Oct. 31, 1950 M. S. BAKER 2,528,327

FOUNTAIN PEN

Filed Nov. 8, 1945 3 Sheets-Sheet 1

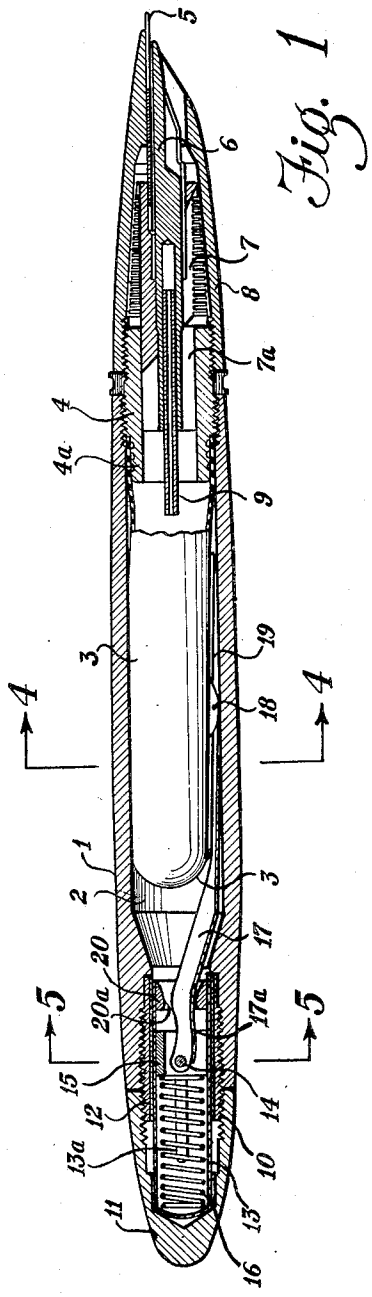

Fig. 1

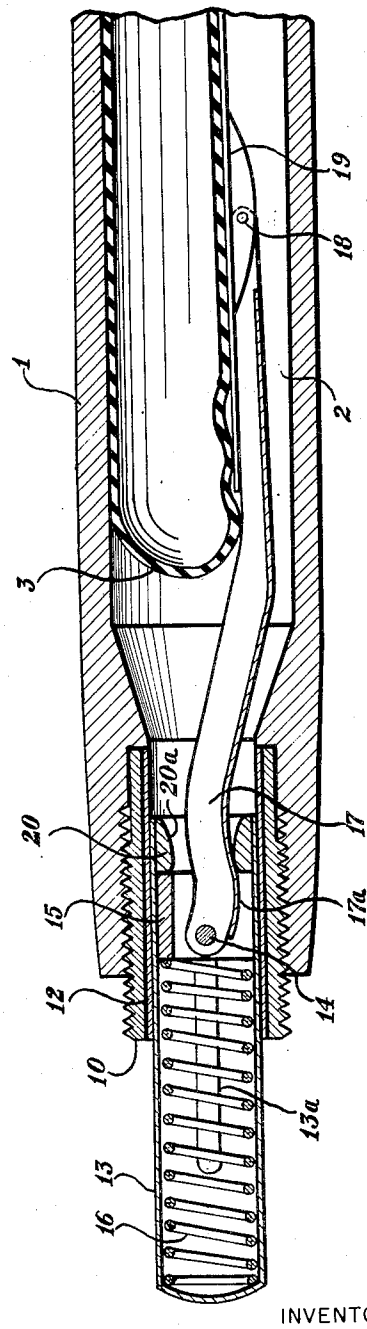

Fig. 2

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