July 27, 1943. F. P. MOORE 2,325,069

FOUNTAIN PEN

Filed March 2, 1942

Fig. 1.

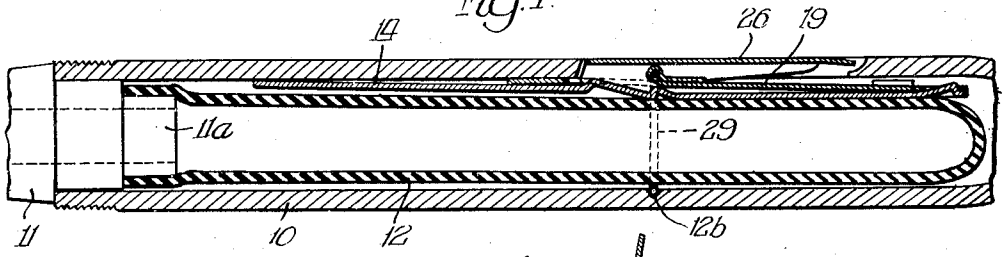


Fig. 2.

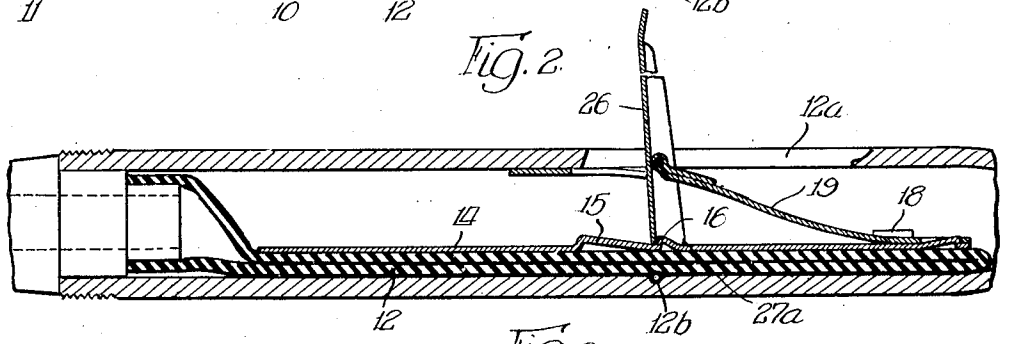


Fig. 3

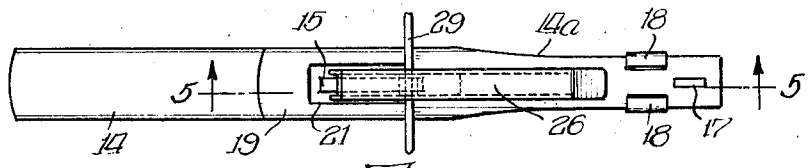


Fig. 4

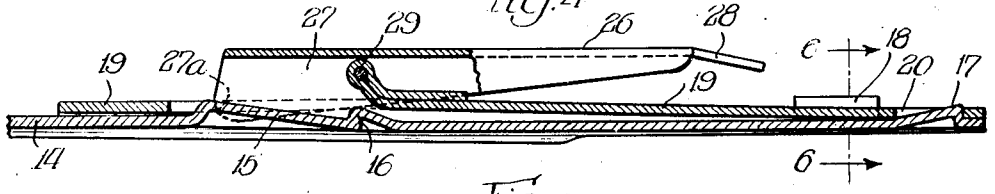


Fig. 5

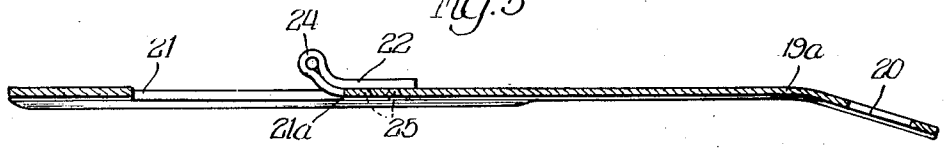
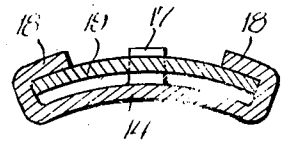


Fig. 6



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2,325,069

FOUNTAIN PEN

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Application March 2, 1942, Serial No. 432,914

15 Claims. (Cl. 120—46)

This invention relates to improvements in fountain pens and pertains particularly to filling mechanism of the type wherein a collapsible elastic tube or sac is used for the purpose of producing the filling suction.

