Oct. 15, 1935. M. G. SYPHER 2,017,109

FOUNTAIN PEN

Filed Aug. 18, 1933

Fig. 7.

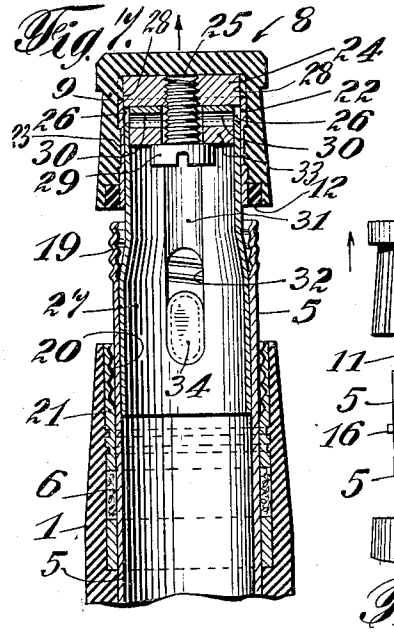


Fig. 2.

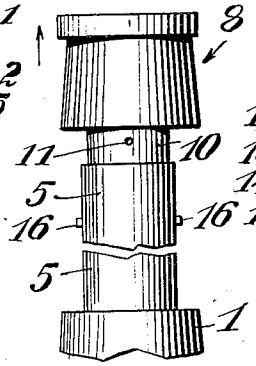


Fig. 1.

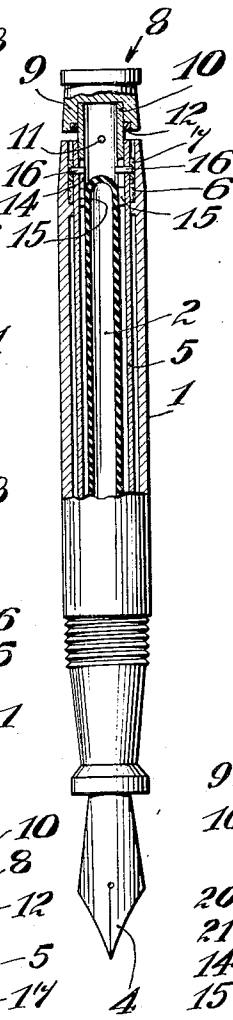


Fig. 5.

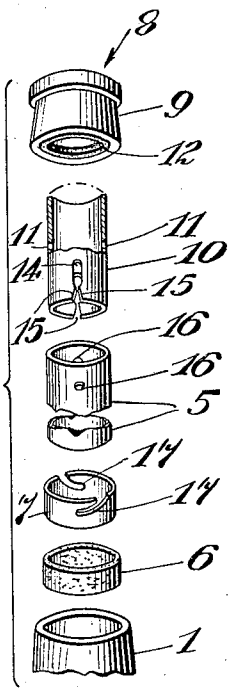


Fig. 3.

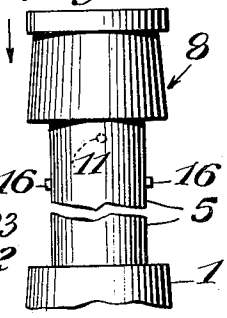


Fig. 8.

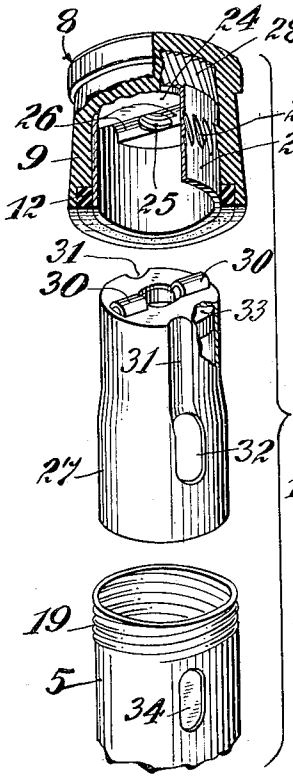


Fig. 4.

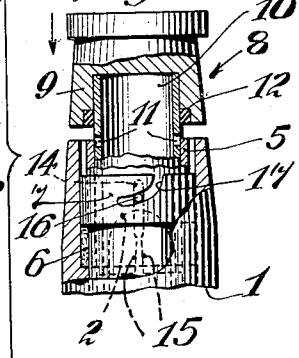
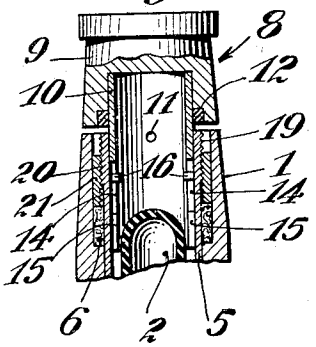


Fig. 6.