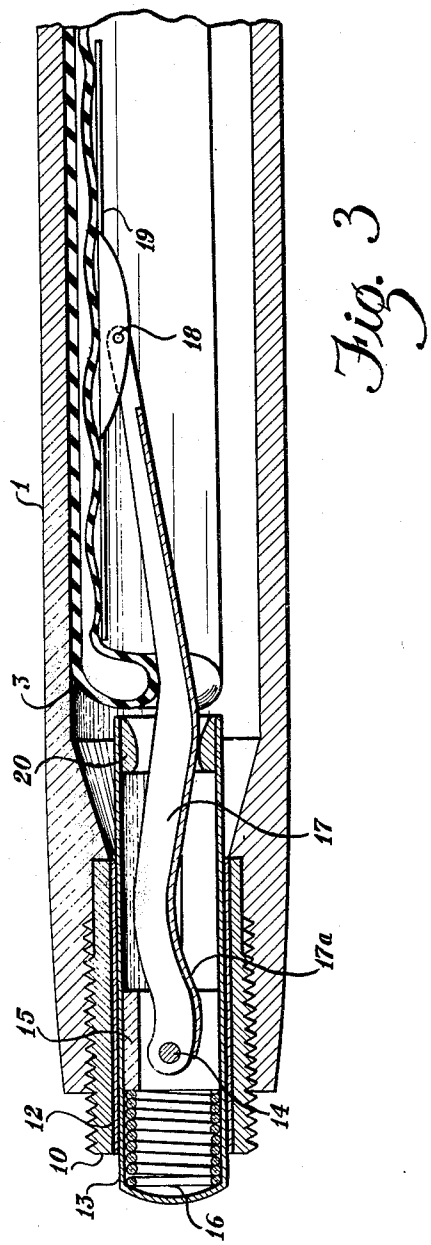

Fig. 3

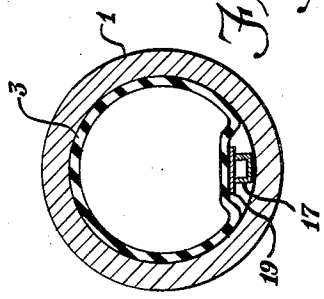

Fig. 4

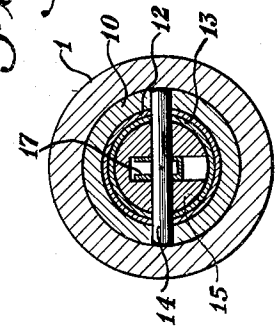

Fig. 5

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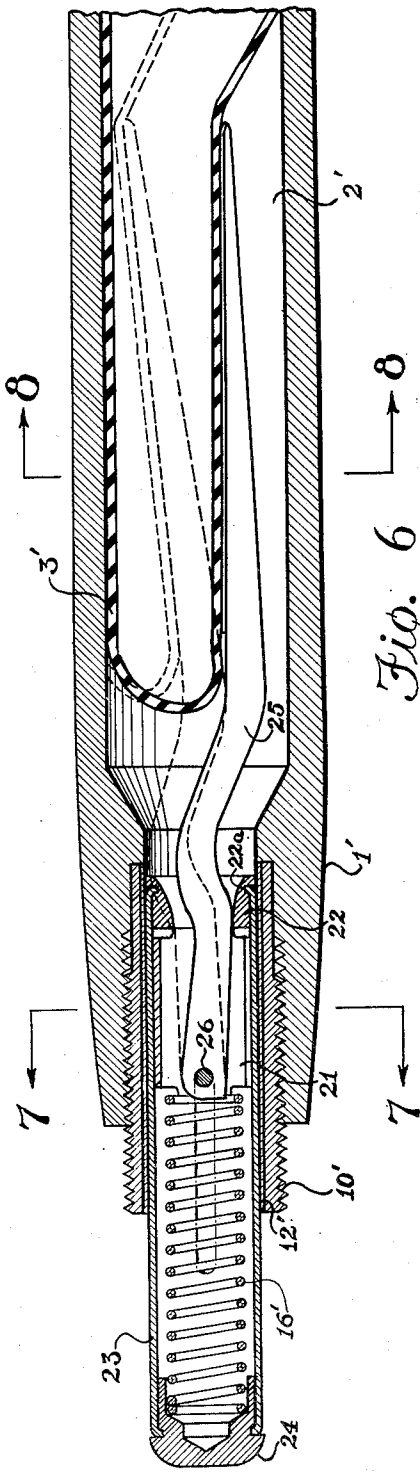

