

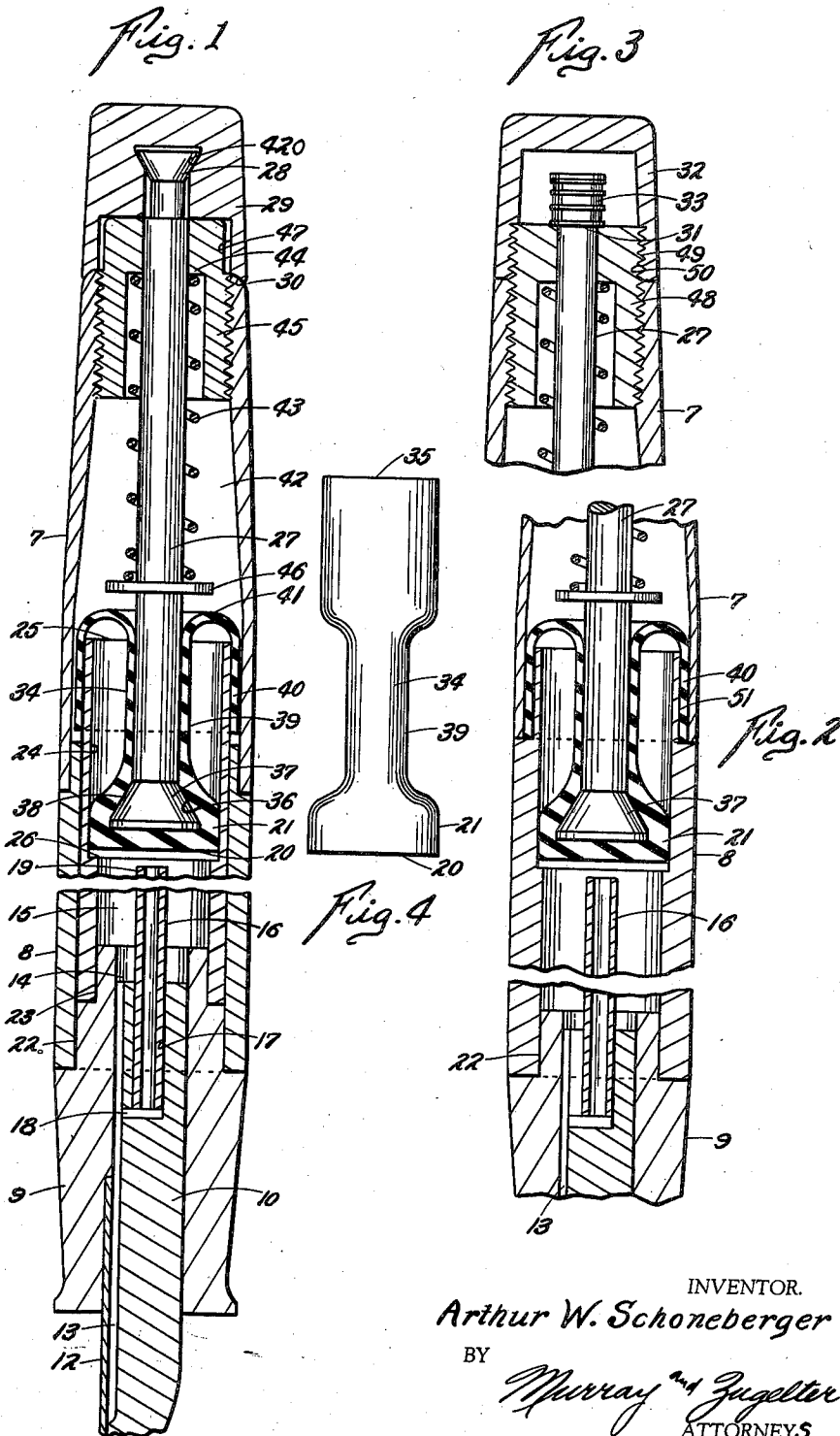
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FOUNTAIN PEN

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FOUNTAIN PEN

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The present invention relates to a fountain pen, and especially to that portion thereof which concerns the means for charging the pen with a supply of writing fluid. The pen is of that class known as the plunger or piston type pen, as distinguished from the diaphragm type and the bulb type.

