

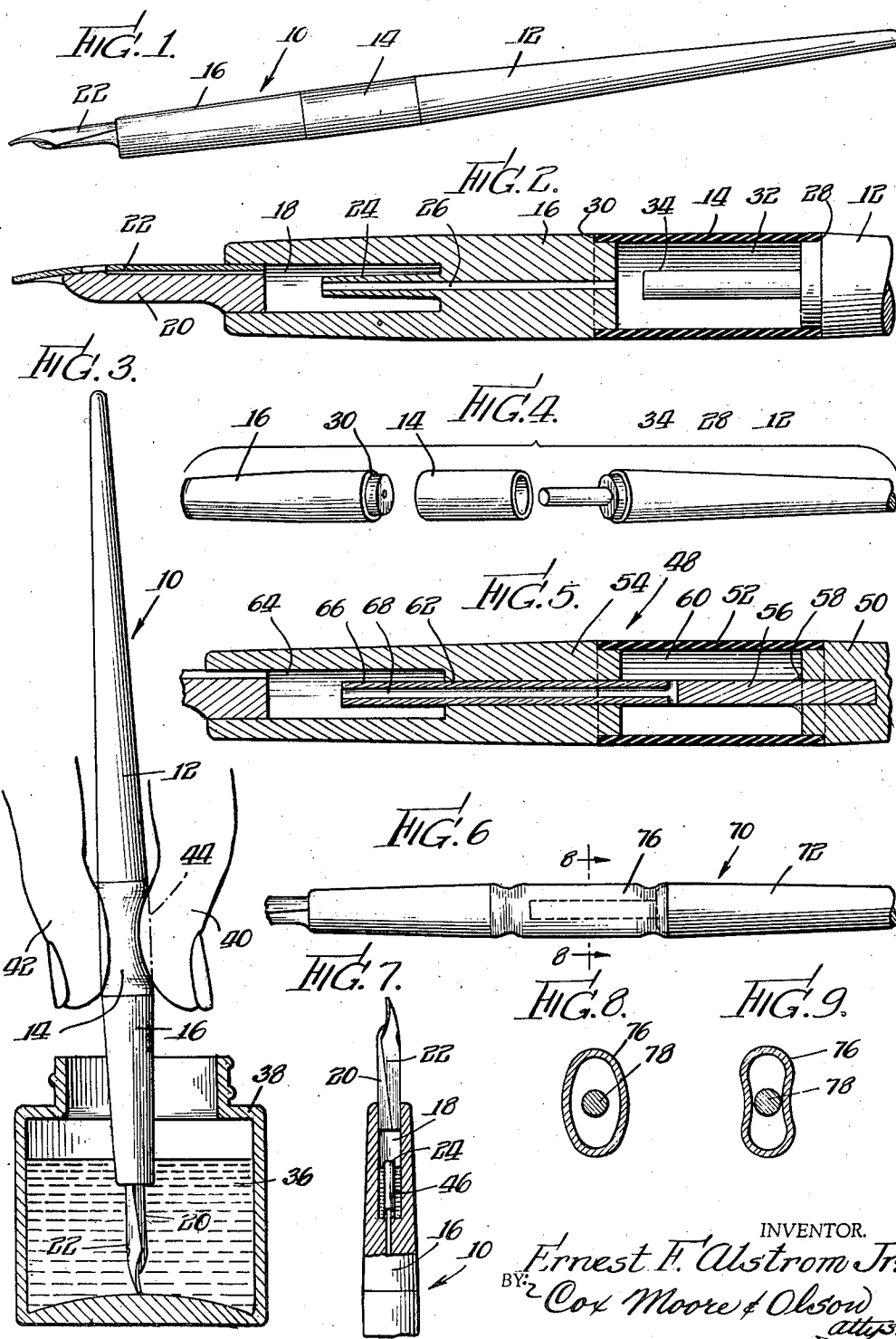
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This invention relates to a new writing instrument. More particularly, it relates to an improved pen adapted to receive and hold a small quantity of ink.

