

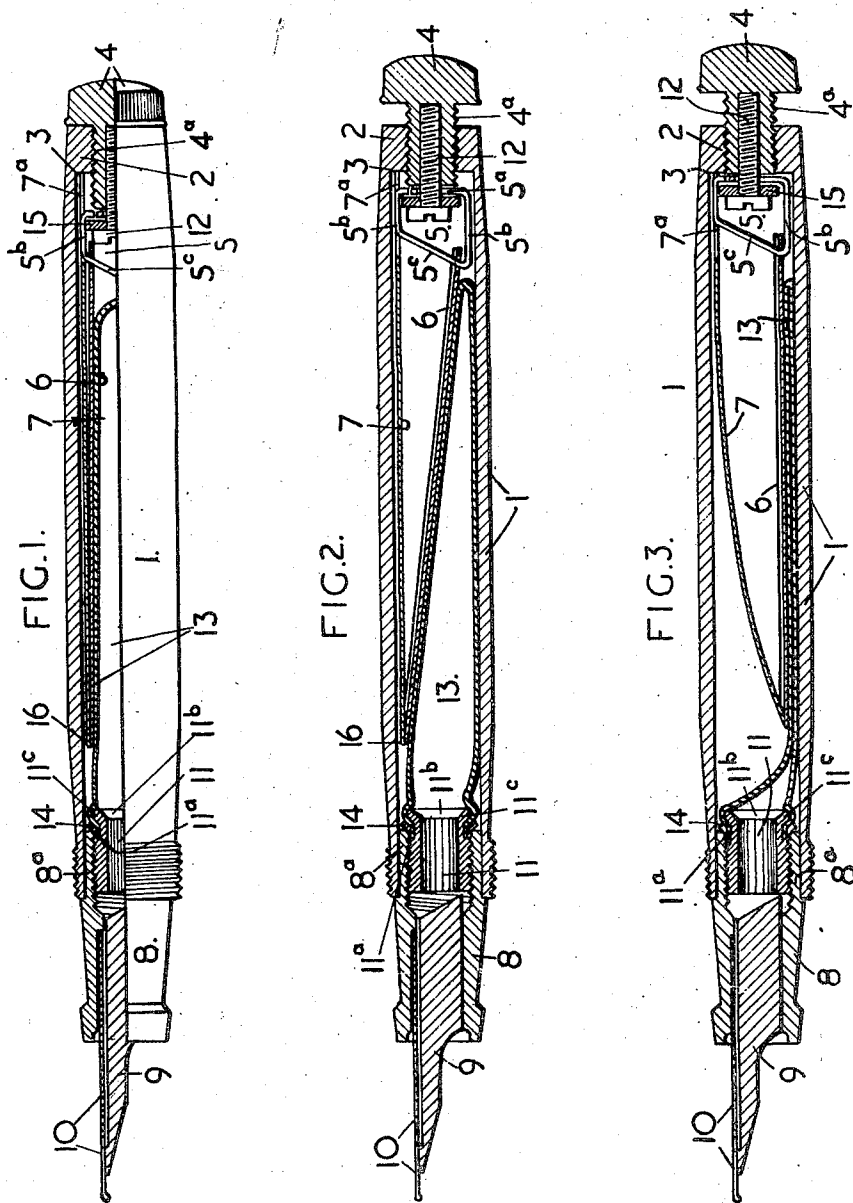
May 29, 1951

E. S. SEARS
FOUNTAIN PEN

2,554,641

Filed June 11, 1946

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

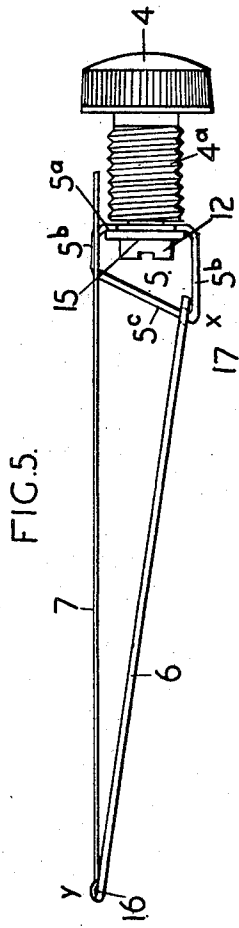


FIG. 5.

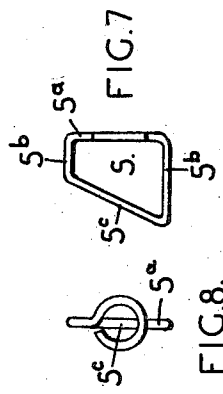


FIG. 7

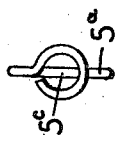


FIG. 8.

