Feb. 24, 1931. K. S. PARKER 1,793,824

FILLING MECHANISM FOR FOUNTAIN PENS

Filed Feb. 1, 1929 2 Sheets-Sheet 1

Fig. 1.

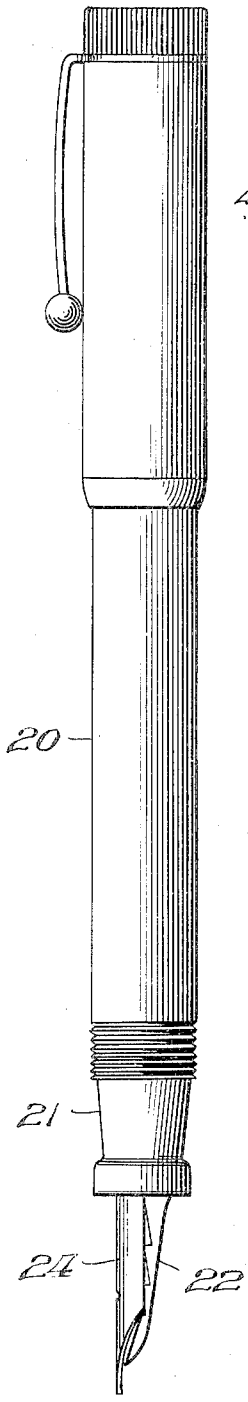


Fig. 2.

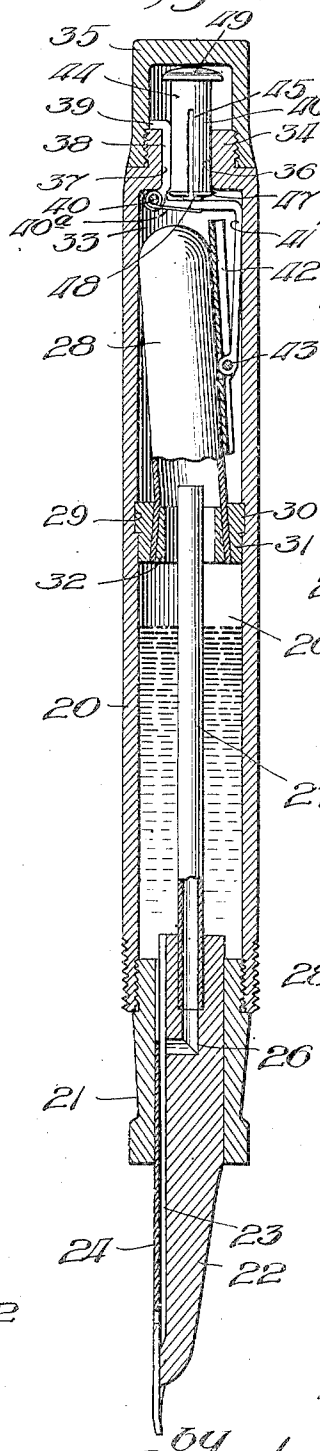


Fig. 3.

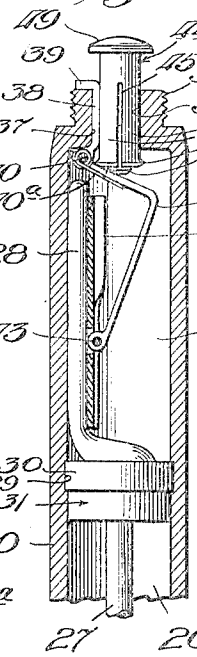


Fig. 4.

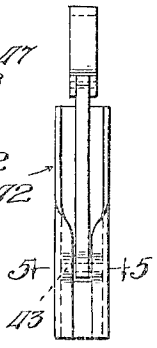


Fig. 5

Fig. 6.

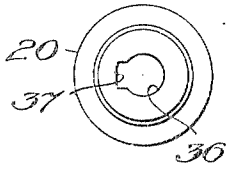


Fig. 20

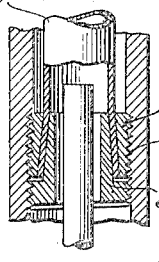
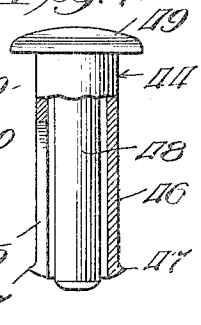


Fig. 7.