The variety of fountain pens known in the art may for present purposes be divided up into two groups. One of these groups includes fountain pens which are adapted to be carried about from place to place, as, for example, in the pocket of the user, and the other those which are intended to be kept in one particular place, forming, for example, part of a desk set. Despite the fact that it is not only unnecessary but in certain cases, at least, undesirable, pens of both types are provided with the same sort of filling means. Although numerous types of filling means are known, these have been developed in substantially every case for use in pens of the first class mentioned above, namely, those which are intended to be carried about from place to place. Whatever the purpose may have been, however, these filling means are in general much better adapted for pens which are to be carried about from place to place since all of these various filling means are so constructed and arranged as to be difficultly accessible, the obvious purpose being, of course, to prevent accidental discharge of ink. However, where a pen is to remain in one place, as on a desk, to have the filling means relatively inaccessible in undesirable rather than desirable.

It is therefore an object of this invention to provide a pen adapted to contain a quantity of ink and having readily accessible filling means.

A more specific object is to provide a pen adapted to be used in one place and having readily accessible means for drawing a small body of ink into the pen which is thereafter delivered to the pen point as necessary during writing.

Another object is to provide a fountain pen of the self-filling type, having the filling means located adjacent the pen point.

Still another object is to provide a fountain pen of the self-filling type, which may be filled entirely with one hand simply by shifting the grip on the pen a short distance from the normal writing position.

A still further object is to provide a fountain pen having a minimum of chambers and passages therein through which or into which ink passes.

Another object is to provide a fountain pen of the self-filling type, in which the ink is con-

tained wholly within a chamber having rigid walls.

Other objects will appear hereinafter.

It has now been found that these objects may be accomplished by providing a pen such as that illustrated in the accompanying drawing, in which

Figure 1 is a view in perspective of a pen embodying features of the present invention;

Figure 2 is an enlarged detailed view of the lower end of the pen shown in Figure 1, partly in section, through the center;

Figure 3 is a view in perspective, illustrating the manner in which the pen shown in Figures 1 and 2 is filled;

Figure 4 is an exploded view in perspective of the pen illustrated in Figures 1 and 2;

Figure 5 is a view similar to Figure 2, illustrating another embodiment of the invention;

Figure 6 is a view in perspective of a portion of a pen, illustrating still another embodiment of the invention;

Figure 7 is a view, partly in section, of the lower end of a pen, illustrating the position of the ink supply when the pen is inverted;

Figure 8 is an enlarged section on the line 8—8 in Figure 6; and

Figure 9 is a view similar to Figure 8, taken during the filling operation.

Referring now more particularly to Figures 1, 2 and 4, it will be seen that a pen, designated generally 10, is shown which includes a stem 12, an intermediate flexible portion 14, and a barrel 16. A chamber 18 is formed centrally in the lower end of barrel 16 and receives in its open lower end the usual feed bar 20 and pen point 22. These latter may be of any desired type. Extending downwardly or outwardly from the closed inner or upper end of chamber 18 is a rod 24 which terminates about midway lengthwise of the chamber 18. Extending through rod 24 to the inner or upper end of barrel 16 is a small channel 26.

As is best seen in Figure 2, annular grooves 28 and 30 are provided on stem 12 and barrel 16 to receive the ends of the generally cylindrical, flexible member 14. An air-tight seal is provided between the flexible member 14 and the stem 12 and also between the flexible member 14 and the barrel 16, thereby providing a chamber 32 which is air-tight except for the opening provided by the channel 26. A rod 34 of reduced diameter is formed on the inner end of the stem 12 and extends downwardly in the chamber 32, terminating adjacent the inner end of barrel 16. The body or

upper portion of the stem 12 may be of any desired shape, it being shown herein as a rod of gradually decreasing diameter from the inner end outwardly.

The pen 10 is operated, as shown in Figure 3, by immersing the lower end in a body of ink 36 in a container 38 and pressing the walls of the flexible member 14 inwardly with two fingers 40 and 42, for example, from the position shown by the dotted lines 44 to that shown by the solid lines, and then releasing the pressure. As may best be seen in Figure 2, when the opposite sides of the flexible member 14 are pressed inwardly, the volume of chamber 32 is reduced, thus forcing air outwardly through the channel 26 into chamber 18 and thence outwardly through the feed bar 20 and the pen point 22. Thereafter, when the pressure on the sides of the flexible member 14 is released, these spring back to their normal position illustrated by the dotted lines 44 in Figure 3, increasing the volume of chamber 32 and thus reducing the pressure within the pen 10. Atmospheric pressure operating on the body of ink 36 thereupon forces a small quantity of ink through the feed bar 20 and pen 22 into chamber 18, and the pen is filled. The rod 34 is provided to limit the inward movement of the walls of the flexible member 14 and to thus prevent these walls from being pressed into the point where they will break.