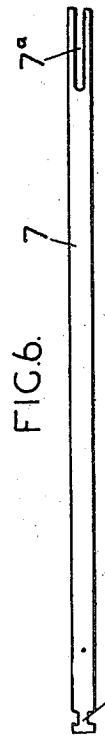


FIG. 6.

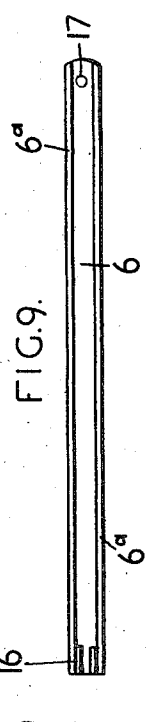


FIG. 9.

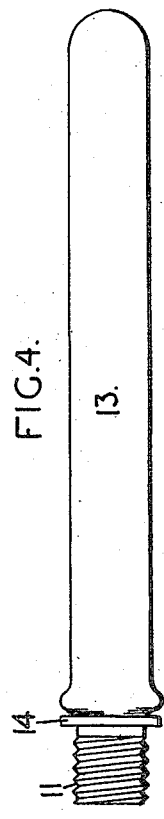


FIG. 4.

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UNITED STATES PATENT OFFICE

2,554,641

FOUNTAIN PEN

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Application June 11, 1946, Serial No. 675,904
In Great Britain June 15, 1945

6 Claims. (Cl. 120-46)

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This invention relates to sac self-filling fountain pens of the type in which actuation of the sac is effected from the rear of the barrel (i. e. the end of the barrel remote from the nib section) by the aid of a rotary knob or button.

Such back-actuated sac pens of arcuate spring type possess a common disadvantage—shared also by the conventional sac-collapsing lever located at a side of the barrel—in that, as the sac-deflating pressure is imposed on or about the middle of the pressure bar, complete evacuation of air from the sac is not feasible, as there is always a certain space within the sac in the vicinity of its closed end not occupied by ink.

A pen designed to obviate this defect is described in my prior British patent specification 390,585, in which compression of the sac commences at its closed end, the remainder of the sac being progressively impressed and deflated.

The present invention aims to improve a pen of the type described in my said prior British patent specification which enables economy in manufacture and an appreciable reduction in stresses and tension on the sac-actuating parts and sac, thereby prolonging the efficient working life of the pen.

A fountain pen, according to my invention is characterised in that there is included in the body bore a member of inclined or angular configuration which is operably associated with or carries a presser-plate and is also connected with a rotary knob, and a bar is situated at the back of said presser-plate and is movably associated therewith; the arrangement being such that, in a sac-filling operation: On unscrewing said knob, the presser-plate carrier is retracted thereby causing by the aid of a stop the engaging extremity of the presser-plate to move or slide along an inclined or angled part of its carrier and across the body bore to press against and so deflate the closed end of the sac: continuation of the unscrewing of the knob brings the back bar into operation, and said bar proceeds to carry the other end of the presser-plate i. e., the end nearest the nib, across the body bore to the opposite side, to complete the deflation of the sac. On screwing said knob back to its normal position, the movement of said presser-plate and back or tail bar are reversed and a charge of ink is induced into the sac.

According to my invention, actuation of the ink sac is effected through the retraction of said presser-plate carrier, the arrangement being such that, in a filling operation, on the unscrewing of the knob the adjacent end of the presser-

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plate is, through abutment of the nearby end of a back-bar connected in swivel or hinged fashion with the presser-plate with a shoulder or other appropriate stop situated at the rear end of the body bore, caused to slide down the inclined or angled part of its carrier from the short to the long side to deflate the closed end of the sac, sac deflation is completed through the consequential angular displacement of the back bar across the bore.

Also included in my invention is the substitution for the conventional step or shank on the nib holder for reception of the sac, of a threaded plug which is screwed to the nib holder, and wherein is formed a through passage providing direct communication of the sac with the feed; thus increasing the length of sac available for deflation.

The medium for returning the presser-plate and back or end bar across the body to normal may, be the sac itself. If the back-bar is in the form of a spring, expansion of the sac is assisted thereby but where the back-bar is rigid, it is returned solely by the sac.

Said presser-plate carrier may be of wire bent to form a trapezoid and including a loop where-through extends for attachment a screw, or the like, associated with the knob.

I will further describe my invention with the aid of the accompanying sheet of explanatory drawings which illustrate, by way of example and not of limitation, one mode of embodying same.

In said drawings—

Fig. 1 is a longitudinal view, partly in elevation and partly in section, of the pen prior to deflation of the sac.

Fig. 2 is a similar view showing the sac partially deflated, and

Fig. 3 is a view in which the sac is fully deflated.