Fig. 6

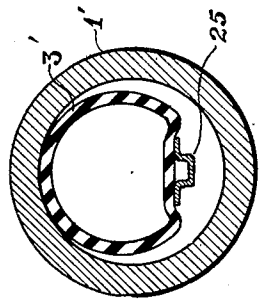

Fig. 8

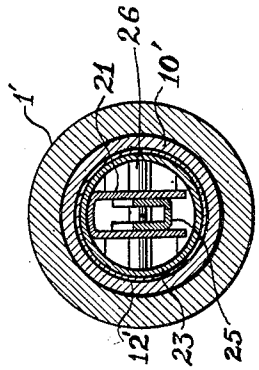

Fig. 7

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Patented Oct. 31, 1950 2,528,327

UNITED STATES PATENT OFFICE

2,528,327

FOUNTAIN PEN

Marlin S. Baker, Janesville, Wis., assignor to The Parker Pen Company, Janesville, Wis., a corporation of Wisconsin

Application November 8, 1945, Serial No. 627,440

8 Claims. (Cl. 120—46)

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My invention relates generally to fountain pens and it has to do particularly with fountain pens having feed means of the type including an overflow ink collector such as disclosed in my U. S. Letters Patent No. 2,223,541, issued December 3, 1940, and also having an ink reservoir in the form of the usual ink sac connected to the feed means.

In pens of the aforementioned type it is desirable that the overflow collector be substantially emptied following the completion of each filling operation so that it will be operative to intercept and retain any ink which may be expelled from the reservoir in excess of that required for writing purposes; and the principal object of my invention is to provide an improved mechanism for filling the ink sac or reservoir, which is effective automatically to clear the collector of ink upon the completion of each filling operation.

Another object is to provide means for clearing the overflow collector of the feed mechanism at the completion of the filling operation without special manipulation of any kind by the user.

Still another object is to provide an improved filling mechanism for a fountain pen of the type having an ink reservoir in the form of a collapsible, self-expanding sac member actuated by a reciprocable filling member normally covered by a cap member or the like removable to render such filling member accessible.

A further object is to provide filling mechanism for a fountain pen having an overflow ink collector and a sac-type reservoir and wherein the filling mechanism is given an additional actuation to completely expand the ink sac by applying the above-mentioned closure cap.

An additional object is to provide filling mechanism for a fountain pen of the foregoing character which is adapted at the end of the filling operation to hold the ink sac in a partially deflated condition, and which is so constructed that when the closure cap for the filling mechanism is applied the filling mechanism is automatically released for full expansion to withdraw ink from the feed mechanism.

Additional objects are to provide filling mechanism for fountain pens of the foregoing character which is effective to clear the collector without dependence upon the user's knowledge of correct filling procedure or upon the user's memory or any special manipulation which the user is apt to neglect to perform in the course of filling the pen; and to provide filling mechanism of the above-indicated character which is inexpensive to manufacture, is sturdy and unlikely

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to get out of order, and which is adapted to perform the filling operation in a substantially foolproof and highly efficient manner.

Other objects of my invention will become apparent as this description progresses and by reference to the drawings wherein:

Fig. 1 is a longitudinal sectional view of a fountain pen showing the filling mechanism in its normal state with the cap attached;

Fig. 2 is an enlarged longitudinal sectional view showing the components of the filling mechanism in the positions which they assume when the cap is detached and the push-button is allowed to retract to the fullest extent;

Fig. 3 is an enlarged longitudinal sectional view similar to Fig. 2 but showing the components of the filling mechanism in the positions which they assume when the pushbutton is fully depressed;

Fig. 4 is an enlarged transverse sectional view taken along the line 4—4 of Fig. 1;

Fig. 5 is an enlarged transverse sectional view taken along the line 5—5 of Fig. 1;

Fig. 6 is an enlarged longitudinal sectional view of the back end of a fountain pen, illustrating a modified version of the invention;

Fig. 7 is a transverse sectional view taken along line 7—7 of Fig. 6; and

Fig. 8 is a transverse sectional view taken along line 8—8 of Fig. 6.