Limiting the movement of the walls of flexible member 14 by means of the rod 34 also serves to control the quantity of ink drawn into the pen at each filling. The pen is designed to retain all of the ink in the lower chamber 18. This is accomplished, first, by proportioning the chamber 32 with respect to the chamber 18 and limiting the movement of the walls of flexible member 14 by means of rod 34 so that the quantity of air expelled when the walls 14 are pushed in against rod 34 is less than the volume of chamber 18 below the lower end of the rod 24, whereby when the pen is in a vertical position, as shown in Figure 3, the upper level of the full charge of ink in chamber 18 lies below the lower end of rod 24. This prevents ink from being drawn up through channel 26 during the filling operation. In order to prevent ink from finding its way into channel 26 during handling or use of the pen, the rod 24 is provided. As may be seen in Figure 7, the chamber 18 is made sufficiently large and the rod 24 is extended downwardly therein for a sufficient distance so that when the pen 10 is up ended, as shown in Figure 7, a full charge of ink 46 will have its upper level below the end of the rod 24. It has been found in actual practice that this construction completely prevents the ink from working its way into chamber 32 or even any substantial distance into the channel 26.

In the embodiment shown in Figures 1, 2 and 4, the flexible member 14 which, as is apparent from the above description, is also resilient, is preferably formed of a material which has a considerable degree of resistance to flexing; particularly as respects force applied longitudinally of the tubular member 14. If the member 14 is formed of such a rigid, but at the same time resilient and flexible, material, the stem 12 cannot readily be bent with respect to the barrel 16, and the flexible member 14 will itself provide an adequate connection between the stem 12 and the barrel 16. A suitable flexible and resilient material, which is also relatively rigid, is Celluloid. Pens constructed as shown in Figures 1, 2 and 4, in which the flexible member 14 is formed

of relatively thin Celluloid, have been found to function quite satisfactorily, and it has been found that the Celluloid provides a sufficiently rigid connection between the stem 12 and barrel 16 so that other connection is not necessary.

The pen 43, illustrated in Figure 5, is generally similar to pen 10 and includes a stem 50, a resilient, flexible, cylindrical member 52, and a barrel 54. One important difference between pens 10 and 43 is that the flexible and resilient member 52 is formed out of a relatively non-rigid material, such as a rubber composition. The member 52 is secured in air-tight relation to the stem 50 and the barrel 54 in the same manner that the flexible member 14 is secured to stem 12 and barrel 16 but, in order to provide greater rigidity between stem 50 and barrel 54, a pin 56 is provided which is imbedded centrally in the inner end of the stem 50 and rigidly secured thereto, as at 58. Pin 56 extends downwardly from the stem 50 through the chamber 50, through a central opening 62 in barrel 54, and into chamber 64, which corresponds to the chamber 18 in barrel 16. The pin 56 is thus rigidly secured in the barrel 54 and serves to give rigidity to the pen structure 43. The lower end 66 of rod 56 serves the same purpose as the rod 24 in pen 10. A small channel 68 extends centrally through the pin 56 from the lower end upwardly to a point within the chamber 60 and thence opens outwardly at diametrically opposite points into the chamber 60. This channel 68 serves the same purpose as channel 26, providing connection between chamber 60 and chamber 64. The pin 56 is still further designed to serve as a stop for the walls of the flexible member 52 in the same manner as rod 34 does in pen 10. The operation of pen 43 is the same as that of pen 10 and does not require further description.

Still another modification of structure is illustrated in Figures 6, 8 and 9. The pen 70, illustrated in Figure 6, includes a stem 72 corresponding generally to stem 12, and a barrel 74 corresponding generally to barrel 16. The flexible member 76 positioned between stem 72 and barrel 74 is also generally similar to the member 14, differing primarily in configuration. The flexible member 76, shaped as indicated in Figure 6 and in the sectional view in Figure 8, is somewhat easier to press inwardly and is somewhat less liable to crack than is the flexible member 14 which is generally cylindrical in shape. The design of the flexible member 76 is particularly suitable where this member is formed of a flexible, resilient material which has considerable rigidity, such, for example, as Celluloid, mentioned above.

