

March 14, 1944.

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FILLING MECHANISM FOR FOUNTAIN PENS

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2 Sheets-Sheet 1

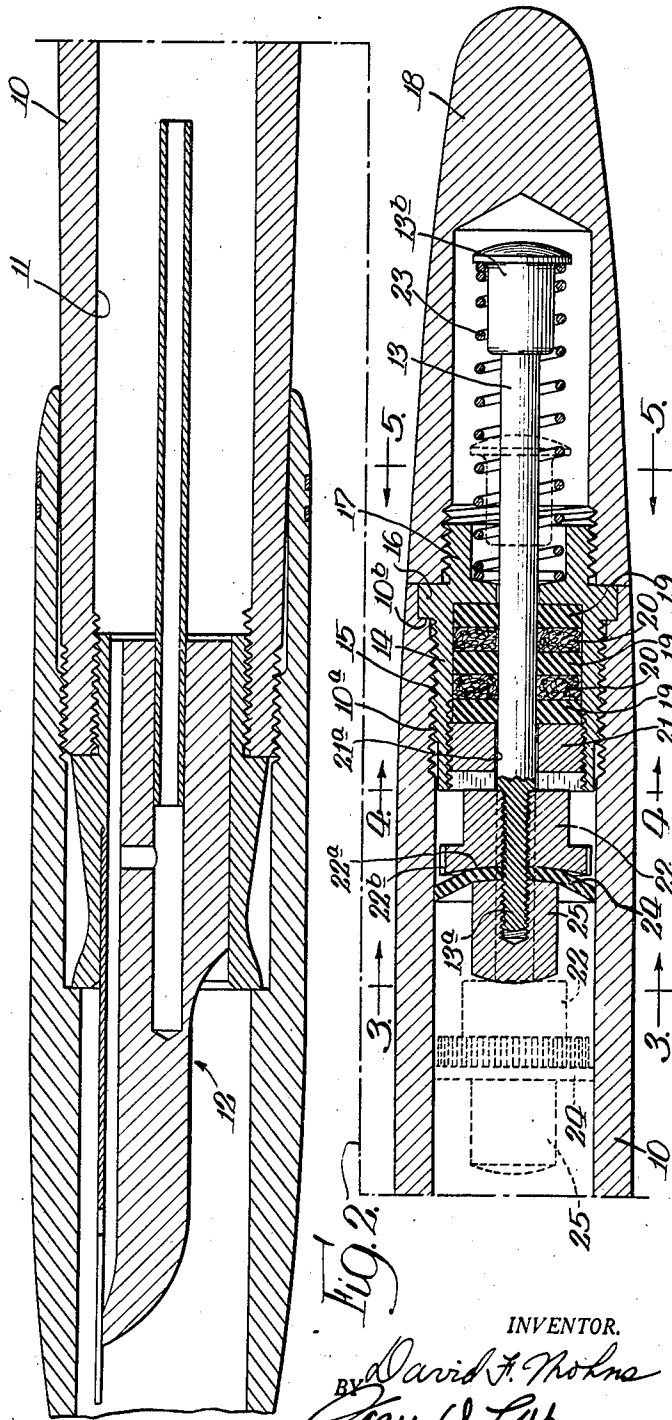
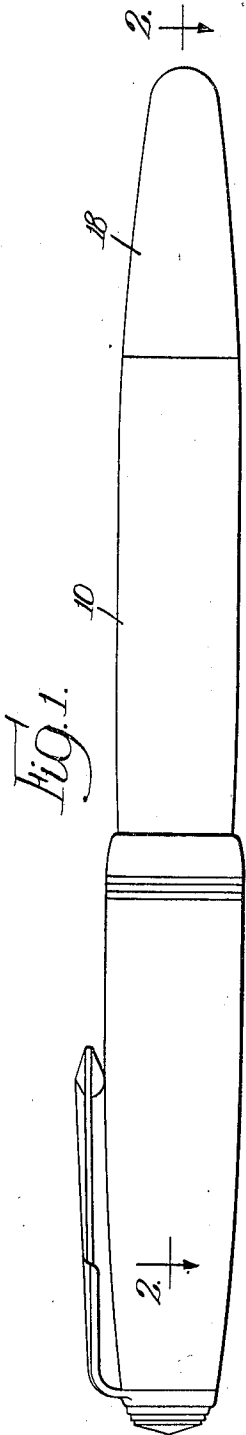


Fig. 2.