An object of the invention is to provide a piston type of filling means for a fountain pen, wherein has been obviated the commonly recognized disadvantages and faults of the plunger or piston type self-filling fountain pens.

More specifically, it is an object of the present invention to provide a filling means for fountain pens, which is absolutely leakproof even after long usage, due to an automatic compensation for wear of the piston head. The pen is thereby rendered quick filling, with the application of a minimum number of piston strokes, and the serviceability and life of the pen, generally, is greatly enhanced.

Another object of the invention is to provide a filling means for fountain pens, whereby the above stated objects may be realized or accomplished with the use of simple and durable means, and at a minimum manufacturing cost.

The foregoing and other objects are attained by the means described herein and disclosed in the accompanying drawing, in which:

Fig. 1 is an enlarged fragmental cross sectional view taken vertically through a fountain pen embodying the present invention.

Fig. 2 is a view similar to Fig. 1, showing a modification.

Fig. 3 is a fragmental cross sectional view showing a piston rod arrangement at the upper end of a fountain pen, which arrangement is a variation of that shown in Fig. 1.

Fig. 4 is an enlarged elevational view of a flexible plunger or piston member which forms a part of the present invention.

In the art to which this invention relates, it is a matter of general knowledge and observation that piston or plunger type filling means for fountain pens have heretofore not performed, in a satisfactory manner, the service for which they were designed. Manufacturers and dealers in fountain pens of this general character have found that such pens have required frequent servicing which, in many instances, resulted in considerable loss to the manufacturer or dealer. To obviate the faults of the plunger or piston type filling means, there has been proposed and put into practice, the use of rubber diaphragms for displacing air from the pen barrel and creat-

ing a vacuum for the filling of the barrel with writing fluid. This type of filler, however, was slow acting and otherwise objectionable, so that, in the final analysis, it is believed that the plunger or piston type of filling means is better adapted for fountain pen construction, than are any of the other types heretofore known and used, provided that it can be constructed to obviate the various objections referred to above. The improvements herein illustrated and described have effectively overcome the objections mentioned, in addition to others known to those skilled in this art, so that a high degree of perfection has been attained, thereby placing the plunger or piston type of filling means in a dominating position relative to other types of filling means heretofore known and used. It is deemed unnecessary to relate the reasons why a pump or piston type filling means is more acceptable, from the standpoint of appearance and ease of operation, than are the other current types of filling means, such reasons being well known to users as well as to manufacturers and dealers in fountain pens.

According to the present invention, the fountain pen is constituted generally of a barrel or body made up of the two parts 7 and 8, and a finger grip portion 9 within which is supported a feeder or nib holder 10 that maintains in position the writing point or nib 12. In accordance with common practice, the nib holder is provided with a channel 13 extending longitudinally thereof and terminating at 14 so as to be in fluid communicating relationship with the reservoir 15 that contains the writing fluid. A longitudinal upstanding breather or air-relief tube 16 is supported in a bore 17 of the feeder or nib holder, and the hollow interior thereof is connected with the passage or groove 13 by means of a short bore or channel 18. The tube 16 is open at its upper end 19, which end extends substantially to the lower face 20 of the piston head 21. In the construction illustrated in Fig. 1, the barrel or body part 8 is mounted upon a shoulder 22 of the nib holder, and the inner barrel or reservoir member 15 is supported upon a second shoulder thereof indicated at 23. The Fig. 2 modification differs from the construction shown in Fig. 1, by the omission of the inner barrel or reservoir member. From the foregoing, it will be understood that the air relief or breather tube 16 is enclosed completely within the reservoir 15, with its lower end communicating with the atmosphere through the groove or passage 13, while the upper end 19 thereof extends up into the reservoir to a point adjacent to the piston head

21 when said head is in the normal or lowered position of Fig. 1. The end 14 of the groove or passage 13 also communicates with the reservoir, at its lower end, to convey writing fluid to the nib or writing point.