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UNITED STATES PATENT OFFICE

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FOUNTAIN PEN

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Application August 18, 1933, Serial No. 685,700
In Canada December 5, 1932

27 Claims. (Cl. 120—47)

The present invention relates, generally, to fountain pens, and more particularly to the class of self-filling pens which utilize air pressure for deflating the ink sac.

A popular type of self-filling pen utilizes the usual ink sac and a tube telescoping with the barrel of the pen. By moving the barrel and tube relative to each other, the air chamber about the ink sac is increased and decreased in size, depending upon whether the tube is withdrawn to its outward position or returned to closed position. An aperture in a cap closing the tube permits the pressure within the chamber about the ink sac to remain at atmospheric pressure while the tube is retracted. When the tube is returned to its closed position, the chamber about the ink sac decreases in size and, by closing the aperture with the finger, the pressure within the chamber increases and deflates or collapses the ink sac. The pen point is then placed into ink and the finger is removed from the aperture to restore atmospheric pressure. The ink sac, by reason of its elasticity, returns to its normal shape, drawing a quantity of ink therein to fill the pen. Difficulty has been encountered with this type of pen due to the fact that the operator fails, in some instances, to close the aperture completely, which permits the air to escape from the chamber about the ink sac and the pen does not fill because the ink sac is not properly deflated.

The present invention aims to provide an effective device for automatically opening the chamber about the ink sac to maintain atmospheric pressure when the tube is withdrawn, to increase the size of the air chamber about the ink sac. The invention also contemplates the provision of means adapted to automatically close the air chamber to increase the pressure while the tube is being returned and adapted to open the air chamber automatically to atmosphere when the parts are returned to their normal position, whereby atmospheric pressure in the chamber is restored and the ink sac is inflated to fill the pen. In this way, the pen will automatically fill itself when the tube is retracted and returned to its position. This simplifies the filling operation and makes it unnecessary to distribute detailed instructions as to how to operate the pens.

An object of the present invention is to provide an improved self-filling fountain pen.

Another object of the invention is to provide an improved self-filling pen, which utilizes air pressure for collapsing the ink sac.

Another object of the invention is to provide an inexpensive device for controlling the air pressure within the air chamber to simplify the filling operation.

Another object of the invention is to open the air chamber automatically to atmosphere when the chamber about the ink sac is enlarged.

Another object of the invention is to close the air chamber automatically about the ink sac while the chamber is being decreased in size.

Another object of the invention is to open the chamber to atmosphere when the parts are returned to their closed position, so that the ink sac may inflate and fill the pen.

Another object of the invention is to provide a single device for automatic venting of the air chamber when the tube is retracted, for automatically closing the chamber while the tube is being returned to its original position, and automatically venting the chamber when the tube is returned to its original position.

A further object of the invention is to provide an improved means for locking the parts in closed position and utilizing said means for retaining the packing within the pen.

Still another object of the invention is to utilize said locking means for venting the air chamber when the parts are returned to their closed position.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawing, forming a part of the specification, wherein

Fig. 1 is a fragmentary, sectional view illustrating an embodiment of the invention embodied in a fountain pen;

Fig. 2 is a fragmentary view of the upper end of the pen with the slidable tube in retracted position, the venting aperture being open;

Fig. 3 is a fragmentary view illustrating the inner tube being returned to its closed position, the venting aperture being closed;

Fig. 4 is a fragmentary view, partly in section, illustrating the parts substantially in closed position, with the venting aperture about to be opened by the locking operation;

Fig. 5 is an exploded view illustrating the parts about to be assembled;

Fig. 6 is a sectional view of a slightly different

form of the invention applied to a fountain pen;

Fig. 7 is a sectional view of the preferred embodiment of the invention; and

Fig. 8 is an exploded view illustrating the parts of the embodiment shown in Fig. 7.

Referring again to the drawing, and more particularly to Figs. 1 to 5 thereof, there is shown a fountain pen having a barrel 1, a deflatable sac 2 for containing ink adapted to be fed to the writing pen 4. A tube 5 is telescoped within the barrel, with packing 6 adapted to form a substantially fluid-tight joint between the barrel of the pen and the tube. The packing may be retained in position by means of a ring 7 or other suitable means frictionally or positively held within the barrel of the pen to fit slidably with the tube 5.