Inventor:
Kenneth S. Parker

by
Rector, Hibben, Davis & Macauley, Attys

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FILLING MECHANISM FOR FOUNTAIN PENS

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Fig. 8.

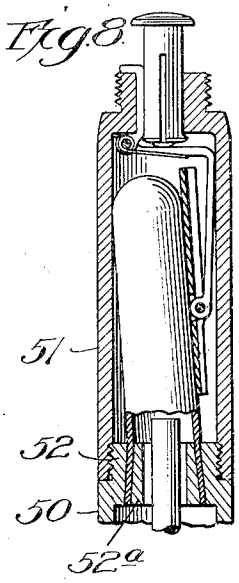


Fig. 9.

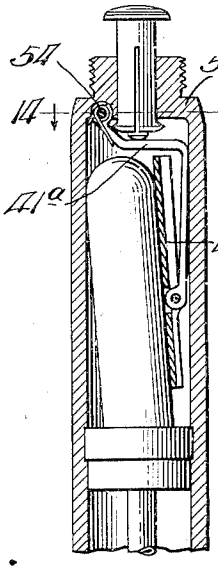


Fig. 10.

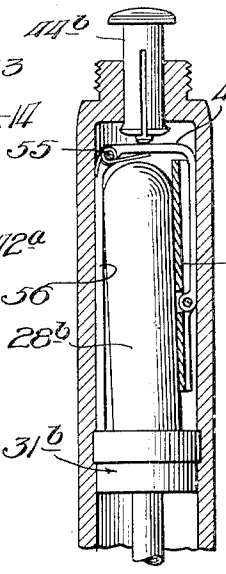


Fig. 11.

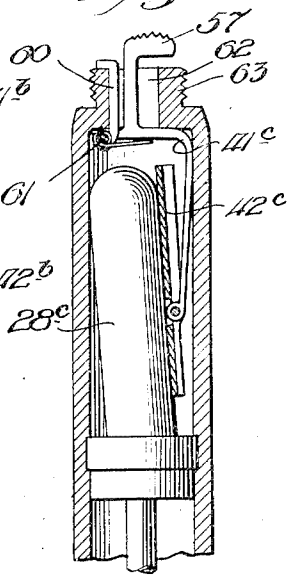


Fig. 16.

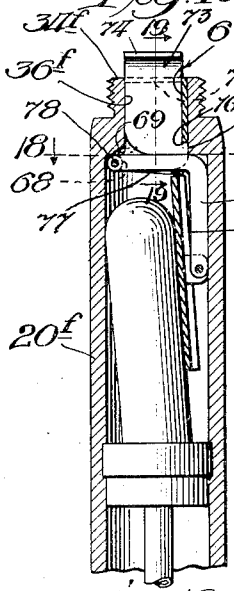


Fig. 14.

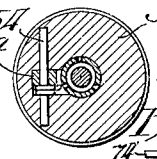


Fig. 17.

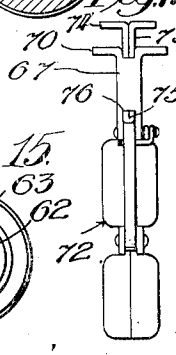


Fig. 12.

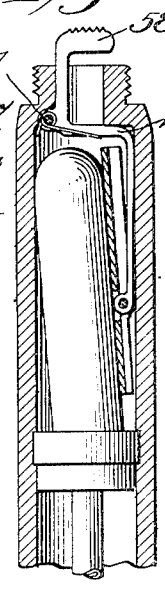


Fig. 13.

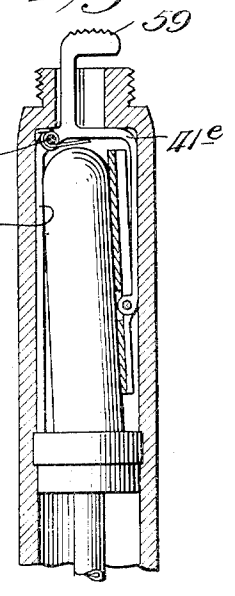


Fig. 15.