The upper end of the inner barrel or reservoir member has a smooth inner surface 24 which provides a cylinder section within which the piston head 21 may reciprocate from the normal position of Fig. 1, to an elevated position near the upper annular edge 25 of the inner barrel. The cylinder section 24 may be defined by a shoulder 26 of the inner barrel, which shoulder may also provide a stop for the piston, although the provision of such shoulder 26 is entirely optional and even unnecessary when other means are provided for limiting the downward movement of the piston head or its piston rod 27. For the purpose of showing how the shoulder 26 may be eliminated, the drawing discloses the upper end 28 of the piston rod embedded in the end cap 29, which cap abuts the pen body at 30 to determine the extent of downward movement of the piston rod. As an alternative construction for limiting the downward movement of the piston rod, reference is made to the shoulder 31 of the piston rod shown in Fig. 3. In the latter figure, the cap 32 is free of any connection with the upper end 33 of the piston rod.

The generalities of the structure having been explained, attention is now directed to the peculiarities of the pump arrangement that constitute the primary feature of the improved fountain pen. The character 34 indicates generally a flexible element which may be made of molded or formed rubber or other suitable fluid-tight material, that takes the place of the piston head ordinarily employed in the pump type fountain pen filling means. Said element 34 is in the form of a tube having its lower end closed as at 29, and its upper end open as at 35. The lower end of the flexible element which furnishes the piston head 21, is enlarged and made relatively heavy so as to provide a reinforced piston head of a size approximating the inside diameter of the cylinder section 24 in which it is adapted to reciprocate. Interiorly of the thickened or reinforced lower end of the flexible member, said member is provided with an enlarged pocket or recess 36 having its annular wall flared or tapered downwardly and outwardly in the direction of the piston head face 20. Said pocket or recess provides a seat for the piston rod head 37, this head being enlarged and preferably of truncated cone formation so that the inclined outer face 38 thereof will substantially coincide with the flare or taper of the seat 36. The portion of the piston rod above the head 37 is snugly received in a constricted neck or intermediate section 39 of the flexible element indicated generally by the character 34. The upper enlarged section 35 of the flexible element is turned outwardly and downwardly as indicated at 40 so as to embrace the outer wall of the inner barrel or reservoir member 15, as indicated in Figs. 1 and 2. The outwardly and downwardly turned portion 40 may be either frictionally maintained in the relationship disclosed, or it may be cemented in position, if necessary. In any event, the outwardly and downwardly turned portion 40 is maintained in fixed relationship to the pen body, while the intermediate section 39 and the head portion 21 may be reciprocated relatively thereto, by means of an upward and downward manipulation of the piston rod.

It is to be particularly noted that the flared or tapered character of the piston rod head 37, cooperating with the correspondingly shaped seat 36 of the piston head 21, provides for automatically expanding the piston head against the cylindrical wall 24 of the inner barrel when the piston rod is lifted or moved upwardly. Conversely, a downward movement of the piston rod relieves the piston head of any expanding force, and permits it to return to the normal or lowered position of Fig. 1 without an appreciable frictional drag upon the cylinder wall 24. From this, it will be understood that the piston head automatically accommodates itself to the cylinder 24 regardless of wear, so that it may be considered self-adjusting. The construction results in a leakproof pump which is long lived and requires no adjustment or replacement of parts except possibly at great intervals of time. Since the piston head is self-adjusting and is always kept in tight leakproof engagement with the cylinder wall 24 upon each upward stroke of the piston rod, no material portion of the vacuum created is lost, with the result that the pen reservoir will always be quick filling with the application of the same number of piston strokes whether the pen be new, or used for a considerable length of time.