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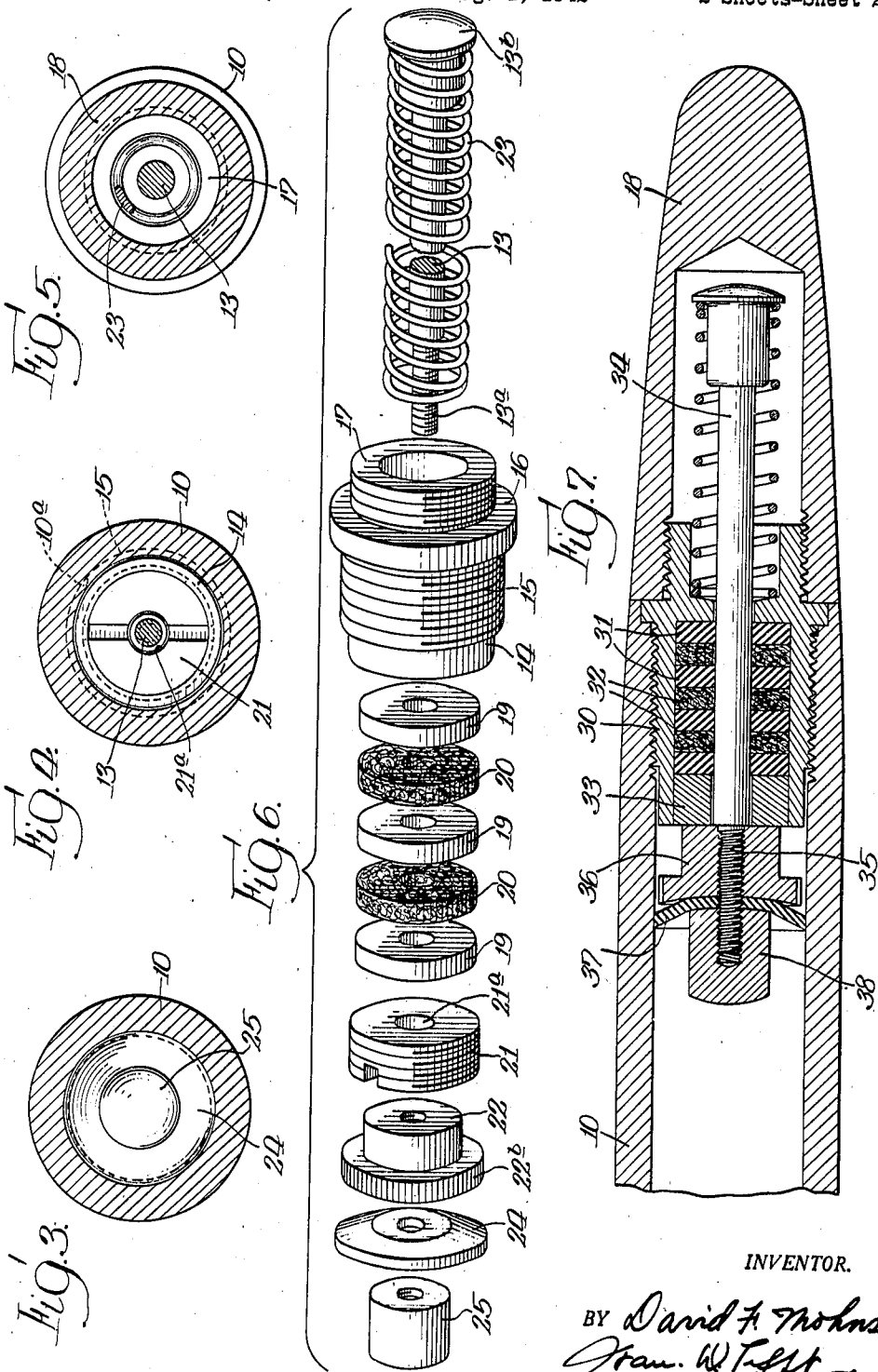
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2 Sheets-Sheet 2



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FILLING MECHANISM FOR FOUNTAIN PENS

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Application August 1, 1942, Serial No. 453,145

7 Claims. (Cl. 120—47)

My invention relates to fountain pens and it has to do particularly with filling mechanisms therefor.