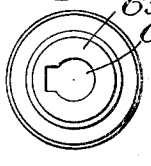


Fig. 19.

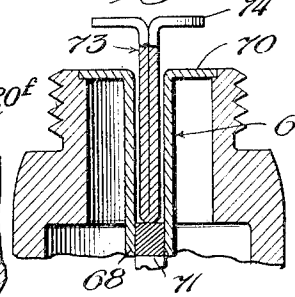
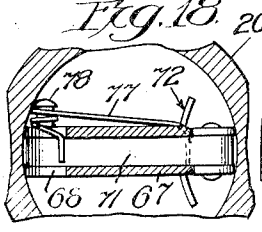


Fig. 18.



Inventor:
Kenneth S. Parker
by Richter, Hibben, Davis & Macauley
Attys

Patented Feb. 24, 1931 1,793,824

UNITED STATES PATENT OFFICE

KENNETH S. PARKER, OF JANESVILLE, WISCONSIN, ASSIGNOR TO THE PARKER PEN COMPANY, OF JANESVILLE, WISCONSIN, A CORPORATION OF WISCONSIN

FILLING MECHANISM FOR FOUNTAIN PENS

Application filed February 1, 1929. Serial No. 336,875.

My invention relates to fountain pens and has to do particularly with filling mechanism for socalled sacless, self-filling pens of a type having a barrel which provides an ink reservoir, a collapsible air-displacement device or bulb at one end of the reservoir within the barrel, and ink feed means at the other end of the reservoir.

In pens of this character, it is highly desirable that the ink reservoir be of large capacity while, at the same time, keeping the overall size of the pen within limits which do not render it uncomfortable in the hand and cumbersome in use. One of the objects of my invention is to provide for the foregoing desirable feature by providing an improved compact form of filling mechanism which requires but little mounting and operating space and which can be mounted within the short pen barrel space occupied by the air displacement means at the end of the ink reservoir.

Another object is to provide a simple, inexpensive and quick-fill mechanism of this character embodying but a few, freely operable parts which may be readily and easily operated by one's finger to successively collapse and expand the displacement bulb in rapid order, the arrangement being such that the bulb or diaphragm is collapsed or deflated by pressure of one's finger, and it is quickly expanded or inflated when the pressure of the finger is released from the filling mechanism.

Still another object is to provide a positive-acting filling mechanism including interconnected parts which may be assembled in the pen barrel as a unit and which co-act with the displacement bulb substantially throughout the length of the latter in such a way as to accomplish substantially complete collapse of the same, all without injury or material wear of the bulb thereby providing a long-lasting filling arrangement.

Other objects and advantages will become apparent as this description progresses and by reference to the drawings, in which,

Figure 1 is an elevational view of a fountain pen embodying my invention;

Fig. 2 is a slightly enlarged longitudinal sectional view of the pen shown in Fig. 1, the displacement bulb being shown in its expanded position;

Fig. 3 is a fragmentary view of the upper portion of the pen of Fig. 2 showing the displacement bulb in a collapsed position;

Fig. 4 is a separated elevational view of the filling mechanism unit;

Fig. 5 is a section taken substantially on line 5—5 of Fig. 4;

Fig. 6 is a top plan view of the pen barrel with the filling mechanism removed;

Fig. 7 is a detached, partial sectional view of the filling mechanism plunger;

Figs. 8 to 13, inclusive, are sectional views of one end of the pen showing modified forms of my filling mechanism;

Fig. 14 is a horizontal section taken substantially on line 14—14 of Fig. 9;

Fig. 15 is a top plan view of the pen shown in Fig. 11 with the filling mechanism removed;

Fig. 16 is a vertical sectional view of the upper portion of a pen embodying still another form of filling mechanism embodying my invention;

Fig. 17 is a detached elevational view of the filling mechanism shown in Fig. 16;

Fig. 18 is an enlarged horizontal section taken substantially on line 18—18 of Fig. 16;

Fig. 19 is an enlarged vertical section taken substantially on line 19—19 of Fig. 16; and

Fig. 20 is a fragmental sectional view of the pen barrel illustrating an additional method of mounting the bulb in the pen barrel.