A cap 8 is provided to close the open end of the tube 5 so that the air chamber about the ink sac 2 may be increased in size, and subsequently decreased in size, to deflate the ink sac for filling the fountain pen. The cap 8 preferably comprises a molded upper part 9, into which is secured a gasket 12 adapted to fit against the upper end of the tube 5 (Fig. 3), and a tubular member 10 having apertures 11 therein. The lower end of the tubular part 10 preferably has a longitudinal slot 14 with a restricted opening 15, as shown more particularly in Fig. 5. The lower end of the opening is preferably flared to receive a pin 16, or other projection, formed on or attached to the tube 5. The pin 16, when pressed into the mouth of the slot 14, may be forced through the restricted opening 15 into the longitudinal slot 14 so that the cap 8 is securely attached to the tube 5 through a slidable connection. If desired, instead of providing a restricted opening 15, the portion of the member 10 below the slot 14 may be split longitudinally to facilitate entry of the projection 16. By reason of the length of the slot 14, it is possible to slide the tubular member 10 with respect to the tube 5.

The purpose of this sliding operation is to open and close the aperture 11 for automatically venting and closing the air chamber about the ink sac 2. Preferably, the tube 10 extends within the tube 5, and the projection 16 extends both on the interior and exterior of the tubular part 10. In the operation of the mechanism described above, the cap may be engaged to withdraw the tube 5 from the barrel 1. When the upper part 9 of the pen cap is pulled outwardly, the tubular part 10 slides outwardly from the tube 5 so that the gasket 12 is moved away from the end of the tube 5 and the aperture 11 is uncovered to vent the chamber to atmosphere (Fig. 2). Ordinarily, the fit between the member 10 and the tube 5 is sufficiently loose to permit entrance or escape of air; hence, the aperture 11 is not essential. As the cap is pulled outwardly, the pin 16 engages the bottom of the slot 14 so that the tube 5 is withdrawn. The air chamber about the ink sac may then be increased in size until, preferably, it is substantially twice its original size. A suitable stop may be provided at the lower end of the tube to prevent it from being completely withdrawn. When pressure is applied to the upper part of the cap 8 to return the parts to their closed position, the tubular member 10 will slide further into the tube 5 until the projection 16 engages the upper end of the slot 14 and the gasket 12 in the cap abuts against the upper end of the tube 5, which causes the aperture 11 to telescope into tube 5 and the tube 5 is closed by the gasket 12 and the cap 8, as shown in Fig. 3. This closes the chamber about the ink sac to atmosphere and compresses the air within the chamber as the chamber is reduced in size by the return of the tube 5 to its original position. The compression of the air within the chamber deflates the ink sac, expelling the ink therefrom. It now becomes necessary to restore atmospheric pressure to the chamber so that the ink sac will inflate and draw ink into the pen. This may be achieved by pulling upwardly on the upper part 9 of the pen cap to retract the tubular cap 8 from the end of tube 5, thereby exposing the aperture 11 and opening the chamber to atmosphere. If desired, an inclined slot 17 may be provided in the ring 7, which holds the packing in position. This inclined slot 17 is adapted to be engaged by the projection 16 on the tube 5 for locking the parts in position. The relative sizes of the parts are such that, when the cap 8 is turned or rotated to cause the projection 16 to lock with the slot 17, the cap 8 is drawn into locked position on the end of the barrel 1 or the tube 5, which automatically pulls the tube 5 away from the cap 8, causing the tube 10 to move upwardly to unseat the gasket 12, uncover the apertures 11, and vent the chamber about the ink sac to atmosphere. Venting the chamber to atmosphere permits the ink sac to inflate.

A slightly different form of the mechanism is shown in Fig. 6, wherein the projection 16 extends only on the interior of the tube to lock the cap in position, and a threaded portion 19 is provided on the exterior of the tube 5 to engage cooperating interior threads 20 on a member 21 secured to the barrel 1. The other parts of the pen correspond to those shown in Figs. 1 to 5. The operation of the pen is likewise the same, except for the fact that the cap 8 must be rotated more in order to space the gasket 12 from the end of the tube 5 and to uncover the aperture 11 to vent the pressure chamber. The continuous threads utilized herein lock the cap securely in position and prevent accidental withdrawal of the tube 5.

