Feb. 1, 1944. G. E. ZIEGLER 2,340,359

FOUNTAIN PEN

Filed Feb. 1, 1941

Fig. 1.

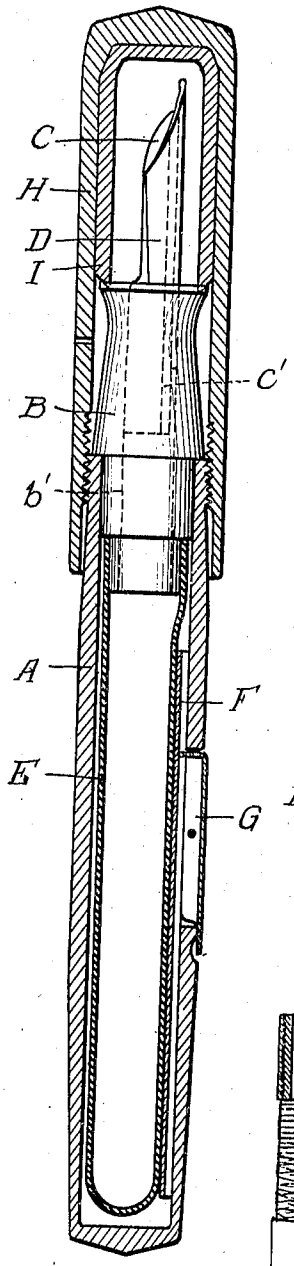


Fig. 2.

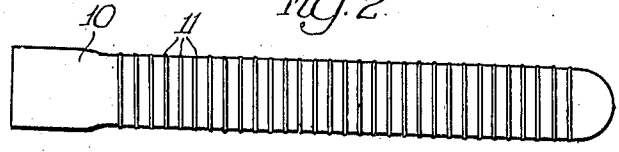


Fig. 3.

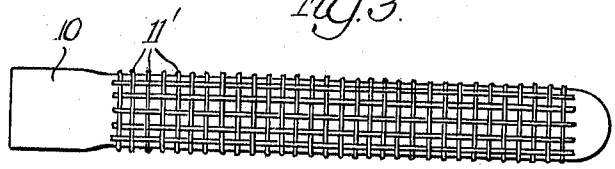


Fig. 4

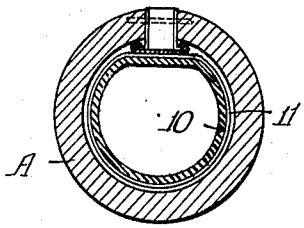


Fig. 5

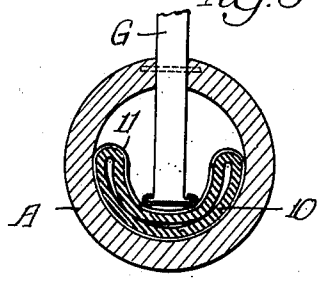


Fig. 6.

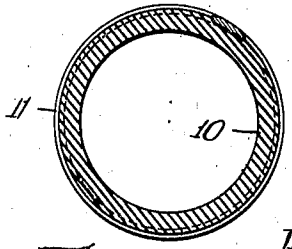


Fig. 7

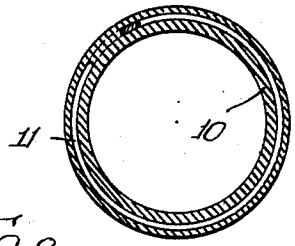


Fig. 9.