Referring to the drawings and, particularly, to the form shown in Figs. 1 to 7, inclusive, the pen comprises a barrel 20, a part of the interior of which serves as an ink reservoir 20^a. A pen-section nozzle 21 is screwed into the lower end of the barrel, and this nozzle supports a feed bar 22. The feed bar is provided with an ink-feed channel 23 located beneath a pen point 24 and opening into the lower part of the ink reservoir. The feed bar is also provided with an L-shaped passage 26, the vertical leg of which passage extends to the inner end of the bar. Its horizontal leg opens into the feed channel 23 intermediate

the ends of the latter. An open-ended tube 27 is mounted in the open end of the vertical leg of the bar opening 26, and this tube extends co-axially with the barrel 20 toward and near its rear end (Fig. 2).

Filling of the pen reservoir 20^a is accomplished by successive collapsing and expanding of a flexible rubber bulb 28 mounted within the pen barrel in the relatively small space at the inner end of the ink reservoir. This bulb is formed of comparatively stiff rubber so that, when it is collapsed or deflated, it will tend to rapidly assume its normal inflated position. One manner of mounting this bulb is as follows (Figs. 2 and 3): The inner wall of the barrel at the inner end of the reservoir 20^a is provided with a shallow annular groove 29 which receives the thin circumferential flange 30 on the outer ring member 31 of the bulb support unit. This outer ring has an inner tapered wall surface which is similar to the taper of the outer wall of an inner ring member 32. The lower or open end of the bulb 28 is interposed between the ring members 31 and 32 and it is fixedly held in place by the wedging of these two rings together. If desired, the ring members and bulb may be fixed together as a unit in any desired manner. Further, these ring members 31 and 32 may be made of any suitable material which will resist deteriorating action of the ink, and they may be formed of such material that their resiliency, in addition to that of the barrel, permits the outer ring or the bulb support unit to be forced into place to engage the flange 30 in the groove 29 and provide the desired air tight, ink-tight joint.

In the structure so far described, the relative cross sectional areas of the tube passage and the feed channel, and the relative fluidity of the air and ink, are such that when the bulb 28 is collapsed, air will be forced out through the tube 27, together, probably with a relatively small amount of ink, if there is any ink in the barrel. When the collapsed bulb 28 is expanded to the position shown in Fig. 2, ink will be drawn into the ink chamber through the feed channel 23 and tube 27. Since the amount of ink which is forced out when the bulb is collapsed is very small, repeated collapsing and expanding of the bulb 28 will completely fill the pen.

To provide a large ink reservoir without increasing the over-all size of the pen to an undesirable, uncomfortable and cumbersome extent, the bulb 28 is mounted in a relatively small, short space at the inner end of the ink reservoir. My invention has to do, in part, with bulb collapsing and expanding mechanism which is located and practically concealed within the small bulb-receiving space. This mechanism will now be described.

The rear or bulb end of the pen has an externally threaded neck 34 (Figs. 2 and 3) which detachably receives an end cap 35 which conceals the end-exposed, accessible parts of my filling mechanism. This neck is provided with a central bore 36 (Figs. 2, 3, 6) communicating with the relatively short bulb chamber 33 at the inner end of the ink reservoir. The wall of this bore is provided with a longitudinal recess 37 which receives a flat bar supporting member 38 having a lateral extension 39 (Figs. 2 and 3) on its outer end embracing the outer end of the neck 34. The inner end of this bar 38 is, likewise, extended laterally beneath the neck 34 for anchoring the bar in place against longitudinal displacement. The inner, laterally turned end of this member 38 is hingedly connected as at 40 to an inverted L-shaped arm 41 which supports a presser bar 42 adapted to engage the bulb 28 to collapse the latter (Figs. 2, 3 and 4). The presser bar 42 is formed, preferably, of a channeled-strip having its vertical flanges near the center turned over and crimped upon a pin 43 which hingedly connects the presser bar 42 to the operating arm 41 (Fig. 5).