Another embodiment of the present invention is illustrated in Figs. 7 and 8, which is the preferred embodiment. This construction preferably comprises a cap 8 provided with a gasket 12 which may be held in position by a tubular member 22. Preferably, the member 22 is provided with knurls 23 adapted to facilitate securing the member 22 to the cap part. For example, the cap may be made of pyroxylin or other material adapted to shrink into engagement with the knurls. A circular member 24, having a threaded aperture 25 and grooves 26 therein is mounted in the cap to provide means for connecting a suitable tubular member 27 thereto by threading a screw 29 into the aperture 25. In order to secure the member 25 into the cap, knurls 28 are provided therein which are embedded in the cap material. If desired, an annular groove may be formed in the member 25 to provide a seat for the upper end of member 22. In this manner, the member 22 assists in holding the member 25 in the cap. A suitable rib 30 is provided in the upper end of member 27, which fits into the grooves 26 to prevent relative rotation between the cap 8 and the tubular member 27. The rib 30 and the upper end of member 27 may be reinforced by inserting a suitable washer 33 adapted to receive the screw 29. The lower end of member 27 is slidably connected to the tube 5 to facilitate venting and closing of the air chamber about the ink sac. To provide an improved and serviceable connection, longitudinal

grooves 31, terminating in slots 32, are formed in the member 27 and projections 34 are formed in the tube 5, which fit therein. The lower portion of member 27 is enlarged so that its fits snugly into the tube 5 and so that the lower ends of the slots engage the projections 34 to withdraw the tube 5 during the filling operation. Preferably, the tube 5 is provided with screw threads 19 which may be rolled therein and are adapted to cooperate with threads 20 on the member 21 secured within the barrel 1. If desired, recesses or grooves (Fig. 7) may be formed on the outer periphery of member 21 for molding, shrinking, or otherwise securing the barrel 1 about member 21.

In assembling the above described construction, the member 27 is inserted into the lower end of the tube 5 and is moved upwardly therein until the projections 34 fit into the recesses 32. The cap may then be secured thereto by the screw 29 to permit limited movement thereof with respect to the tube 5. In this manner, when the cap is pushed inwardly toward the barrel, the projections 34 slide in the recesses 31 until the gasket 12 engages the upper end of the tube 5 to close the air chamber. When the cap is withdrawn, the recesses 31 move with respect to the projections 34 until the lower ends of the slots 32 engage the projections and cause the tube 5 to be withdrawn. When the cap is pulled outwardly, the seal between the gasket 12 and the tube 5 is broken; the recesses 31 may provide venting apertures for restoring atmospheric pressure in the air chamber about the ink sac. The parts generally fit loosely and apertures are not necessary for venting the chamber but may assist in performing this function.

In the operation of the device, the cap 8 is retracted to the position shown in Fig. 2, during which the aperture 11 is uncovered to maintain atmospheric conditions within the chamber about the ink sac 2. The pen point 4 is then placed into an ink reservoir, and the cap 8 is pressed downwardly to return the parts to closed position. Downward pressure on the cap 8 causes the tube 19 to slide with respect to the tube 5, thereby moving the gasket 12 against the end of the tube 5 and closing the aperture 11. Further pressure on the cap 8 causes the tube 5 to slide within the barrel of the pen, reducing the size of the chamber about the ink sac. Reduction in the size of the chamber increases the pressure within the chamber because the venting aperture 11 is closed. When the parts have been returned substantially to their closed position, the ink sac is completely deflated and atmospheric pressure must be restored in the chamber to permit it to inflate and draw ink into the pen. This may be done by pulling up on the cap or by permitting the air pressure to raise the cap to break the seal between the gasket 12 and the tube 5 and to uncover the aperture 11. In the embodiments shown in Figs. 1 to 6, the air chamber automatically vents when the cap is screwed on the barrel. The tube 5 engages the screw means in the collar 7 in Fig. 4, or collar 21 in Fig. 6 and complete rotation of the cap to lock it in position pulls the tube 5 downward, which will slide the tube 5 with respect to the tube 19 to uncover the aperture 11 and to unseal the gasket 12 from the end of the tube 5. In this manner, the locking operation automatically vents the chamber about the ink sac to atmosphere and permits the pen to fill.

It will be seen that the present invention provides a very effective means for filling pens and the like. The filling operation may be accomplished by retracting the cap of the pen and returning it to its locked position, thereby eliminating any instructions to purchasers of the pens. The utilization of air pressure affords an effective deflation of the ink sac and permits a greater amount of ink to be drawn into the pen, with the same size of barrel. The several parts are simple in construction and may be readily assembled.