The arrangement just described requires little or no stretching of the flexible member, so that it is not subject to destruction by reason of repeated expansion and contraction. When the piston head is elevated by the action of the piston rod 27, the turned portion 41 of the flexible member, merely elevates and lowers at half the longitudinal travel of the piston rod, without stretching or imposition of strains or stresses upon the working parts. It will be evident that any writing fluid that may pass the piston head 21 cannot enter the chamber 42 above the flexible member, and that any fluid thus entrapped will be forced downwardly past the piston head and into the reservoir 15 upon an upward movement of the piston rod.

The means whereby the piston rod may be manipulated to effect the filling operation, may take various forms. For example, in Fig. 1 the upper end 28 of the piston rod is molded or otherwise embedded in a recess 420 of the cap 29, so that the cap may merely be lifted to elevate the piston head 21. Preferably, though not necessarily, a spring 43 may be provided for returning the piston head to the normal position of Fig. 1, the upper end of the spring being adapted to abut a shoulder 44 of a threaded closure or nipple 45, while the lower end of the spring abuts a fixed shoulder or washer 46 of the piston rod. Contemplated also, is the provision of threads between the upper portion of the nipple 45 and the interior of the cap bore at 47, so that the cap may be screwed into position upon the closure member or nipple 45. In thus modifying the manipulating means, it would be desirable to have the head 28 rotatably related to the cap 29 so as to avoid possible twisting of the flexible member 34 when applying or removing the cap 29. An alternative structure is disclosed in Fig. 3, wherein the upper portion of the end closure nipple part 48, is threaded as at 49 to engage cooperative threads 50 of the cap bore, the cap being unattached to the upper end 33 of the piston rod 27. To operate the Fig. 3 manipulating means, it is necessary only to completely remove the cap 32, and to grasp and reciprocate the finger piece 33 in order to effect the filling operation.

As stated previously, the Fig. 2 modification

differs from the Fig. 1 structure only in eliminating the inner barrel or reservoir part 15. When said inner barrel is eliminated, the outwardly and downwardly turned portion 40 of the flexible member may be cemented or otherwise secured directly to the outer barrel or body 8 of the pen, in any suitable manner. One means of arranging for the connection of part 40 to the pen body, may be that of reducing the exterior diameter of the body as indicated at 51, and fixing the part 40 thereto, after which the upper section 7 of the pen body or barrel may be applied either permanently or in such manner as to be capable of removal in the event that access to the interior of the filling means is desired. It will be understood that the upper end of the pen body section 7 shown in Fig. 2, may be developed to accommodate either of the cap arrangements shown in Figs. 1 and 3, or such other manipulating means as may be suitable to actuate the piston head in the manner described.

The flexible member 34 may be formed of rubber or any other material adaptable for performance of the functions herein explained, it being contemplated also that the piston head portion thereof may be reinforced otherwise than by merely thickening the material in the region of the plunger head seat. Although, as disclosed in Fig. 4, the flexible member is illustrated as having an enlarged upper end, it is obvious that the enlargement may be accomplished by stretching the upper end when applying it to the reservoir of the pen for disposition thereof to the outwardly and downwardly turned relationship disclosed in Figs. 1 and 2. In other words, the upper portion 35 of the flexible member shown in Fig. 4, might be of the same diameter as the intermediate portion 34.

It is to be understood that various other modifications and changes in the structural details of the device may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What is claimed is:

1. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a piston head mounted for reciprocation relative to the barrel, and means associated with the piston head to positively expand said head upon movement of the head in one direction only of its reciprocatory movement.

2. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible piston head mounted for reciprocation within the barrel longitudinally thereof, and means operating, upon each fluid-admitting movement of the piston head, to expand said head radially outwardly against the barrel interior to establish a fluid-tight frictional seal.

3. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible piston head mounted for reciprocation within the barrel, a piston rod connected to the piston head and mounted also for reciprocatory movement, and cooperative

means associated with the head and rod for applying a positive expanding force radially to the flexible head upon unidirectional movement of the piston rod.

4. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible tubular member having an open upper end and a closed lower end, the open upper end being fixed relative to the barrel for dividing said barrel into an upper and a lower chamber, a piston rod mounted upon the pen for reciprocation in said upper chamber, and cooperative means associated with one end of the piston rod and the closed lower end of the flexible member, for applying an expanding force radially to said closed end of the flexible member upon each elevating movement of the piston rod.

5. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible tubular member having an open upper end and a closed lower end, the open upper end being fixed relative to the barrel for dividing said barrel into an upper and a lower chamber, a piston rod mounted upon the pen for reciprocation in said upper chamber, and cooperative means associated with one end of the piston rod and the closed lower end of the flexible member, for applying an expanding force radially to said closed end of the flexible member upon each elevating movement of the piston rod, and yielding means arranged to lower the piston rod to a normally inoperative position after each elevating movement thereof.

6. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible tubular member having an open upper end fixed relative to the pen barrel for dividing said barrel into an upper and a lower chamber, and a closed lower end providing a piston head having an interior pocket with a wall flared downwardly and outwardly toward said closed end, said closed end being of a diameter approximating the diameter of the barrel interior, a piston rod mounted upon the pen for reciprocation in said upper chamber, said rod having a lower end extended into the flexible tubular member to a location within said pocket, the lower end including an enlargement having a wall tapered downwardly and outwardly to coincide substantially with the wall of the pocket aforesaid, whereby an upward movement of the piston rod causes the tapered wall of the enlargement to apply an outward radial force to the closed lower end of the flexible member, to increase frictional contact thereof upon the barrel interior.

7. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible tubular member having an open upper end fixed relative to the pen barrel for dividing said barrel into an upper and a lower chamber, and a closed lower end providing a piston head having an interior pocket with

a wall flared downwardly and outwardly toward said closed end, said closed end being of a diameter approximating the diameter of the barrel interior, a piston rod mounted upon the pen for reciprocation in said upper chamber, said rod having a lower end extended into the flexible tubular member to a location within said pocket, the lower end including an enlargement having a wall tapered downwardly and outwardly to coincide substantially with the wall of the pocket aforesaid, whereby an upward movement of the piston rod causes the tapered wall of the enlargement to apply an outward radial force to the closed lower end of the flexible member, to increase frictional contact thereof upon the barrel interior, and means associated with the opposite end of the piston rod for manual reciprocation of the rod and piston head.

8. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a flexible tubular member having an open upper end and a closed lower end, the open upper end being fixed relative to the barrel for dividing said barrel into an upper and a lower chamber, a piston rod mounted upon the pen for reciprocation in said upper chamber, and cooperative means associated with one end of the piston rod and the closed lower end of the flexible member, for applying an expanding force radially to said closed end of the flexible member upon each elevating movement of the piston rod, and means for manipulating the piston rod comprising a cap rotatably mounted upon the opposite end of the piston rod, and cooperative screw threads on the cap and pen barrel.

9. As a new article of manufacture, a piston head for the filling means of a pen of the fountain variety, comprising an elongated tube of flexible material having an upper open end, a lower closed end, and an intermediate tubular portion, said closed end being enlarged relative to the intermediate portion and having formed therein a pocket larger in diameter than the diameter of the intermediate portion interior.

10. As a new article of manufacture, a piston head for the filling means of a pen of the fountain variety, comprising an elongated tube of flexible material having an upper open end, a lower closed end, and an intermediate tubular portion, said closed end being enlarged relative to the intermediate portion and having formed therein a pocket larger in diameter than the diameter of the intermediate portion interior, said pocket being determined by a wall tapering outwardly and in the general direction of the closed end.