Obviously, downward hinging movement of the arm 41 about the pivot 40 will move the presser bar 42 laterally to collapse the bulb 28, as indicated in Fig. 3. This movement of the arm 41 is accomplished by means of a plunger 44. This plunger (Fig. 7), preferably, takes the form of a headed shell having longitudinal slots 45 in its lower part providing flexible sections 46, each having a laterally projecting shoulder 47 on its lower edge. A solid stem 48 projects downwardly through the shell from the head 49 to a point slightly beneath the shell for engagement with the upper part of the arm 41. The plunger 44 is freely mounted in the neck bore 36, the yieldable sections 46 permitting its insertion and the shoulders 47 normally preventing its withdrawal, but the sections 46 yield sufficiently to permit its withdrawal when desired. This plunger also serves to retain the support bar 38 in its neck recess, so that with the plunger in place all of the filling mechanism parts so far described are securely anchored.

The operation of this form of filling mechanism will be obvious from Figs. 2 and 3. Downward pressure of the finger on the plunger 44 swings the arm 41 downwardly about its pivot 40 collapsing the bulb 28. When the pressure of the finger on the plunger 44 is released, the bulb 28 will resume its normal position tending to move the presser bar and arm 41 and plunger 44 back to their normal positions of Fig. 2. The bulb may be of such material and so formed that it will serve of its own accord to rapidly return the filling mechanism parts to their normal, non-bulb-collapsing position; but I prefer to aid this action by the use of spring means. More particularly, I may employ a relatively small wire spring 40^a wound around

the pintle 40 with its opposite ends engaging the end wall of the bulb recess 33 and the under side of the arm 41, respectively, whereby this spring opposes the downward swinging movement of the arm 41 and tends to return it rapidly to its normal position of Fig. 2 when the pressure of the finger is released from the plunger 44. The connections between all of these filling parts are arranged for free and non-binding movement so that they will not in any way interfere with the returning of the bulb 28 to its normal expanded state.

In Figs. 8 to 20, inclusive, I have shown several modifications of my invention, and, in all of these, the pen feed, ink reservoir and bulb are the same, except as pointed out more specifically hereinafter. The form of Fig. 8 includes a barrel having a reservoir section 50 and a detachable bulb section 51. The bulb support includes the reduced threaded extension 52 on the upper end of the reservoir section 51, and an inner ring 52^a which has its outer wall surface tapered complementally to a taper on the inner wall of the extension 52. The inner ring 52^a fits within the extension 52 and wedgingly clamps these parts together with the open end of the bulb between them to provide an air-tight, ink-tight joint between the bulb and ink reservoir. The bulb-barrel-section 51 is threaded at its lower end for detachable engagement with the threaded extension 52.

In the form of Figs. 9 and 14, the arm 41^a which hingedly supports the presser bar 42^a is hinged to the end wall 53 of the pen by a pin 54, thereby eliminating the support bar member shown in Fig. 2. The construction and operation is, otherwise, the same as that of the form of Figs. 1 to 7 inclusive.

The form of Fig. 10 is substantially the same as that of Figs. 1 to 7, except that the arm 41^b which carries the presser bar 42^b is hinged at 55 to a bar 56 freely mounted in the barrel at the side of the bulb 28^b. The outer ring 31^b of the bulb unit supports the lower end of this bar 56 and the latter is prevented from lateral movement by the bulb 28^b. The arm 41^b is free to swing about its hinge 55 when the plunger 44^b is depressed.

The forms of Figs. 11, 12, 13 and 15 are similar respectively to those shown in Figs. 2, 9 and 10 with the exception that the respective presser bar support arms 41^c, 41^d and 41^e are moved about their hinges by means of integral finger pieces. Referring specifically to the structure of Figs. 11 and 15, it is provided with a support bar 60 shaped and anchored securely to the bar 38 of the form of Fig. 2. The arm 41^c which is pivoted thereto as at 61 is provided with an integral finger piece 57 which is movable laterally and downwardly (the opening 62 in the pen neck 63 permitting a wide range of movement) to swing the arm 41^c downwardly and inwardly and move the presser bar 42^c to collapse the bulb 28^c in the manner similar to that indicated in Fig. 3.

In the form shown of Fig. 12, the arm 41^d and its finger piece 58 are hingedly connected to the end wall of the pen barrel by a pin 64; and in the form Fig. 13 the integral finger piece 59 and arm 41^e are hingedly supported as at 65 by a bar 66 similar to the bar 56 described in connection with the form of Fig. 10.