One of the objects of my invention is to provide an improved filling mechanism for fountain pens which is simple in construction, is easy to operate, may be manufactured at low cost, and is adapted to operate at all times with a high degree of efficiency.

Another object is to provide an improved filling mechanism for fountain pens which includes a spring-actuated, short-stroke filling plunger that may be easily operated with one hand.

Still another object is to provide an improved plunger structure for supporting a packing member and which is particularly suited for use in connection with fountain pen filling mechanisms of the type wherein the fountain pen barrel serves as an ink reservoir.

A further object is to provide a plunger type filling mechanism for fountain pens of the type wherein the barrel serves as an ink reservoir, including a spring-actuated plunger stem carrying a head supporting a soft, pliable packing member, the arrangement being such that, on the forward stroke of the plunger, the packing member is forced into tight sealed engagement with the wall of the pen barrel but is released from the barrel wall on the return stroke so that only a slight spring pressure is required for rapid reciprocation of the plunger.

An additional object is to provide a unitary filling mechanism of the foregoing character that may readily be applied to and removed from the pen barrel as a unit.

Other objects are to provide a filling mechanism of the plunger type which is provided with a thin, pliable packing member supported in such a manner as to effect a tight seal on the forward stroke of the filling mechanism with a minimum of frictional drag; and to provide a plunger having a packing supporting head closely approaching the diameter of the barrel wall in which it operates but which permits an unrestricted flow of air or ink, or both, therepast.

Additional objects and advantages will become apparent as this description progresses and by reference to the drawings wherein,

Figure 1 is a side elevational view of one form of fountain pen embodying my invention;

Fig. 2 is an enlarged longitudinal sectional view taken substantially on line 2—2 of Fig. 1 and illustrating one form of filling mechanism embodying my invention;

Fig. 3 is a section taken substantially on line 3—3 of Fig. 2;

Fig. 4 is a section taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a section taken substantially on line 5—5 of Fig. 2;

Fig. 6 is an exploded view of the unitary type filling mechanism shown in Fig. 2; and

Fig. 7 is a partial sectional view of a fountain pen embodying a modified form of filling mechanism embodying my invention.

My invention is well adapted for use in connection with fountain pens of the type disclosed in United States Letters Patent No. 1,904,358, granted on April 18, 1933, to Arthur O. Dahlberg, wherein the barrel of the fountain pen serves as an ink reservoir and filling of the ink reservoir may be accomplished by one hand through the operation of a short, spring-actuated plunger reciprocated to effect displacement of air from the reservoir. In the use of a filling mechanism of that type it is required that the spring-actuated movement of the plunger be positive, free and rapid. My invention is particularly concerned with a plunger of the type stated wherein there is employed a plunger-carried head which supports a packing member adapted to engage the reservoir wall of the pen barrel. To the foregoing end I employ a thin, pliable packing member which, on the forward stroke of the plunger, is adapted to effect a tight seal against the reservoir wall but which, on the return stroke of the plunger, is released from the reservoir wall so that the plunger may return to its home position under the influence of its actuating spring in a rapid and positive manner. The arrangement is also such that a very slight spring pressure is required to effect this movement.

Referring particularly to the form of my invention shown in Figs. 1 to 6, inclusive, of the drawings, I employ a pen having a barrel 10, the inner wall of which defines an ink reservoir 11. Ink feeding means, generally indicated at 12 and which may be similar to that disclosed in said Dahlberg patent, is mounted in the forward end of the pen barrel 10. It will be understood, however, that any other desired form of feed mechanism may well be employed without departing from my invention. The ink reservoir 11 is adapted to be filled with ink by the displacement of air therefrom and the creating of a partial vacuum therein; and, to this end, my invention is concerned with a short-stroke plunger-type displacement means mounted in the rear end of the pen barrel 10.