A general purpose of the invention is to provide presser mechanism which is operable by means of a manually minipulated lever to compress the sac and in which all of the operating parts, including the lever, may be completely assembled in their proper relationship exteriorly of the pen barrel and mounted within it as a unit.

Another object is to provide such an operating mechanism which occupies but little space within the pen barrel and which, in its operation, does not subject the pen barrel to injurious stresses.

Another object is to provide such a mechanism which returns to its normal or inactive position quickly and completely by virtue of its own resiliency and does not depend in any degree upon the elastic sac to return it, and hence does not subject the elastic sac to any restraint in its expanding or ink-inducting action.

A particular object is the provision of such a mechanism which may be manufactured economically and in which the resilient parts which accomplish the return operation are effectively safeguarded against fatigue and crystallization.

Other and further objects and advantages of the invention will be pointed out or indicated hereinafter or will become apparent to one skilled in the art upon an understanding of the invention or its use in practice.

For the purpose of explaining the invention I show in the accompanying drawing forming a part of this specification, and hereinafter describe, one form in which it may be embodied. It is to be understood, however, that this is presented for purpose of illustration only and hence is not to be construed in any fashion for limiting the appended claims short of the true and most comprehensive scope of the invention in the art.

In the drawing,

Fig. 1 is a medial longitudinal section through a portion of a fountain pen barrel with a filling device embodying my invention installed therein, the parts being shown in their normal positions;

Fig. 2 is a similar section showing the parts in the positions which they occupy at the end of their sac-compressing operation;

Fig. 3 is a top view of the completely assembled sac-compressing mechanism in condition for insertion into the pen barrel;

Fig. 4 is a medial longitudinal section through a portion of the device illustrated in Fig. 3 and shown on considerably larger scale;

Fig. 5 is a longitudinal sectional view of the resilient leaf portion of the device, same being taken along a line corresponding to line 5—5 of Fig. 3 and showing the leaf in its completed condition prior to connection of it with other portions of the mechanism; and

Fig. 6 is a transverse sectional view on line 6—6 of Fig. 4 but on a considerably larger scale.

An understanding of the invention will be gained from the following description of the illustrative embodiments shown in the drawing.

The reference numeral 10 designates the pen barrel and 11 designates the pen section which is mounted in the forward end of the barrel and carries the pen point and the feed bar through which the ink flows into the reservoir in the filling operation and out of the reservoir in the writing operation. The pen section has a reduced annular portion 11*a* which extends into the barrel and about which the open end of the elastic tubular ink sac 12 is engaged. The parts so far referred to may be of conventional forms, and it is to be understood that the term "elastic sac" as used herein is meant to indicate a collapsible elastic tubular member which assumes its normal or expanded tubular form by virtue of its own inherent elasticity and which tubular member may be either open at both ends or open at only one end. For the mounting of the filling mechanism therein the barrel is provided with a longitudinally extending slot 12*a* through a wall portion thereof and with an internal groove or seat 12*b* opening into the bore of the barrel.