In Figs. 16, 17, 18 and 19 still another form of filling mechanism embodying my invention is illustrated. This form includes a rectangularly shaped open-ended shell member 67 mounted in the opening 36^f in the shoulder 34^f at the rear end of the pen barrel 20^f. The inner ends of the shell walls are extended laterally at one side providing a bifurcate extension 68 which projects under the neck shoulder 69, and the outer ends 70 of the shell walls are turned over upon the end of the barrel to fasten and hold the shell tightly in place. The bifurcate extension 68 pivotally recesses one end of an inverted L-shaped arm or lever 71 and the other end of this lever pivotally supports a presser bar 72. The horizontal part of the L-lever 71 is supported partly within the lower walls of the shell. A flat plunger element 73 is reciprocally mounted in the shell 67 with its lower end abutting the horizontal leg of the L-lever. This element 73 is preferably formed of a single piece bent as in Fig. 19 with the outer ends 74 turned outwardly to provide a readily accessible finger piece and the lower edge of the element 73 opposite the shell extension 69 is extended laterally providing a projection 75 which rides in a short slot 76 in the adjacent end wall of the shell. This limits the outward movement of the element 73 and prevents its removal when the filling parts are assembled in the pen. It will be obvious that downward movement of the finger piece element 73 swings the lever 71 downward and the presser bar 72 inward to collapse the bulb 28^f. When the pressure of the finger is released from the element 73, the tendency of the bulb to return to its inflated condition plus the action of the spring 77 quickly moves the bar, lever and element to their positions of Fig. 16. The spring 77 is wound around the pivot pin 78 with one end engaging the adjacent vertical edge of the shell 67 and its other end engaging the under side of the horizontal part of the arm 71 to accomplish the foregoing return movement.

Fig. 20 illustrates another form of bulb mounting. Specifically, the bulb 28^g is supported by means of an outer ring 79 having its outer surface threaded to engage a suitable threaded portion 80 within the barrel. In this case, I also provide an L-shaped inner ring 81 which has its horizontal leg threaded

to engage the interior threaded barrel portion 80, and its vertical leg is tapered complementally to a taper on the inner wall of the outer ring 79 so that the bulb 28^{g} is wedged and tightly gripped in place when the rings 80 and 81 are assembled and screwed home. If desired, the rings 80, 81 and bulb 28^{g} may be assembled and fastened together in some suitable manner before they are inserted in the barrel, in which case the two rings and bulb will be screwed into place as a unit. Any of the previously described forms of bulb-collapsing mechanisms may be used with this form of bulb mounting.

It will be readily seen from the foregoing that I have provided a compact and quick-fill means for filling the pen, which means, while being very short and of small size for mounting in a very small space, is highly efficient. It may be rapidly and easily operated. It is positive in action and long-lasting. The greater portion of the barrel may be used as an ink reservoir, whereby a large amount of ink may be stored in the pen reducing the filling-periods, all without increase in the over-all size of the pen.

It is to be understood that while I have shown and described several embodiments of my invention, further changes in details and arrangements of parts may be made therein without departing from the spirit and scope of my invention as defined by the claims which follow.

I claim:

1. In a fountain pen, a barrel having an opening in one end thereof, filling mechanism mounted within the barrel which includes a bulb and a member movable to collapse said bulb, and means mounted in said opening for moving said member which comprises a headed shell slotted longitudinally to provide a plurality of yieldable sections, each having shoulders at the end opposite said shell head, a non-yielding center piece projecting below said sections and engaging said member, said yielding sections permitting insertion and removal of said shell from said barrel opening.

2. In a fountain pen, a barrel having a part forming an ink reservoir, a bulb at one end of said reservoir, and a mounting for said bulb comprising an outer ring member supported by the inner wall of said barrel at said one end of said reservoir, said member having its inner surface tapered, an inner ring member having its outer surface tapered and insertable within said outer ring with the open end edge of said bulb between said rings to wedgingly clamp such parts together to provide ink-tight, air-tight joints between said bulb and rings and said outer ring and barrel wall.

In testimony whereof, I have subscribed my name.

KENNETH S. PARKER.