The plunger type displacement means shown in Figs. 1 to 6, inclusive, includes a plunger member 13 which is guidingly supported in a tubular packing sleeve 14, the plunger 13 being long enough to extend through and beyond the opposite ends of the sleeve. Sleeve 14 is externally threaded at 15 for detachable engagement with a threaded opening 10^a in the rear end of the pen barrel 10 (Figs. 2 and 6); and it is provided with an annular flange 16 which is adapted to engage a shoulder 10^b formed by enlarging the outer end of the barrel opening 10^a, thereby limiting the extent to which the sleeve 14 may be screwed into the barrel. The packing sleeve 14, outwardly of the flange 16, is provided with a reduced tubular and externally threaded extension 17 which is adapted to removably receive an end cap 18 (Fig. 2) which conceals the outer projecting end of the plunger 13 and prevents accidental actuation of the same. The plunger 13 is supported within the sleeve 14 in a sealed manner as follows: Within the packing sleeve 14 I mount a plurality of alternating rubber and felt disks 19 and 20, respectively, which have central openings through which the plunger 13 passes. The lower or inner end of the packing sleeve 14 is internally threaded for reception of an adjustable packing nut 21 having an opening 21^a therein through which the plunger 13 passes for guidance. With this arrangement, by tightening the packing nut 21 the disks 19 and 20 are expanded into sealed engagement with the plunger 13 thereby preventing the escape of ink or air past the sleeve 14 and plunger 13. By adjusting the nut 21 the proper engagement of the disks 19 and 20 with the plunger 13 may be effected while at the same time permitting free axial movement of the latter. If desired, the felt disks 20 may contain a lubricant which will aid in the free reciprocation of the plunger 13.

The plunger 13 is provided at its inner end with a reduced threaded extension 13^a upon which is threadedly received a plunger head 22. The outer end of the plunger 13 is provided with an enlarged head 13^b and a coil spring 23 surrounds the outer end of the plunger with its outer end abutting the head 13^b and its other end seated in the projecting tubular extension 17 of the sleeve 14. This spring is of such length that it is confined normally under slight compression so that it yieldingly holds the plunger 13 outwardly (Fig. 2) with the plunger head 22 seated against the packing nut 21.

The lower or forward face 22^a of the plunger head 22 is concave and is adapted to serve as a seat for a complementally shaped concavo-convex packing member 24. The packing member 24, which is of slightly greater diameter than the wall of the ink reservoir 11, is formed of thin, soft rubber or other suitable pliable material. The plunger extension 13^a is long enough to project through and beyond the packing member 24 where it receives a retaining nut 25 of considerably less diameter than the plunger head 22 and packing member 24. The plunger head 22, which is of cylindrical shape, has its lower portion enlarged to such an extent that its periphery closely approaches the wall of the reservoir 11 and which, in this way, provides a packing supporting face which extends in close proximity to the reservoir wall and supports the packing member 24 over the greater portion of its surface.

In the use of the foregoing structure the pen barrel may be grasped in one hand and the plunger 13 actuated by the thumb or forefinger