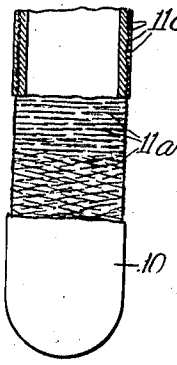
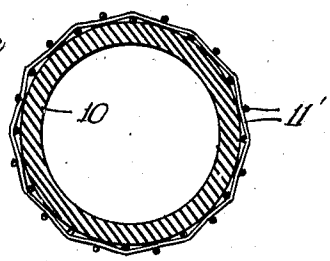


Fig. 8



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UNITED STATES PATENT OFFICE

2,340,359

FOUNTAIN PEN

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Application February 1, 1941, Serial No. 376,954

7 Claims. (Cl. 120—46)

This invention relates to fountain pens of the self-filling type wherein the ink reservoir includes an elastically compressible bulb or sac and operating means whereby the sac may be compressed or collapsed so that upon its return to its normal distended or reservoir form under its inherent elasticity, ink may be drawn into the reservoir. The invention resides primarily in a new and improved construction for the elastically compressible bulb or sac.

A general object of the invention is the provision of an improved elastically compressible sac structure for fountain pens and the like which will prevent dilation of the sac beyond its normal size under various conditions which are encountered in the use and carrying of a fountain pen.

Another object is the provision of such a construction which may be employed in various types of fountain pens of conventional construction without reducing the capacity of the bulb or sac or of the ink reservoir or the elastic compressibility or collapsibility of the sac or bulb, and which may be operated in the customary fashions by various well known means to accomplish the filling of the pen.

Other and further objects of the invention will be pointed out or indicated hereinafter or will be apparent to one skilled in the art from the following explanation or upon use of it in practice.

For the purpose of aiding in an explanation of the invention, I show in the accompanying drawing forming a part of this specification, and hereinafter describe, various forms in which it may be embodied. It is to be understood, however, that these are presented merely for purpose of illustration and are not to be construed in any fashion calculated to limit the appended claims short of the true and most comprehensive scope of the invention in the art.

In said drawing,

Fig. 1 is a longitudinal sectional view of one type of fountain pen of conventional construction;

Fig. 2 is a side view of a sac embodying the present invention in one form, same showing the sac in its normal or distended condition.

Fig. 3 is a side view of another form of sac embodying the invention and showing it in its normal or distended condition;

Fig. 4 is a cross-sectional view of a fountain pen embodying a sac of the form illustrated in Fig. 2 and showing same in its normal or distended condition;

Fig. 5 is a similar cross section showing the sac in a collapsed condition, as in the course of a filling operation;

Fig. 6 is a cross-sectional view of the sac shown in Fig. 2 but on a considerably larger scale;

Fig. 7 is a cross section of a sac embodying the invention but of further modified form;

Fig. 8 is a cross section, on a larger scale, of the sac shown in Fig. 3; and

Fig. 9 is an elevational view, partly broken away and partly in section, of a portion of a sac embodying the invention in a modified form.

As is well known in the art, there are various types of fountain pens which are equipped with self-filling means including an elastic sac or bulb of rubber or the like which in its normal distended condition is of tubular form so that it is adapted to contain or receive an appreciable quantity of fluid such as ink and/or air, but which may be collapsed by operation of mechanism of conventional type to expel its fluid contents. Under its inherent elasticity, it tends to assume its normal distended or tubular form. One type of such fountain pen is illustrated conventionally in Fig. 1, wherein the pen is shown with a hollow barrel A fitted at its lower or forward end with a pen section sleeve B, which carries the feed bar C and pen point D. Upon the reduced inner end portion of the pen section sleeve is secured an elastic sac E which occupies the cavity of the barrel and forms a reservoir for the ink, the cavity of said sac communicating with ink passages *b'* in the pen section sleeve and *c'* in the feed bar through which fluid may pass out of or into the sac. By means of a presser bar F and pivoted lever G the sac may be collapsed in the pen barrel to expel fluid through the aforesaid ink passages and, upon release from the restraint of the collapsing means, will assume its normal distended or tubular form and induce flow of fluid into it through said ink passages, under the external atmospheric pressure. The pen is equipped with a cap H adapted for attachment to the barrel to house the pen section, pen point and feed bar, as a means for protection when the pen is carried in the pocket, in a handbag or the like, and this cap is equipped with a portion I adapted to seat against the forward end of the section sleeve with a fluid-tight joint, so as to seal off the ink feed and air admission passages from access of air which is external to the cap.