Figure 9 illustrates the shape of the flexible member 76 when the front and rear sides thereof, as shown in Figure 6, are pressed inwardly for the purpose of filling the pen 70. This figure also illustrates the manner in which the rod 78, corresponding to rod 34, serves as a stop.

Some mention has been made above of suitable flexible materials from which to construct the members 14, 52 and 76. It is to be understood, however, that these are merely illustrative and are not intended to limit the scope of the invention. Members 14, 52 and 76 may be constructed of any desired material which has the necessary resilience and flexibility. The fact that these parts do not come in contact with the ink makes it unnecessary to select materials for their construction which are inert with respect to ink. Preferably, but not necessarily, the rod

extending in the chamber enclosed by members 14, 52 and 76 will be rigid with both the stem and barrel where the resilient, flexible material does not also have considerable rigidity.

Referring more particularly to pens 10 and 70, it will be understood that the rods 34 and 78 may extend upwardly from the barrel instead of downwardly from the stem as shown, the rods 34 and 78 being mounted on the stem merely for the sake of convenience in construction.

The passages or channels 26 and 68 may vary somewhat in diameter but are preferably kept relatively small since they are intended only to pass air and since in particular it is desired to avoid having ink enter these passages. By way of illustration, it may be mentioned that pens have been constructed in which these openings have diameters of the order of $\frac{1}{32}$ to $\frac{1}{64}$ of an inch. Such pens perform entirely satisfactory but it is contemplated that these openings may have both larger and smaller diameters, if desired.

In pen 10 the rod 34 is preferably formed integral with stem 12. It may, however, be formed separately and suitably secured thereto. Also, the rod 24 is preferably formed integral with the barrel 16 but it may likewise be formed separately and suitably secured in the barrel 16. In contrast, the pin 56 in pen 48 is formed separately, as illustrated, from either the stem 50 or the barrel 54. It will be understood, however, that the pin 56 may be integral with either the barrel 50 or the stem 54, being suitably secured to the other member, if desired, in assembling the pen. The member 56 will, of course, serve to give substantial rigidity to the pen 48 if it is merely secured either to the stem 50 or to the barrel 54, and then merely inserted in the other of the latter two members, and still more rigidity when secured in or to both members.

Both the stem and barrel of any of pens 10, 48 and 70 may be formed of any desired material, for example, wood or any of the plastic materials from which fountain pen barrels are now made. To provide variety in construction and a more pleasing appearance, the stem may also be formed of one material and the barrel of another. Still another variation in construction consists in providing a transparent window about the lower end of the lower chamber, illustrated by chambers 18 and 64, whereby the quantity of ink within the pen may be readily seen. Many other variations in construction within the spirit of this invention will be readily apparent to those skilled in the art.

Some of the advantages of the present invention are suggested by the above description. One of the more outstanding of the advantages is the ease and facility with which the pen may be filled. As is indicated by Figure 3, the position occupied by the fingers during the filling operation is substantially identical with that which they occupy in writing and they are removed only a short distance from the position which they occupy in gripping the pen for writing.

Another related advantage is that the filling means are very easily accessible and do not require the removal of any parts in order to get at them. They likewise do not require the pulling down of a lever in order to accomplish the filling operation nor do they involve a complicated plunger construction. In addition, the usual rubber bulb is completely eliminated and the portions of the pen through which the ink passes and with which it comes into contact are materially reduced in number. In any pen struc-

ture the ink, of course, necessarily comes into contact with the feed bar and the point. In the present structure the only other part of the pen with which the ink is in contact is the chamber in the lower end of the barrel. Except for the small capillary means in the feed bar adjacent the pen point, the ink does not pass through any other small openings. This greatly reduces the difficulty due to clogging of the pen by reason of the use of poor grade inks or long disuse of the pen itself.