As a new filling mechanism, broadly, my invention contemplates the combination with a collapsible, self-expanding sac-type ink reservoir of a pressure means engaging the sac laterally, and a pushbutton-operated cam which acts upon the pressure means to compress the sac. Preferably the pressure means comprises a lever arm pivoted at one end and having a cam-engaged surface which is so contoured that a forward movement of the cam is effective to rotate the lever arm about its pivotal center, thus causing the free end of the lever arm to compress the sac.

More specifically, and especially where the invention is to be employed in a fountain pen having an overflow collector which it is desired to clear following each filling operation, my new filling mechanism is so arranged that the sac is, in effect, not fully expanded by total release of the pushbutton but instead is held in a partially collapsed condition until the user re-attaches a cap to the barrel, which cap serves as a detachable cover for the otherwise exposed pushbutton and is effective, upon being re-attached to the barrel, to partially depress the pushbutton, to a predetermined extent, which partial depres-

sion causes the sac to expand from its partially collapsed condition and thereby draw ink from the collector into the reservoir after the pen has been withdrawn from the ink bottle. This end is achieved, according to the preferred practice of the invention, by so forming the cam-engaged lever arm surface that the sac is partially collapsed by the lever arm when the pushbutton is completely retracted but, as previously stated, is fully expanded when the pushbutton is held by the cap in a predetermined, partially depressed position—the contour or trend of said surface being further such that a complete depression of the pushbutton is effective to collapse the sac to the maximum extent to which it is intended to be collapsed.

The fountain pen illustrated comprises a barrel 1 formed generally of plastic material and having an internal chamber 2 for the reception of an ink reservoir in the form of a collapsible, self-expanding rubber sac 3. Threaded into the forward end of barrel 1 is a metal sleeve 4 having a backwardly extending neck 4*a* which is embraced by the open end of rubber sac 3. Sac 3 is preferably cemented to neck 4*a* so that the joint therebetween will be ink-tight. To the forward end of the barrel is connected a pin nib 5 and a feed means comprising a feed bar 6, an overflow collector 7, and a shell 8. The feed bar is supported in a bore of the collector and the latter has a shank 7*a* which is pressed into the bore of sleeve 4. Shell 8 is threaded onto sleeve 4 and forms a housing for the collector and a cover for the top of the pen nib except for the writing end thereof. A breather tube 9 is connected to the feed means and extends rearwardly into sac 3.

The feed structure to which reference has just been made is fully described in my aforementioned patent and, therefore, need not be again described here beyond mentioning that the collector 7 normally becomes filled with ink during the filling operation and must be at least partially cleared of ink at the completion of the filling operation in order that it may be conditioned to receive any ink which may be expelled from the reservoir in excess of that required for writing purposes.

Threaded into and projecting from the rear end of barrel 1 is a bushing 10 to which is detachably secured a cap 11. The bushing 10 may be of plastic material with a metal liner 12 which serves as a bearing surface for a tubular plunger 13, the rearward end of which projects from the barrel to form a manually operable pushbutton. A pin 14 extends laterally through plunger 13 and is anchored at both ends in bushing 10 (see Fig. 5), and said plunger is slotted longitudinally on two diametrically opposite sides as indicated at 13*a* to permit the plunger to move relatively to pin 14 longitudinally of the barrel. A sleeve 15 is held in place by pin 14 and serves as an abutment for one end of helical spring 16 which continuously urges plunger 13 rearwardly.

A lever arm 17 of U-shape cross-section extends lengthwise of the barrel and is pivoted near one end on pin 14 while its free end is pivotally connected at 18 to a pressure bar 19 which extends lengthwise along one side of sac 3 and serves as means for compressing said sac laterally when actuated by lever arm 17. The latter, together with pressure bar 19, may be referred to as a pressure bar unit.