so that the complete filling operation is performed with one hand. This action is facilitated by the spring 23 which in this case may be such as to require only a slight pressure to compress the same in moving the plunger 13 inwardly. With the foregoing arrangement, when the plunger is depressed, the packing member 24 is forced into tight sealed engagement with the wall of the reservoir 11, thereby forcing air from the reservoir 11. Depression of the plunger 13 is followed by release of the same so that the spring can return the plunger to its normal position of Fig. 2, the combined depression and release action of the plunger establishing the required pressure differential for filling the reservoir 11 with ink. This action may be accomplished in a free and rapid manner due to the fact that, as the plunger 13 moves outwardly, the packing member 24, due to the friction between it and the reservoir wall, is turned forwardly and freed from the reservoir wall sufficiently to avoid any material sealing action between it and the barrel wall. The free, rapid return movement of the plunger 13 is facilitated, notwithstanding the fact that the periphery of the plunger head is in close relation to the reservoir wall, by providing the enlarged portion of the plunger head 22, throughout its periphery, with equally spaced longitudinal grooves 22^b (Fig. 2). In this way the packing member 24 is afforded firm support substantially throughout its entire surface and any air or ink, or both, that may become trapped behind the plunger head 22 will be freely released past the plunger head and the packing member 24 on the outward movement of the plunger. This arrangement positively avoids retardation of the plunger movement from the possible causes stated. Further, with the foregoing arrangement, it is possible to use a very thin and pliable packing member, thereby greatly reducing the friction between the packing member and the reservoir wall while positively insuring, on the forward stroke of the plunger, a tight seal to effect the desired displacement.

My invention may take various forms, another of which is shown in Fig. 7. Specifically, this form is the same as that previously described except for the packing unit which guidingly supports the filling plunger 34. More particularly, a packing sleeve 30 similar to the sleeve 14 is mounted in the rear end of the barrel and this sleeve contains a plurality of alternating rubber and felt packing elements 31 and 32. These elements are retained in place by an end portion 33 which is fixedly secured in place in any desired manner. The plunger 34 is provided with a reduced extension 35 at its forward end and this reduced extension threadedly receives a plunger head 36 similar to the plunger head 22 (Figs. 2 and 6). The plunger head supports a concavo-convex packing member 37, like the packing member 24, which is secured in place by a retainer nut 38. In this form, the outward face of the plunger head 36 is flat, similar to the inner end surface of the sleeve 30, and, in the normal outward position of the plunger 34, these surfaces engage each other to seal the passageway through the packing sleeve against the entry of air and ink therethrough in the normal condition of the pen. The packing elements 31 and 32 are initially located and compressed to snugly engage the plunger 34 and they, as will be well understood, aid in preventing leakage of ink and air at the rear end of the pen during periods of filling or otherwise.

I believe that the operation and advantages of my invention will be well understood from the foregoing description. The filling mechanism embodying my invention is quite simple in construction; it may be manufactured quite cheaply; it constitutes a self-contained unit that may readily be applied to and removed from the barrel; and it is easy to operate, although positive in its air displacement action.

I claim:

1. In filling mechanism for a fountain pen having a barrel serving as an ink reservoir, a plunger adapted to be reciprocally mounted in the rear end of the barrel, a head having a concave face carried by the inner end of said plunger and of such size that its periphery extends into close proximity to the wall of the ink reservoir, the periphery of said head being provided with axially extending grooves which permit ready passage of ink or air or both past said head, a concavo-convex packing member formed of a thin, pliable material seated against the concave face of said head and being of greater diameter than the wall of the ink reservoir, and a retaining element also carried by the inner end of said plunger for securing said packing member in place upon said head, said retaining element being of much less diameter than said packing member and head to permit said packing member to free itself from the wall of the ink reservoir on the return stroke of said plunger.

2. In a filling mechanism for a fountain pen having a cylindrical barrel the inner surface of which serves as an ink reservoir, a plunger adapted to be reciprocally mounted in the rear end of the barrel and having an exteriorly accessible portion and another or inner portion adapted to project into the ink reservoir, spring means associated with the exterior portion of said plunger constantly urging it outwardly, a cylindrical packing head having a concave face on the inner portion of said plunger adapted to engage said sleeve to limit the outward movement of said plunger, said head being of a diameter closely approaching the diameter of the ink reservoir and having a plurality of longitudinal grooves in its periphery to permit ready passage of air or ink or both therepast, a concavo-convex packing member formed of a thin, pliable material seated against the face of said head and being of a diameter greater than the diameter of the ink reservoir, and a retaining member carried by the inner portion of said plunger and being of less diameter than said packing member and head for securing said packing member upon said head, the arrangement being such that said packing member is forced into sealed engagement with the wall of the ink reservoir on the forward stroke of said plunger and on the return stroke of the latter said packing member is moved out of sealed engagement to permit said spring means to freely and rapidly return said plunger to its home position.