This case is a continuation in part of application Serial No. 585,192, filed January 7, 1932.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a fountain pen of the class described, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac whereby said air chamber may be enlarged by retracting one of said tubular members and may be reduced to its normal size by returning said tubular member to its original position, and means slidable with respect to one of said members for automatically venting said air chamber when one of said tubular members is retracted.

2. In a fountain pen of the class described, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac whereby said air chamber may be enlarged by retracting one of said tubular members and may be reduced to its normal size by returning said tubular member to its original position, and means movably attached to one of said tubular members and provided with an aperture for automatically venting said air chamber when the tube is retracted, said aperture being adapted to be closed when pressure is applied for returning the tube to its normal position.

3. In a device of the class described, the combination of a barrel, an ink sac within said barrel, a tube adapted to be telescoped within said barrel about said ink sac, a cap for said tube having a tubular portion adapted to telescope with said tube, and means for movably securing said tube and tubular portion together, said cap having a gasket therein adapted to abut against said tube to close said tube.

4. In a device of the class described, the combination of a barrel, a collapsible sac, a tube within said barrel for creating pressure in said sac, a packing intermediate said barrel and said tube, means secured to said barrel for holding said packing in position, and means operatively connected to said tube adapted to cooperate with said first means to lock said tube in position.

5. In a device of the class described, the combination of a barrel, a tube within said barrel having a cap attached thereto, a packing intermediate said barrel and said tube, means for holding said packing in position, and means associated with said tube and said cap adapted to cooperate with said holding means to lock said cap in its closed position.

6. In a device of the class described, the combination of a tubular member, a cap adapted to

fit upon said tubular member, said cap having a tubular portion with a slot therein, and a projection on said tubular member adapted to fit into said slot to hold said members together.

7. In a device of the class described, the combination of a tube adapted to telescope with the barrel of a pen, a cap adapted to fit upon said tube, a tubular portion on said cap adapted to telescope with said tube, said tubular portion having a slot with a restricted opening, and a proection on said tube adapted to be snapped into said slot to permit limited movement therebetween, one of said movable parts having venting means therein adapted to be opened and closed by said relative movement.

8. In a fountain pen, the combination of a barrel, an ink sac within said barrel, a tube adapted to be telescoped within said barrel about said ink sac, a cap for said tube having a tubular portion adapted to telescope with said tube, and means for slidably securing said tube and said tubular member together, said tubular portion having an aperture therein adapted to be opened and closed by said sliding movement.

9. In a fountain pen, the combination of a barrel, an ink sac in said barrel, a tube slidable within said barrel for varying the air pressure on said sac, and a second tube relatively slidable with respect to said first tube, one of said tubes having an aperture therein for controlling the pressure about said sac.

10. In a fountain pen, the combination of a barrel, an ink sac, a tube slidable with respect to said barrel to vary the air pressure within said barrel, and a cap portion secured to said tube and slidable with respect to said tube, said cap portion having an aperture therein for releasing the air pressure within said barrel.

11. In a fountain pen, the combination of a barrel, an ink sac, a tubular member adapted to be reciprocated with respect to said barrel, a second tubular member slidable with respect to said first tubular member, one of said tubular members having venting means therein, and a cap portion secured to said second tubular member for relatively moving said tubular members.

12. In a fountain pen, the combination of a tubular member, an ink sac within said member, a second tubular member telescoped within and slidable with respect to said first tubular member for varying the air space within said tubular members, and a cap secured to said second tubular member and slidable with respect thereto, said cap being provided with venting means for controlling the pressure of the air in the space within said tubular members.

13. In a device of the class described, the combination of a barrel, a collapsible sac in said barrel, a tube within said barrel for deflating said sac, and a cap attached to said tube having an aperture in the side wall thereof adapted to be closed by a portion of said tube.

14. In a fountain pen, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac, one of said members being stationary and the other movable, whereby said air chamber may be enlarged by retracting said movable member and may be reduced to its normal size by returning the movable member to its original position, and a substantially resilient sealing means adapted to close the chamber formed by said tubular members to atmosphere while said movable member is being returned to its closed position and to open said chamber to atmosphere at all times during the retraction of said retractible member to prevent the formation of a partial vacuum in the chamber.

15. In a fountain pen, the combination of a barrel, an ink sac within said barrel, a tube slidable with respect to said barrel, a cap having a tubular member mounted therein, said member being adapted to telescope with said tube, projecting means on said tube, and said tubular member having slots therein adapted to receive said projecting means and permit limited slidable movement thereof to make said aperture effective.