An annular cam member 20, secured to and movable with plunger 13, has a curved bore 20*a* which bears upon and moves along the surface 17*a* of lever arm 17. Said surface 17*a* is non-rectilinear lengthwise and of such contour that with cap 11 in place lever arm 17 is fully released so that it exerts no pressure on sac 3 except that of its own weight and the weight of pressure bar 19. Thus, sac 3 is free to expand to the fullest extent possible when cap 11 is in place.

When cap 11 is detached, plunger 13 is retracted by spring 16 as illustrated in Fig. 2 and carries with it cam 20. Due to the contour of surface 17*a* the full backward movement of cam 20 causes lever arm 17 to be partially depressed, as a result of which sac 3 is partially collapsed. This is illustrated in Fig. 2.

Upon fully depressing plunger 13, as depicted in Fig. 3, cam 20 moves forward along surface 17*a* of lever arm 17 and thus causes it to be rotated about its pivotal center to such an extent that the pressure bar 19 is moved to collapse sac 3 to the maximum intended degree. This is not necessarily the maximum degree to which the sac is inherently susceptible of being collapsed but rather the maximum degree to which it is in fact collapsed by the structure shown.

The major part of the filling operation is accomplished by depressing and releasing the pushbutton or plunger 13 one or more times. Upon each release of plunger 13, and by reason of the contour of surface 17*a*, lever arm 17 moves from the position in which it is shown in Fig. 3 through that in which it is shown in Fig. 1 to the position in which it is shown in Fig. 2. This results first in a full expansion of sac 3 followed instantly by a partial collapse thereof and is functionally equivalent to allowing said sac to expand only to the partially extended state depicted in Fig. 2 without going through the fully expanded stage. In either case sac 3 is capable of further expansion after the ordinary pumping operation has been completed and this further expansion is accomplished by re-attaching cap 11 to the barrel—which re-attachment results in depressing plunger 13 to the position shown in Fig. 1. In doing this cam 20 is moved to such a position with respect to surface 17*a* that lever arm 17 is free to yield to the force of expansion exerted by the partially collapsed sac 3. Thus it will be seen that re-attaching cap 11 to the barrel causes sac 3 to attain its fully expanded condition, thereby producing an in-draft which, if the pen point has been removed from the ink bottle, as it should be, will draw all or at least a large part of the ink from collector 7.

As anyone skilled in the art will immediately understand, the contour of lever arm surface 17*a* is determined graphically in accordance with the practice which is always followed in laying out cams and it is a sufficient definition of the contour of this surface to prescribe the positions to be assumed by lever arm 17 when cam 20 and plunger 13 occupy the three positions illustrated in Figs. 1, 2 and 3, respectively.

In Figs. 6, 7 and 8 there is depicted another embodiment of the invention which is functionally identical with the structure already described, but differs therefrom in certain details which will be pointed out. In this case barrel 1', chamber 2', sac 3', bushing 10', liner 12' and spring 16' may be identical with corresponding unprimed parts of Figs. 1 to 5.

Sleeve 21 serves the same purposes as sleeve 15 of the previously described structure, but, instead of being cut from a solid bar, is formed

from sheet metal as a matter of volume production economy.

The annular cam member **22** is substantially identical with cam member **20** except for the provision of an annular external groove **22***a* into which is spun the forward edges of the tubular plunger member **23**, which latter is provided at its rear end with a closure button **24**.

Lever arm **25** is functionally identical with lever arm **17** but differs therefrom structurally in that its forward portion is formed to present a flat surface, as shown in Fig. 8, which bears directly on rubber sac **3**, and it is not provided with a pressure bar corresponding to pressure bar **19**. Said lever arm **25** is pivoted on a pin **26** corresponding to pin **14**. The surface of lever arm **25** which engages the bore of cam **22** is somewhat more sharply curved than the corresponding surface of the previously described structure, but this difference is only a matter of degree and is solely for the purpose of effecting an increased expansion of the sac in consequence of replacing the cap. The structure of Figs. 6 to 8, inclusive, is the one which has been tentatively adopted for commercial production and it has the advantage of being susceptible of more economical production than the structure first described.