Still a further advantage is the great simplicity in the construction of the pen generally. The greater proportion of the parts of the pen can be readily cast or molded or otherwise formed out of any of a variety of plastic materials. It will be obvious that the structure shown herein could be varied to provide a pen which can be carried about in the pocket or purse of the user but, since the pen is designed primarily as a desk pen, the maximum charge of ink is ordinarily not very great, being of the order of about five drops. For desk use a large volume is obviously unnecessary since a fresh supply of ink is usually readily available. On the other hand, five drops of ink is a relatively large supply compared with pens which are not of the fountain type. It has been found, for example, that as many as two thousand words or more may be written with one charge, containing about five drops, as measured by dropping the ink off the end of the pen.

Still other advantages will appear from the foregoing description.

It is apparent that many widely different embodiments of this invention may be made without departing from the spirit and scope thereof, and therefore it is not intended to be limited except as indicated in the appended claims.

The invention is hereby claimed as follows:

1. A pen having a writing point, a space located interiorly of said pen comprising two separate chambers connected by a passageway of relatively small diameter opening into the lower of said chambers at a point adjacent the middle of said chamber lengthwise of the pen, capillary means providing communication between the lower of said two chambers and said writing point, for feeding ink to said writing point, said space being air-tight except for said capillary means, and the upper chamber being enclosed, at least in part, by a flexible wall portion which also forms a part of the outer wall of said pen.

2. A pen having a barrel, a stem, a writing point mounted in one end of said barrel, and a flexible wall portion extending between the other end of said barrel and said stem and forming a part of the outer wall of said pen, a chamber formed within said barrel adjacent said point and connected thereto by capillary means, for feeding ink from said chamber to said point, a passageway of relatively small diameter extending from a point adjacent the middle of said chamber lengthwise of the pen, upwardly through said barrel, and opening into a second chamber enclosed by said flexible wall portion, the space provided by said interconnected chambers being air-tight except for said capillary means.

3. A pen having a writing point, a space located interiorly of said pen comprising two separate chambers connected by a passageway of relatively small diameter opening into the lower of said chambers at a point adjacent the middle of said chamber lengthwise of the pen, capillary means providing communication between the lower of said two chambers and said writing point,

for feeding ink to said writing point, said space being air-tight except for said capillary means, the upper chamber being enclosed, at least in part, by a flexible wall portion which also forms a part of the outer wall of said pen, and said two chambers being proportioned with respect to each other so that the maximum quantity of ink which can be drawn into the lower of said chambers by flexing the wall of the upper chamber once has a volume less than half that of the lower chamber and less than the volume of the lower chamber above the point where said passageway opens into the lower chamber.

4. A pen having a writing point, a space located interiorly of said pen adjacent the lower end thereof and comprising two separate chambers connected by a passageway of relatively small diameter opening into the lower of said chambers at a point adjacent the middle of said chamber lengthwise of the pen, capillary means providing communication between the lower of said two chambers and said writing point, for feeding ink to said writing point, said space being air-tight except for said capillary means, the upper chamber being enclosed, at least in part, by a flexible wall portion which also forms a part of the outer wall of said pen, and said two chambers being proportioned with respect to each other so that the maximum quantity of ink which can be drawn into the lower of said chambers by flexing the wall of the upper chamber once has a volume less than half that of the lower chamber and

less than the volume of the lower chamber above the point where said passageway opens into the lower chamber.

5. A pen having a barrel with an opening extending longitudinally therethrough, said opening being of relatively small diameter in the upper end of the barrel and having a relatively large diameter in the lower end whereby to provide a chamber, a writing point and feed bar secured in the lower end of said chamber and including capillary means for feeding ink from said chamber to said point, a stem positioned above said barrel, a relatively rigid, flexible wall portion positioned between said barrel and said stem and forming a part of the outer wall of said pen, said flexible wall portion enclosing a second chamber into which the opening in said barrel opens and in which a stop member for said flexible wall portion extends, said two chambers and connecting passageway being air-tight except for said capillary means, the small opening in said barrel opening into the lower chamber adjacent the middle thereof lengthwise of the pen, and said chambers being proportioned with respect to each other so that the maximum flexing of said flexible wall as determined by said stop draws a charge of ink into said lower chamber which has a volume less than that of either the portion of the lower chamber below the lower end of said small opening or that thereabove:

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