11. As a new article of manufacture, a piston head for the filling means of a pen of the fountain variety, comprising an elongated tube of flexible material having an upper open end, a lower closed end, and an intermediate tubular portion, said closed end being reinforced and enlarged relative to the intermediate portion and having formed therein a pocket larger in diameter than the diameter of the intermediate portion interior.

12. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a closely fitting piston head

mounted for reciprocation relative to the barrel, and means associated with the piston head to furnish a continuous imperforate diaphragm adjacent to the closely fitting piston head, for definitely sealing one end of the barrel.

13. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means comprising combined diaphragm and piston members, said diaphragm having a portion thereof fixed relative to the pen barrel and a portion thereof reciprocable in frictional contact with the pen barrel interior.

14. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means comprising a hollow flexible tube having an open end and a closed end, the closed end being developed into a piston head closely fitting the barrel interior to furnish a pump action when reciprocated, and the open end being adapted for fixation relative to the pen barrel to provide a leak-proof closure for one end of the barrel so as to furnish a writing fluid reservoir, and means for reciprocating the piston head end of said tube.

15. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means comprising a hollow flexible tube having an open end and a closed end, the closed end being developed into a piston head closely fitting the barrel interior to furnish a pump action when reciprocated, and the open end being adapted for fixation relative to the pen barrel to provide a leak-proof closure for one end of the barrel so as to furnish a writing fluid reservoir, and means substantially embedded in the piston head, without extending through said head, for reciprocating the piston head end of said tube.

16. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means comprising a hollow flexible tube having an open end and a closed end, the closed end being developed into a piston head closely fitting the barrel interior to furnish a pump action when reciprocated, and the open end being adapted for fixation relative to the pen barrel to provide a leak-proof closure for one end of the barrel so as to furnish a writing fluid reservoir, means for reciprocating the piston head end of said tube, and a breather tube having connection at its one end with the ink feed member and having its other end disposed adjacent the limit of approach of the piston head toward said ink feed member.

17. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means comprising a hollow flexible tube having an open end and a closed end, the closed end being developed into a piston head closely fitting the barrel interior to furnish a pump action when reciprocated, and the open end being adapted for fixation relative to the pen barrel

to provide a leak-proof closure for one end of the barrel so as to furnish a writing fluid reservoir, means substantially embedded in the piston head, without extending through said head, for reciprocating the piston head end of said tube, and a breather tube having connection at its one end with the ink feed member and having its other end disposed adjacent the limit of approach of the piston head toward said ink feed member.

18. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping a writing fluid in the interior of the barrel, said means including a piston head mounted for reciprocation relative to the barrel, means associated with the piston head to positively expand said head upon movement of the head in one direction only of its reciprocatory movement, and a breather tube having connection at its one end with the ink feed member and having its other end disposed adjacent the limit of approach of the piston head toward said ink feed member.

19. In a fountain pen employing a tubular barrel with a writing point and ink feed member disposed at one end of said barrel, and means for exhausting air and admitting and trapping

a writing fluid in the interior of the barrel, said means comprising combined diaphragm and piston members, said diaphragm having a portion thereof fixed relative to the pen barrel and a portion thereof reciprocable in frictional contact with the pen barrel interior, and a breather tube having connection at its one end with the ink feed member and having its other end disposed adjacent the limit of approach of the piston head toward said ink feed member.

20. In a device of the class described the combination of a hollow pen body, a flexible elongated hollow diaphragm member, open at one end and closed at its other end, the diaphragm having a constriction adjacent its said closed end, whereby to provide a pocket at the closed end thereof, the open end of the diaphragm having peripheral connection with the pen body whereby the diaphragm divides the hollow interior of the pen body, and an actuating rod having an enlargement at its one end, said enlargement being disposed in said pocket, whereby the constriction in the diaphragm retains the enlargement in the pocket for operatively connecting the actuating rod and the closed end of the diaphragm.

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