I claim:

1. In a fountain pen having a barrel and a reservoir including a collapsible, self-expanding sac mounted in said barrel, the combination with said sac of filling mechanism including a pressure bar unit extending lengthwise of the barrel and pivoted at one end, the free end of said unit being movable about the pivotal center thereof to collapse said sac laterally, a plunger projecting out of the rear end of said barrel to form a manually operable pushbutton, a spring for retracting said plunger, and a cam carried by and movable with said plunger, said unit having a surface engaging said cam and formed with surface portions engageable respectively with said cam, as said plunger is moved from fully retracted position to fully depressed position, said surface portions being of different heights respectively and arranged to move said unit from a position partially collapsing said sac to a position permitting said sac to fully expand, when said plunger is in a predetermined, partially depressed position, and thence to a position collapsing said sac beyond said partially collapsed condition.

2. In a fountain pen having a barrel, a reservoir including a collapsible, self-expanding sac mounted in said barrel, a detachable cap for the rear end of said barrel, and ink feed means including an overflow collector, the combination with said sac of filling mechanism comprising a pressure bar unit pivoted at one end and having its free end engaging said sac laterally, a plunger projecting from the rear end of said barrel to form a pushbutton which is normally enclosed by said cap, and cam means operably interposed between said plunger and said unit and actuated by said plunger, said unit having surface portions engageable with said cam and dimensioned to effect different displacements of said unit respectively to move said unit into position partially collapsing said sac to a predetermined extent when said plunger is fully retracted, and into position permitting said sac to more fully expand when said plunger is moved to a predetermined, partially depressed position, and into position collapsing said sac to the maximum intended extent when said plunger is fully depressed respectively, said cap being engageable with said plunger when moved into its position on said barrel to move said plunger to the aforesaid predetermined, partially depressed position.

3. In a fountain pen having a barrel, a reservoir including a collapsible, self-expanding sac in said barrel, ink feed means including an overflow collector, and a detachable cap for the rear end of said barrel, the combination with said sac of filling mechanism comprising a pressure bar unit pivoted at one end and having its free end engaging said sac laterally, a plunger projecting from the rear end of said barrel to form a pushbutton which is normally enclosed by said cap, said unit being operable upon rotation in one direction about its pivotal center to collapse said sac, a cam engaging a surface of said unit and movable by said plunger to rotate said unit to collapse said sac, said surface having a high portion engageable with said cam, when said plunger is fully depressed to position said unit to collapse said sac to the maximum intended extent, a low portion engageable with said cam when said plunger is partially depressed to a predetermined extent to position said unit to permit said sac to expand to the fullest extent, and a portion of intermediate height engageable with said cam element when said plunger is fully retracted to position said unit to partially collapse said sac to a predetermined extent, said cap being engageable with said plunger upon movement into its position on said barrel to move said plunger to said predetermined partially depressed position.

4. In a fountain pen having a barrel, a reservoir including a collapsible, self-expanding sac in said barrel, and ink feed means including an overflow collector, the combination with said sac of filling mechanism comprising an elongate pressure bar unit disposed within and extending lengthwise of said barrel, said unit being pivoted near its rear end and having its free end engaging said sac laterally and movable about its pivotal center to collapse said sac, a plunger mounted in the rear end of said barrel and projecting rearwardly therefrom to form a pushbutton, a cam for actuating said unit, said cam being mounted within and movable lengthwise of said barrel by and with said plunger, a spring for retracting said plunger and cam, said unit having a surface engaging said cam and along which said cam rides in the course of its movements, the lengthwise contour of said surface being formed with a high portion engageable with said cam when said plunger is fully depressed to move said unit to a position collapsing said sac to the maximum intended extent, a portion of intermediate height engageable with said cam when said plunger is fully retracted to move said unit to a position partially collapsing said sac to a predetermined extent, and a low portion engageable with said cam when said plunger is partially depressed to a predetermined extent to position said unit to permit said sac to more fully expand, said cap being operative upon movement into its position on said barrel to move said plunger to said predetermined partially depressed position.