16. In a fountain pen, the combination of a barrel, an ink sac in said barrel, a tube slidable within said barrel for varying the air pressure on said sac, a second tube slidable with respect to said first tube, one of said tubes having an aperture therein for controlling the pressure about said sac, and means for locking said tubes against slidable movement with respect to the barrel.

17. In a fountain pen, the combination of a barrel, an ink sac in said barrel, a tube slidable within said barrel for varying the air pressure on said sac, a second tube slidable with respect to said first tube, one of said tubes having venting means therein for controlling the pressure about said sac, and means for locking said tubes against slidable movement with respect to the barrel, the operation of said locking means being adapted to operate said venting means to release air pressure about the sac.

18. In a fountain pen, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac, one of said members being stationary and the other movable, whereby said air chamber may be enlarged by retracting said movable member and may be reduced to its normal size by returning the movable member to its original position, and a sealing gasket adapted to be pressed against the end of one of said members to close the chamber formed by said tubular members to atmosphere while said movable member is being returned to its closed position.

19. In a fountain pen, the combination of a barrel, an ink sac, a tubular member adapted to be reciprocated with respect to said barrel, a second tubular member slidable with respect to said first tubular member, a sealing gasket mounted adjacent the end of one of said tubular members for closing the chamber formed by said tubular members to atmosphere, and a cap member secured to said second tubular member.

20. In a fountain pen, the combination of a rubber sac, a pair of telescoping barrels forming a chamber about said sac, and means slidably mounted on one of said barrels for automatically opening said chamber about the sac to atmosphere at the commencement of the retraction of one of said barrels for enlargement of the chamber.

21. In a fountain pen, the combination of an ink sac, a pair of telescoping barrels forming a chamber about said ink sac, and means slidably mounted on one of said barrels for automatically opening said chamber about the ink sac to atmosphere at the commencement of the retraction of one of said barrels for enlargement of the chamber, said means being adapted to automatically close said chamber to atmosphere at the commencement of and during the return stroke of said barrel to compress the air therein.

22. In a fountain pen, the combination of a pair of telescoping barrels adapted to provide a

chamber and means slidably attached to one of said barrels and movably associated with the other of said barrels to seal the chamber within said barrels to atmosphere when one of the barrels is moved in one direction with respect to the other barrel and to open the chamber to atmosphere when said barrel is moved in the opposite direction.

23. In a fountain pen, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac whereby the effective air space about said ink sac may be increased by retracting one of said members and may be reduced by returning said tubular member toward its original position, and means for automatically venting said chamber at the commencement of and during the retraction of said tubular member to prevent the formation of a partial vacuum in said chamber, said venting means being automatically ineffective during the return movement of said tubular member to create air pressure within the chamber for collapsing the ink sac.

24. In a fountain pen, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac, whereby said air chamber may be enlarged by retracting one of said tubular members and may be reduced to its normal size by returning said tubular member to its original position, and means slidable with respect to one of said tubular members for automatically connecting said chamber to atmosphere during substantially the entire retraction movement of said tubular member to prevent the formation of a partial vacuum therein.

25. In a fountain pen, the combination of an ink sac, a pair of telescoping tubular members adapted to form a chamber about said ink sac, whereby said air chamber may be enlarged by retracting one of said tubular members and may be reduced to its normal size by returning said tubular member to its original position, and means slidably mounted at the end of one of said tubular members for automatically connecting said chamber to atmosphere during substantially the entire retraction movement of said tubular member to prevent the formation of a partial vacuum therein, and for automatically closing said chamber to atmosphere during substantially the entire return stroke of said tubular member to create pressure within said chamber for deflating the ink sac.

26. In a fountain pen, the combination of a member adapted to be operated by air pressure, a pair of telescoping barrels adapted to provide a chamber about said member, and means slidably attached to one of said barrels and movably associated with the other of said barrels to seal the chamber about said member to atmosphere when the barrels are moved to compress the air in the chamber and to open the chamber to atmosphere when the barrels are moved in the opposite direction.

27. In a fountain pen, the combination of a member formed of resilient material adapted to be collapsed by air pressure, a pair of telescoping barrels adapted to form a chamber about said member, and a sealing member slidably attached to the end of one of said barrels and movably associated with said barrels to seal the chamber when the barrel is moved in the direction to collapse said member of resilient material and to open the chamber to relieve the air pressure and to permit said member to inflate and draw ink into the pen when the barrel is moved in the opposite direction.

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