The filling mechanism comprises a presser bar 14 formed of thin material and having rigidity sufficient to prevent any material extent of bending under pressures adequate to collapse the sac. It is of sufficient width to span the greater portion of the width of the sac and preferably is arched or curved transversely for the purposes of giving it stiffness and conformity to the curve of the barrel bore. In its medial portion it has parts struck upwardly to form a narrow guide spline 15 and an abutment 16 and for a portion of its length extending from one end it is narrowed somewhat as indicated at 14*a*. Adjacent its narrower end, which I will refer to as the "anchor end," it is formed with a narrow upstanding lug 17, and inwardly from that lug it is formed with lateral ears which are

bent upwardly and then inwardly at a distance above its upper surface to form retaining elements 18. The lug 17 and retaining elements 18 constitute anchorage members, as hereinafter described. The mechanism also includes a spring leaf 19 formed of thin material having a high degree of resiliency or spring quality. The spring leaf is considerably shorter than the presser bar and may conform to it in width and marginal contour and is arched or curved transversely so as to conform to the curvature of the barrel bore. As seen in Fig. 5, which shows a longitudinal section of the spring leaf, its narrower end portion corresponding to the narrow end portion of the presser bar is deflected downwardly, as at 19a, and given a set in that form, and at a location corresponding to that of the lug 17, the leaf is provided with a medial slot 20 of size to accommodate the lug 17. At a short distance from its other or free end, the leaf is slotted out to form a medial aperture 21, and a narrow strip 22 of the severed material is left connected with the shank of the leaf and is bent upwardly out of the aperture 21 and doubled back upon itself to form a hinge eye 24 overlying the inner end portion of the aperture 21, the end portion of this strip being permanently fastened to the shank of the leaf, as by spot welds indicated at 25.

The mechanism includes also a filling lever 26 of proper size to be received within the lever slot 12a of the barrel. This lever is of channel form in cross section, having lateral flanges 27 which are rounded off at one end to form a camming nose for the lever, and at its other end the lever is provided with a tang portion 28 adapted for engagement by a fingernail. Toward the nose end the flanges 27 are pierced for reception of the mounting member 29 which is in the form of a slender spring ring of size to seat in the barrel groove 12b and a portion of which serves as a pintle for connecting the lever 26 to the leaf 19.

The spring leaf is assembled with the presser bar by placing it on top thereof, inserting its narrower or anchorage end under the retaining elements 18, and sliding it longitudinally on the presser bar toward the anchorage lug 17. In this operation the downwardly deflected portion of the spring leaf is elastically flexed upwardly so that the leaf is placed under spring tension as it is slid toward the anchorage lug, and as the longitudinal movement of the spring leaf is continued, its end rides up the sloping portion of the lug 17 and finally snaps down behind the lug when the slot 20 reaches a position to receive it. In this fashion the leaf is securely anchored to the presser bar and held in a tensioned condition against the anchorage elements 18, with the result that the presser bar is resiliently pressed or stressed upwardly toward the free end of the leaf. The lever 26 is assembled with the other parts of the mechanism by placing it astraddle of the strip 22 with its flange pierces in alignment with the pivot eye 24, and then inserting the mounting member or pivot ring 29 through the pierces and eye. The proportions of the several parts are such that the nose ends of the lever flanges pass through the aperture 21 of the leaf and engage the upper surface of the presser bar 14 at opposite sides of the guide spline 15, and because of the stressed condition of the spring leaf and the cantilever action which it exerts upon the presser bar, the latter is kept yieldably pressed against the nose end of the lever, thus tending to hold the lever in its swung-down position, as illustrated in Figs. 1 and 4.

The operating mechanism being thus completely assembled, it is inserted into the barrel 12 through the open end thereof, before the pen section and its attached sac are mounted in the barrel. By means of a suitable tool, the mechanism is moved as a unit longitudinally within the barrel until the lever enters the slot 12a, whereupon the spring ring snaps into the internal groove 12b. Thus the mechanism is assembled in the barrel in the relationship shown in Fig. 1, wherein a portion of the spring leaf 19 on the side of the pivot which is away from the anchorage end bears against the wall of the barrel bore, and the presser bar, leaf and lever are held in close overlying association upon one another. The pen section with the attached sac is then slid longitudinally into the barrel, the sac coming to a position such as indicated in Fig. 1 when the pen section reaches its seated position. When so assembled, the presser bar is held in its elevated position and the lever in its swung-down position by the continuously acting spring pressure of the tensioned leaf.