Figs. 4 to 9, inclusive, drawn to a somewhat larger scale than Figs. 1 to 3 are detached views of certain of the component parts as follows: Fig. 4 is the sac with the plug holder; Fig. 5 is a unit assembly of presser-plate, back bar, presser-plate carrier and knob; Fig. 6 shows in plan the back-bar; Fig. 7 a side elevation of the presser-plate carrier; Fig. 8 an end elevation of the presser-plate carrier and Fig. 9 a plan view of the presser-plate.

In the several figures, like characters of reference denote like parts.

A pen body 1 is bored to suitable size for nearly its full length, a secondary bore 2 of smaller diameter being continued through the remainder: the shoulder 3 thus formed functions as a

stop to limit outward movement on unscrewing knob 4, as the rear portion 5a of a carrier 5 of a presser-plate 6 abuts against said shoulder 3 when knob 4 is unscrewed. Situated at the back of said presser-plate 6 is a back-bar 7. Said secondary bore 2 is screw-threaded, as shown, to freely receive the threaded part 4a of knob 4, and body 1 is threaded externally in known manner to receive a conventional cap closure.

The nib holder 8 may be of common design outwardly, with stepped portion or shank 8a corresponding to the size of, and fitting frictionally in, the main bore of body 1.

A bore is formed in said nib holder 8 for the accommodation of the feed 9 and nib 10 in known manner: this bore is enlarged at the opposite or shank end to a suitable depth and size, and is screw-threaded to freely receive a threaded plug 11. Said holder-bore enlargement 8a is countersunk, as shown, at the end remote from the nib 10 at a suitable angle.

The sac-actuating knob 4, which may be roughened or knurled, is made to conform with the outer shape of body 1 at the end remote from the nib, the stepped portion or shank 4a of the knob being threaded to correspond with the thread of the secondary bore 2 of body 1 in which it should move freely: said externally threaded portion 4a of knob 4 is bored and internally threaded to receive a carrier-screw 12.

Feed 9 may be of common form and of suitable size and length, but an angle or slope—as shown—may be cut at the end which abuts against said threaded-plug 11 to allow free flow of the ink to nib 10. Said plug 11 is suitably through-bored, and one or more longitudinal channels may be cut in its interior wall to facilitate ink flow: a portion of plug 11 is threaded externally for free attachment in the nib holder 8. An outwardly sloping portion 11c of plug 11 forms a continuation of its recess 11a at an angle corresponding to that in the nib holder, and a countersink 11b at a corresponding angle may be made in the upper side of this enlarged part of the plug to facilitate ink flow from sac 13.

A washer 14 of suitable thickness and preferably of "plastic" material surrounds the open end of sac 13, and is of sufficient pliability to be readily adaptable to seat and adapt itself to the aforementioned angles of nib carrier 9 and enlarged portion of plug 11.

Said presser-plate carrier is one convenient construction, and as illustrated, may be formed from a single length of wire of suitable diameter and sufficiently malleable for shaping, and preferably protected by plating or the like; its configuration approximates a trapezoid with top or looped portion 5a at right angles with the two sides 5b, one side being shorter than its opposite: the bottom member 5c forms a slope or angle towards the nib point. The top 5a or part of the carrier adjacent the threaded end of knob 4 is looped at its centre; or, in other words, one end of the length of wire is looped to freely receive said headed carrier-screw 12 secured in knob 4. The carrier is then shaped to the desired form, the free end of the wire of which it is composed finishing on the opposite side of the loop; and, in a preferred formation, this latter end is left unattached as it may be found that attachment is not essential with the incorporation of a screw washer 15. This free end of the carrier makes for ease of assembly with regard to presser-plate 6, and also allows for a certain amount of adaptation, as the carrier should, preferably, be a slid-

ing fit in the bore of the body to obviate fouling or undue gripping on the wall of the bore, whilst being to a certain extent adaptable to the size of the bore.

The presser-plate 6 may be of known form in so far as the usual narrow ribs 6a (Fig. 9) longitudinally and at right angles with its face are concerned, and may be a separate unit; or both plate 6 and back-bar 7 may be formed from one strip of metal by turning the strip completely back on itself at a suitable point at the nib end. In a preferred arrangement, however, the presser-plate and back-bar are, as illustrated, separate units, the presser-plate being connected to the back-bar at 16, the end nearest the nib point: the opposite end of the presser plate i. e. the end remote from the nib is drilled through at 17 (Fig. 9) and is adapted for slidable connection with the sloping or angled part 5c of the plate carrier 5.

Said back-bar 7 is made from suitable metal; spring steel may be used, but experiment indicates that mild steel is quite satisfactory, as very little strain or tension is placed upon it. In a preferred embodiment, said back-bar is a metal strip slightly narrower than the width between the ribs 6a of the presser-plate 6, and in the recess formed by said ribs the back-bar is positioned when inactive. The end of the back-bar nearest the nib is adapted in any suitable manner for swivel attachment to the presser-plate 6: swivel attachment is preferred in furtherance of my object to relieve stress or strain on the "movement" when operative.