The embodiments of the present invention which are illustrated in the other figures are adapted for use in a pen of this construction,

but it is to be understood that the invention is not limited to use in pens of that particular type or in ink sacs or bulbs of the various specific forms shown.

It has been found that under certain conditions which may occur in the use or carrying of fountain pens of the type illustrated in Fig. 1, as well as other types which include an elastic sac or bulb as part of the ink reservoir or filling means, leakage or expulsion of ink from the reservoir may be caused by changes in the atmospheric pressure to which the pen is subjected. Such changes are encountered when the pen is carried to different altitudes, and may be quite rapid, as when it is carried on an airplane. Starting at ground level, with the ink sac in its normal or distended condition and containing more or less ink, and the ink passages sealed off from external air by means of the cap, the decrease of external air pressure on the sac, which occurs with increase of altitude, produces an unbalance with respect to the pressure of such air as may be contained in the sac or confined in the cap ahead of the pen section sleeve B. This results in a dilation of the sac from its normal size and capacity and an increase of its air content, some of the air which is confined in the cap being drawn into the sac. As a consequence, when the normal air pressure is restored exteriorly of the sac, as when the pen is brought back to ground level, the sac will resume its normal size and capacity under its inherent elasticity, and if there is ink in the outlet passages of the feed section or ahead of any of the air in the sac, such ink will be forced out into the cap.

The present invention is designed to prevent such occurrences and the particular embodiments of it illustrated in the drawing will now be described.

In Figs. 2 and 6 is illustrated an ink sac 10, of normal size and form, made of a suitable flexible and elastic material such as rubber. The sac here shown is entirely closed excepting at its forward end, which is open and adapted for connection with the pen section sleeve in the customary manner. The sac is equipped with a shrouding which, in the form illustrated in said figures, is formed of one or more strands of filaments 11 wound about it. Such strand or filament is quite light and very flexible but substantially non-extensible longitudinally, and may be made of textile fiber such as linen, rayon, or the like. It is wound closely about the sac without producing any contraction or constriction thereof and is securely attached thereto in any suitable fashion effective to retain the turns of the strand in proper positions or distribution longitudinally of the sac. The turns may be in contact with one another, but it is preferable that they be spaced from one another by slight distances.

Rubber sacs of this character are customarily manufactured by dipping suitable mandrels into a solution of rubber or latex until a coating of proper thickness is built up on them and subjecting such coating to a proper cure. The shrouding may be applied to the partially completed sac on the mandrel, either before or after the curing treatment, and the sac then re-dipped one or more times and subjected to further curing to congeal and unite the coatings and thereby embed the strand in the rubber material. The shrouding may thus be left substantially on the surface of the sac, as illustrated in Figs. 2 and 6, or, by repeated dippings after it is applied, it may be completely incorporated in the sac, as illustrated in Fig. 7.

Another manner in which the shrouding may be associated with the sac is illustrated in Fig. 3. Here the shrouding is formed of a textile net tube 11′ which is very pliant and easily collapsible but non-expansible circumferentially beyond its normal size, and which encompasses the sac and fits it closely. It may be attached to the sac as above described or in any suitable fashion, or it may be retained thereon merely by its close frictional fit. Like the shrouding illustrated in Fig. 2, this tubular net shrouding is very light and soft and flexible so that while conforming closely to the sac, it will not interfere with or reduce its collapsibility or impede its return to its normal distended form under its inherent elasticity.

In Fig. 4 is shown a shrouded sac, like that of Fig. 2, in its normal distended condition within the pen barrel A, and in Fig. 5 is shown such a shrouded sac collapsed within the pen barrel, as in the filling operation.