To operate the mechanism for the filling of the pen, the tang end of the lever 26 is engaged by a fingernail and swung outwardly, rotating on the mounting member 29. The nose end of the lever is thus swung inwardly and, riding on the surface of the presser bar, forces the latter downwardly against the elastic sac, thereby elastically collapsing the latter. The spring leaf 19 accommodates this movement by downward flexion incident to which it is elastically tensioned. This flexion of the leaf is distributed throughout almost its entire length, the portions under and beyond the anchorage elements 18 sharing in the flexion, said elements being the instrumentality whereby the flexing pressure is applied to the leaf. The extent of outward swinging movement of the lever 26 is limited by the abutment 16 and by the end margin 21a of the aperture 21, the abutment 16 affording a stop for engagement with the web of the lever and the margin 21a affording a stop for engagement by the margins of the lever flanges 27. It will be observed that the reaction stresses imparted to the lever pivot are carried to the barrel through the mounting member 29 in such fashion that they are not concentrated at localized points, thus safeguarding the barrel material against rupture by stresses from the pivot.

With the sac collapsed as above described and the parts in the positions illustrated in Fig. 2, wherein the lever is held in its outwardly swung position by the pressure of the leaf, the outer end of the pen section is immersed in ink and the lever is tripped by swinging it past the dead center position. Thereupon the stressed leaf draws the presser bar away from the sac with an instantaneous movement, at the same time snapping the lever down completely to its in-folded position. This completely relieves the sac of restraint from the presser bar and allows it to resume its normal expanded position freely, in which action it draws ink into the pen. It is to be observed that this mechanism may be employed in pens in which more than one stroke or operation of the filling mechanism is required to fill the reservoir, as well as in those in which the filling of the reservoir is accomplished with a single stroke. It will also be observed that the mechanism may be made very economically be-

cause of the relatively small amount of material required, the ease with which the parts may be assembled, and the facility of manufacture obtained by complete assembly of the mechanism exteriorly of the pen barrel and the mounting of it in the latter as a unit.

Important advantages are obtained by the fact that the construction permits the use of a spring leaf which is relatively short and of stiffness such as to effect instantaneous return of the parts to normal positions, but at the same time obtains an extensive distribution of the flexing tension throughout substantially the entire length of the leaf, thus avoiding excessive localized flexion which would be conducive to fatigue and crystallization of the material.

What I claim is:

1. Filling mechanism for a fountain pen having a tubular barrel comprising a presser bar, a spring leaf overlying the presser bar and connected at one end thereto, an operating lever hinged on the spring leaf and cooperating with the presser bar to flex the leaf and swing the presser bar away from it when the lever is swung to approximately perpendicular relationship to the bar, and a mounting member forming the hinge connection between said lever and leaf and having a portion for seating removably within the barrel bore, all said parts being insertable into and removable from the barrel in their assembled condition.

2. In a fountain pen having a hollow barrel portion, a filling mechanism comprising a presser bar extending longitudinally in the barrel bore, a spring leaf overlying the presser bar and connected at one end to it and having a portion adjacent its other end bearing against the bore wall of the barrel, and an operating lever hinged on the leaf at a distance from both ends thereof for cooperation with the bar to swing the unconnected portions of the bar and leaf apart against the spring pressure of the leaf.

3. In a sac presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf overlying the presser bar and connected at one end thereto, said spring leaf being provided with a slot adjacent its other end, and an operating lever overlying the leaf and hinged thereon adjacent said slot so that one end of said lever may be swung through said slot to press the presser bar away from the leaf.