5. In a fountain pen having a barrel and a reservoir including a collapsible, self-expanding sac mounted in said barrel, the combination with said sac of filling mechanism including an elongate pivoted lever arm, the free end of which engages said sac laterally and is movable about the pivotal center of the lever arm to collapse said sac, a plunger mounted within and re-

ciprocable lengthwise of said barrel, a spring for retracting said plunger, and a cam driven by said plunger and adapted to actuate said lever arm, said cam and lever arm having surfaces positioned to slide on each other, one of said surfaces having a first portion of predetermined height for positioning said lever arm to permit maximum expansion of said sac when said plunger is partially depressed to a predetermined extent, a second portion of a different predetermined height for positioning said lever arm to collapse said sac to the maximum intended extent when said plunger is fully depressed, and a third portion of a predetermined height intermediate the heights of said other surfaces for positioning said lever arm to partially collapse said sac to a predetermined extent when said plunger is fully retracted.

6. In a fountain pen having a barrel and a reservoir including a collapsible, self-expanding sac mounted in said barrel, the combination with said sac of filling mechanism including an elongate pivoted arm, the free end of which engages said sac laterally and is movable about the pivotal center of the arm to collapse said sac, a plunger reciprocable lengthwise of said barrel, a spring for retracting said plunger, a cam driven by said plunger and adapted to actuate said arm, said cam and arm being formed with mutually contacting surfaces, one of which surfaces is formed with a portion of maximum height to pivot said arm to collapse said sac to the maximum intended extent when said plunger is fully depressed, a portion of intermediate height to pivot said arm to partially collapse said sac to a predetermined extent when said plunger is fully retracted, and a portion of minimum height to position said arm to permit said sac to expand to the maximum intended extent when said plunger is partially depressed to a predetermined extent, and a cap detachably connected to said barrel and normally forming an enclosure for said plunger, said cap being effective when fully attached to said barrel to hold said plunger depressed to the aforementioned predetermined extent.

7. In a fountain pen having a barrel, a reservoir including a collapsible, self-expanding sac mounted within said barrel, and ink feed means including an overflow collector, the combination with said sac of filling mechanism comprising a pressure bar unit pivoted at one end and having its free end engaging said sac laterally, a tubular plunger mounted within and reciprocable lengthwise of said barrel, spring means mounted within and operative to retract said plunger, and an annular cam carried by said plunger and receiving said bar unit therethrough to actuate said bar unit for compressing said sac, said cam

and said bar unit being formed with mutually engageable surfaces at least one of said surfaces having portions of different heights respectively to position said bar unit to collapse said sac to the maximum intended extent when said plunger is fully depressed, to position said bar unit to permit expansion of said sac to the maximum intended extent when said plunger is partially depressed to a predetermined extent, and to position said bar unit to partially collapse said sac to a predetermined extent when said plunger is fully retracted, and a cap adapted for removable attachment to the rear end of said barrel, said cap normally forming an enclosure for said plunger and effective, when fully attached to the barrel, to partially depress said plunger to the aforementioned predetermined extent.

8. In a fountain pen having a barrel and a reservoir including a collapsible, self-expanding sac mounted in said barrel, the combination with said sac of filling mechanism including an elongate, one-piece pivoted arm directly engaging said sac laterally throughout a substantial portion of its free length, said arm being movable about its pivotal center to collapse said sac, a plunger reciprocable lengthwise of said barrel, a spring for retracting said plunger, a cam driven by said plunger and adapted to actuate said arm, said cam and arm being formed with mutually engageable surfaces shaped to effect pivotal movement of said arm upon depression of said plunger, one of said surfaces including surface portions of different heights respectively effective when said plunger is fully depressed to position said cam to collapse said sac to the maximum intended extent, effective when said plunger is fully retracted to position said arm to partially collapse said sac, and effective when said plunger is partially depressed to a predetermined extent to position said arm to permit said sac to expand to the maximum intended extent, and a cap detachably connected to said barrel and normally forming an enclosure for said plunger, said cap being effective when fully attached to said barrel to hold said plunger depressed to the aforementioned predetermined extent.

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