In Fig. 9 is illustrated a further modified embodiment of the invention. In this figure the lower end portion of the sac is shown in elevation, the upper end portion in section, and the intermediate portion in broken-away condition.

In this modified construction the shrouding is formed of pliant fibers, such as of cotton or linen, embedded in the elastic sac material at or adjacent its surface. These fibers 11*a* are applied to the freshly dipped, partially completed sac after it has been built up to substantial thickness and before the final dipping, so that they will adhere to the tacky material. These fibers are applied in such fashion that they will extend, for the most part, in the circumferential direction of the sac, and in fairly uniform distribution. They may be applied so that all run approximately parallel in the circumferential direction, as illustrated in the upper part of the broken-away portion of Fig. 9, or they may be applied so that they extend generally in the circumferential direction but not all parallel with one another, so as to have overlapping or crossing relationships with one another, as illustrated in the lower part of the broken-away portion of the figure. After the fibers have thus been applied, the sac may be given a curing treatment, or the sac may be given further dipping so as to completely cover the fibers, and then cured. In the cured elastic material, the fibers are securely retained and bound together, so that they form, in the aggregate, a non-expansible shrouding, which may be of a felted character. While the structure is non-expansible radially, it remains properly flexible and radially collapsible, and retains its desired elasticity, so that the sac can perform its intended functions as an ink container or as a collapsible filling element in the pen.

It will be understood from the foregoing that a shrouded sac of the kind herein described retains the characteristics of the conventional fountain pen sac as to form and size, collapsibility and elasticity. However, it has the additional functional characteristic that it is non-expansible from its normal distended size by pressure within atmospheric range to an extent such as to increase appreciably its capacity. Consequently, it may be employed in fountain pens to accomplish the desired functions of a filler or reservoir sac or bulb but at the same time preclude expulsion of ink as a result of

changes of atmospheric pressure to which the pen may be subjected under contemplated conditions of use.

What I claim is:

1. In a fountain pen, an elastic tubular ink sac which assumes its normal distended form and size under its inherent elasticity and is collapsible radially and a flexible shrouding constraining it against circumferential dilation beyond its normal size but collapsible with it radially.

2. A filler element for a fountain pen comprising an elastic radially-collapsible tubular member which assumes its normal distended form and size under its inherent elasticity and a conformable flexible shrouding encompassing said tubular member and constraining it against circumferential dilation beyond its normal size.

3. A filler element for a fountain pen comprising a flexible elastic tubular member which assumes its normal distended form and size under its inherent elasticity and a flexible non-extensible strand wound about it and attached to it and constraining it against circumferential dilation beyond its normal size, said strand being conformable to the elastic tubular member in its collapsed condition.

4. A filler element for a fountain pen comprising a radially-collapsible elastic tubular member which assumes its normal distended form and size under its inherent elasticity and having a flexible shrouding embedded therein and constraining it against circumferential dilation beyond its normal size and conformable with it in its collapsed condition.

5. A filler element for a fountain pen comprising an elastic radially-collapsible tubular member which assumes its normal distended form and size under its inherent elasticity and a flexible tubular shrouding encompassing said tubular member and freely collapsible with it and constraining it against circumferential dilation beyond its normal size.

6. A filler element for a fountain pen comprising an elastic radially-collapsible normally tubular member having embedded therein pliant filaments which extend generally in the circumferential directions of said member and constrain it against circumferential dilation beyond its normal size yet permit it to be collapsed radially.

7. In a fountain pen having a barrel with an externally opening ink passage, the combination of means for enclosing the external opening of said passage, a filling device comprising a radially-collapsible tubular member operable to create suction through said passage, said tubular member being elastic and assuming its normal tubular form by virtue of its inherent elasticity, and flexible means for constraining said tubular member against circumferential dilation beyond its normal size by atmospheric pressure, said flexible means conforming with said tubular member in its movement to and from its collapsed and normal conditions.

GEORGE E. ZIEGLER.