4. In a sac presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf connected at one end thereto so as to overlie the bar and having a slot at a distance from its connection, and an operating lever overlying the leaf and hinged thereon with an end portion of the lever projecting through the slot therein, said leaf being tensioned relative to the bar to press them toward each other and hold the bar yieldably pressed against said end portion of the lever.

5. In a fountain pen having a tubular barrel, a filling mechanism comprising a relatively rigid presser bar extending longitudinally in the barrel bore, a relatively flexible spring leaf overlying said bar and connected at one end thereto, said leaf having an aperture therethrough at a distance from its connected end, an operating lever overlying the leaf with an end portion in position to be swung through said aperture to flex the leaf and a hinge ring seating in an internal seat in the barrel bore and forming a pintle connecting the lever and leaf in hinged relationship.

6. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf connected at one end to said bar so as to overlie the same closely, said leaf having an opening therethrough at a distance from its connected end and a portion forming a hinge eye adjacent said opening, and an operating lever overlying the leaf and hinged on said eye in position such that an end portion of the lever may be swung through said opening to press the bar away from the leaf and flex portions of the leaf away from the bar.

7. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf connected at one end to said bar so as to overlie the same closely, said leaf having an opening therethrough at a distance from its connected end and a portion forming a hinge eye located adjacent said opening and above the leaf, and an operating lever overlying the leaf and hinged on said eye in position such that an end portion of the lever may be swung through said opening to press the bar away from the leaf and flex portions of the leaf away from the bar.

8. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf connected at one end thereto so as to overlie the bar, said leaf being tensioned so as normally to press its other end toward the bar, and an operating lever overlying the leaf and hinged thereto in position to press portions of the bar away from the leaf when the lever is swung to angular positions relative thereto.

9. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf overlying the bar and having a portion arched relative to the bar in the longitudinal direction, a retaining element holding the arched portion of the leaf deflected toward the bar against the spring tension of the leaf, and an anchorage element retaining the leaf against withdrawal from the retaining element.

10. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf overlying the bar, a retaining element carried by the bar adjacent one of its ends and engaging a portion of the leaf to hold it close to the bar, and an anchorage member holding the leaf against withdrawal from the retaining member and bar.

11. A presser mechanism for fountain pens as specified in claim 10 and wherein the retaining element and anchorage element are arranged to permit the leaf to be retentively engaged with them by movement of the leaf longitudinally along the surface of the bar.

12. A presser mechanism for fountain pens as specified in claim 10 and wherein the leaf has a portion arched longitudinally of the bar and held in tensioned condition by the retaining element.

13. In a presser mechanism for fountain pens, a relatively rigid presser bar, a relatively flexible spring leaf overlying the bar and having a portion arched relative thereto in the longitudinal direction, an operating lever hinged on the leaf in overlying relationship thereto and having an end portion associated with the bar, and means connecting the leaf at one end to the bar and holding the leaf under tension relative to the bar with said end of the lever pressed against the latter.

14. An assembled presser mechanism unit for mounting a fountain pen, comprising a relatively rigid presser bar, a relatively flexible spring leaf overlying said bar and connected at one end

thereto, an operating lever overlying the leaf with an end in position for engagement with the underlying bar, and a spring ring encompassing the leaf and bar and forming a pintle connection between the leaf and lever upon which the lever may be swung to press the unconnected portions of the leaf and bar apart from each other against the spring tension of the leaf.

15. A presser mechanism for use in the tubular barrel of a fountain pen, comprising a relatively rigid presser bar, a relatively flexible spring leaf overlying the bar and connected at one end thereto, an operating lever overlying the leaf and hinged thereto at a distance from its connected end and having an end portion arranged for cooperation with the bar to press the unconnected portions of the bar and leaf apart from each other against the spring pressure of the leaf, the leaf extending for a substantial distance beyond the hinge connection of the lever, and means for maintaining the hinge connection of the lever and leaf in position in the pen barrel.

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