3. In a filling mechanism for a fountain pen having a cylindrical barrel the inner surface of which serves as an ink reservoir, a plunger adapted to be guidingly supported in the rear end of the barrel and having its end portion extending outwardly and inwardly thereof with its inner end reduced and threaded, a spring disposed between the threaded extension on said sleeve and the outer end of said plunger constantly urging the latter outwardly, a packing head having a threaded opening in which the inner end of said plunger is received, said head being adapted to

abut said sleeve to limit the extent of outward movement of said plunger, said head also having a concave face, being cylindrical, being of a diameter closely approaching the diameter of the ink reservoir and having its periphery grooved longitudinally to permit the ready passage of air or ink therepast, a thin, pliable, concavo-convex packing member of greater diameter than the ink reservoir seated against the concave face of said head and having a central opening through which the inner end of said plunger passes, and a retaining member carried by the inner end of said plunger and engaging said packing member to hold the latter against the face of said head, said retaining member permitting the periphery of said packing member to fall freely away from the wall of the ink reservoir on the return stroke of said plunger.

4. In filling mechanism for a fountain pen having a barrel serving as an ink reservoir, a plunger mechanism for effecting a displacement within said reservoir for the purpose of drawing ink thereinto, which comprises a plunger stem adapted to be reciprocally mounted in said barrel and having at its forward end a head portion of such size that its periphery is adapted to be disposed in close proximity to the wall of the ink reservoir, a packing element carried by the forward portion of said plunger head and formed of pliable material of greater diameter than the wall of the ink reservoir and so mounted upon the plunger head that upon forward movement of the plunger it effects a sealed engagement with the barrel wall and upon rearward movement of the plunger it is released from the barrel wall to permit free and unrestrained movement of the plunger rearwardly, the peripheral surface of said plunger head being provided with axially extending grooves which permit ready passage of ink or air or both past said head, and spring means lightly opposing forward movement of said plunger but of sufficient strength to effect quick rearward movement of said plunger as said packing member is released from the cylinder wall upon such rearward movement.

5. A plunger device for filling mechanism of fountain pens wherein the barrel serves as an ink reservoir, which comprises a plunger stem, a head at the forward end of said stem, the peripheral surface of which is adapted to lie in close proximity to the wall of the ink reservoir, a packing member carried by the forward portion of said head and adapted to engage the reservoir wall and effect a seal between such wall and the periphery of said head upon the forward movement of said plunger and further adapted upon rearward movement of said plunger to be released from said wall to permit free movement of the plunger rearwardly, the peripheral surface of said head having axially disposed grooves therein permitting ready passage of ink or air or both past said head.

6. In a filling mechanism for a fountain pen having an ink reservoir, a plunger mechanism for effecting a displacement within said reservoir for the purpose of drawing ink thereinto which comprises a plunger stem, a head at the forward end of said stem, the peripheral surface of which is adapted to lie in close proximity to the wall of the ink reservoir, a packing member carried by the forward portion of said head and adapted to engage the reservoir wall and effect a seal between such wall and the periphery of said head upon the forward movement of said plunger and further adapted upon rearward move-

ment of said plunger to be released from said wall to permit free movement of the plunger rearwardly, the peripheral surface of said head having axially disposed grooves therein permitting ready passage of ink or air or both past said head.

7. In filling mechanism for a fountain pen having a barrel containing an ink reservoir, a plunger adapted to be reciprocally mounted in the rear end of the barrel, a head having a concave face carried by the inner end of said plunger and of such size that its periphery extends into close proximity to the wall of the ink reservoir, the periphery of said head being provided

with axially extending grooves which permit ready passage of ink or air or both past said head, a concavo-convex packing member formed of a thin, pliable material seated against the concave face of said head and being of greater diameter than the wall of the ink reservoir, and a retaining element also carried by the inner end of said plunger for securing said packing member in place upon said head, said retaining element being of much less diameter than said packing member and head to permit said packing member to free itself from the wall of the ink reservoir on the return stroke of said plunger.

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