 of the plunger. Spring pressure in the present instance is provided by a coiled tension spring 36 mounted within the sleeve member 24 and surrounding the shank of the plunger. The rear end of the spring 36 is held in a fixed position, and to this end one or more turns of the spring at its rear end are enlarged as at 37 and are seated at the inner end of the bore 23. The enlargement of these turns is such that they are held in place within the bore against longitudinal movement by the sleeve member 24 when the latter is screwed into the bore. The forward end of the spring is adapt-

ed to be connected to the plunger and, in the preferred construction, such attachment is effected by bending the end of the spring transversely as at 40 to extend through a transverse slot 41 formed in the reduced portion 30 of the plunger. The bent portion 40 of the spring may thus be readily inserted into the slot 41 and is securely held therein by the connector 31 when the latter is cemented to the reduced portion 30.

Since the front or closed end of the diaphragm is secured to the plunger by means of the connector 31, and the bent end 40 of the spring is likewise connected thereto, it is obvious that damage would result both to the diaphragm and to the spring if the plunger were rotated or twisted. Thus the diaphragm, which is intended to be flexed by an inverting movement, would be unduly distorted by any twisting movement thereof, and the coil spring would be either uncoiled or coiled too tightly by such twisting movement of the plunger so that it would not have its proper tension. For this reason the plunger and body portion 20 are so constructed that the plunger cannot be rotated relative to the body member, the latter being fixed within the barrel of the pen. To this end the shank of the plunger has a non-circular form and the passage through the body member, in which the plunger slides, is correspondingly shaped so that the plunger cannot be rotated. Preferably the shank of the plunger is pentagonal in cross section as clearly shown in Fig. 3 of the drawing so that interengaging surfaces are provided on the plunger and body member which prevent any relative rotation. Thus the plunger can only be operated reciprocally which is the desired manner of operation for expanding and contracting the diaphragm.

It will be noted that the structure of the filling mechanism herein disclosed constitutes a self-contained unit. The forward end of the sleeve member 24 on which the diaphragm 25 is mounted, is of such diameter that the diaphragm clears the side wall of the barrel and thus cannot adhere thereto. To provide an effective seal between the filling mechanism and the barrel, the sleeve member intermediate its ends is provided with an outwardly extending flange 42 which is adapted to abut against an internal shoulder 43 formed on the interior of the barrel 10 with a sealing gasket 44 interposed therebetween. With this construction of the filling device all the parts thereof may be assembled before the device is inserted and fixed in the barrel. In case repair of the filling mechanism becomes necessary, the entire device may be readily removed merely by unscrewing the body member 20 from the barrel, the gasket 44 providing the necessary seal to prevent leakage of ink around the filling mechanism.

From the foregoing description it will be apparent that I provide a novel filling mechanism including a plunger and a longitudinally contractible diaphragm, with the plunger so carried by the body structure of the filling mechanism that it can be actuated only in the desired manner. Thus the pentagonal shape of the shank of the plunger prevents it from being twisted relative to the body member and thereby prevents the diaphragm and the spring, which are connected to the plunger, from being twisted and damaged thereby. The mechanism is of the self-contained unitary type readily insertible in and removable from the barrel of the pen and is of simple construction in which the parts of the mechanism are held together in an effective manner.

I claim:

1. A filling mechanism of self-contained unitary construction comprising a body structure adapted to be secured in the barrel of a fountain pen and having a longitudinal passage therein, a longitudinally contractible bulbous diaphragm secured over one end of said body structure out of contact with the barrel, a plunger slidably mounted in said body structure and having a reduced end portion extending into said diaphragm, and a connector mounted on said reduced portion for securing the diaphragm thereto, said plunger and said passage having inter-engaging longitudinally extending surfaces preventing rotation of said plunger relative to the body structure.

2. A filling mechanism comprising a body structure, a longitudinally contractible bulbous diaphragm secured to said body structure, a plunger reciprocally carried by said body structure and secured to said diaphragm to contract and expand the latter, and a tension spring mounted in said body structure and surrounding said plunger, said spring being anchored at one end to said body structure and at its other end to said plunger, said body structure and said plunger being complementally and non-circularly shaped to prevent rotation of said plunger and twisting of said diaphragm and said spring.

3. A filling mechanism comprising a body member having an internal bore at one end, a coiled spring mounted in said bore and having one or more enlarged turns at its inner end, a sleeve member secured in said bore and holding said enlarged turns against endwise movement, a longitudinally contractible bulbous diaphragm mounted on said sleeve member, and a plunger extending through said body member and sleeve member and connected to said diaphragm, the other end of said spring being anchored to said plunger, said plunger and one of said members having inter-engaging surfaces preventing rotation of the plunger to prevent twisting of the diaphragm and the spring.

4. A filling mechanism comprising a body member having an internal bore at one end and a non-circular passage extending from said bore to the other end of the body member, a coiled spring positioned in said bore and having one or more enlarged turns at one end of the spring located at the inner end of said bore, a sleeve member secured in said bore and holding said enlarged turns against endwise movement, a longitudinally contractible bulbous diaphragm secured to the outer end of said sleeve member, and a plunger slidably mounted in and shaped complementally to the non-circular passage in said body member and extending into said diaphragm and connected thereto, said plunger having its inner end transversely slitted with the other end of the spring bent to extend through said slit to secure the other end of the spring to the plunger, the non-circular shape of the plunger and passage preventing rotation of said plunger to prevent twisting of the diaphragm and spring.

5. A filling mechanism for a fountain pen comprising a body member adapted to be mounted in the barrel of the pen, a coiled spring mounted in a bore in the inner end of said body member, a sleeve member having a flange intermediate its ends with the portion of the sleeve member on one side of said flange secured in said bore to hold one end of the spring therein, the other end of the sleeve member being adapted to extend inwardly of the barrel and to support a longitudinally contractible bulbous diaphragm in spaced relation to the side wall of the barrel, said flange being adapted to effect a sealing relation with a shoulder within the barrel, and a plunger slidably carried by said body member and extending through said spring for connection with the other end of said spring and with said diaphragm, said plunger and said body member having inter-engaging surfaces preventing rotation of the plunger to prevent twisting of the spring and diaphragm.

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