The opposite end of back-bar 7, i. e., the end adjacent said shoulder 3 of the secondary bore 2 of the body, extends beyond the corresponding end of presser-plate 6 for a suitable distance to a position slightly short of or not quite abutting against the shoulder. In this end of the back-bar 7 is cut a longitudinal slot 7a sufficiently wide to accommodate freely the short side 5b of the plate-carrier, the length of said slot 7a preferably corresponding with a certain tolerance in excess of the distance covered between the operative and inoperative positions of the plate-carrier 5 and knob 4 and vice versa; or, in other words, the distance required in operation for complete sac deflation. This slot 7a of the back-bar 7 serves as a guide for the presser-plate carrier and, during operation, the back-bar abuts against said shoulder 3 in the bore 2 of the body, thus preventing any tendency for the "movement" to turn. The sac 13 itself also assists in holding the "movement" in positions required. The arrangement just described obviates necessity for the expensive processes of slot cutting, et cetera, in the wall of the body bore.

Said carrier screw 12 is, preferably, of metal of suitable size and common form: its thread should be the opposite to the external thread, and corresponding to the internal thread of the knob extension 4a. The head of the screw 12 projects from the knob extension 4a so as to leave a space therebetween which should correspond with the combined thickness of the presser-plate carrier wire and screw washer 15, plus a slight tolerance to permit of free rotation. The end of the thread at the junction of the shank should be sufficient to act as a stop to limit the extent to which the screw 12 is fixable in knob 4.

Alternatively, the attachment of the carrier to the knob may be formed, with the necessary limits, by a bore of definite depth in the knob 4 and a screw 12 of a definite length, the end of the

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bore in the knob 4 functioning as a stop to limit the distance the screw is inserted. Or, the connection may be in the shape of a split presser-stud of known form, the bore in the knob 4 being adapted to accommodate this type of attachment.

Said washer 15 may be of common ring type, the outside diameter corresponding to the width across the inside of the two sides 5b of the presser-plate carrier, or, preferably, slightly less. In this position said washer serves to prevent fouling between the head of screw 12 and the loop of the presser-plate carrier in known manner, but its more important function is to support the free end of the presser-plate carrier and obviate necessity for attachment of the free end to the loop. This arrangement has been proved by experiment to be more than sufficient to withstand stress during the operation of sac filling, and simplifies manufacture and assembly. The concentric hole in washer 15, which is preferably of metal, should be of a diameter which allows free rotation of carrier screw 12. In a pen filling operation, on the unscrewing of knob 4, and consequential retraction of presser-plate carrier 5, the adjacent end of presser plate 6 is caused to move down the inclined carrier component 5c—i. e. from the short to the long side—and proceed by its lateral movement across the body bore to compress the sac 13 from its closed end by engagement of the back bar 7 with shoulder 3, or other appropriate stop; then back bar 7 associated at 16 with presser-plate 6 is brought across the body bore to complete the sac's deflation preparatory to the induction of an ink charge, as hereinbefore described, and resumption of the parts to position as before actuation.

Assuming that the end of the presser-plate 6 attached to its angled carrier is X and the opposite end is Y, the complete movement would be X—Y on the outward travel of knob 4, and Y—X on the return movement of the knob, thus achieving a natural movement of sac deflation and inflation.

It is to be understood apart from the effect of slight tolerances necessarily provided for in the assembly of the fountain pen parts—said presser-plate 6 at no time rides along the sac 13, as the angle of the plate carrier corresponds with the distance covered by knob 4 during a filling operation: in short, the presser-plate 6 moves across the body bore in a direct line as stated X—Y, Y—X.

In said X—Y, Y—X movements, the Y travel across the body bore is approximately two and a half times faster than that of X along the angle 5a of the plate carrier. This is an advantage in ink filling as the sac is almost completely filled by the time knob 4 is screwed home, thus rendering almost unnecessary the customary pause essential with sac self-filling pens of conventional construction before removing the pen from the ink.

It will be obvious to those skilled in the art that various constructions on the basis of this invention may be made to achieve the same object.

What I claim as my invention and desire to secure by Letters Patent is:

1. A sac self-filling fountain pen comprising in combination a body having a bore therein, a pen nib, ink feed means, a knob closing one end of said body, a collapsible ink sac arranged within the bore of said body, a presser-plate extending longitudinally over said ink sac, a

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presser-plate carrier of trapezoidal form having a slidable connection with the end of said presser-plate remote from the nib and adapted to guide said presser-plate in a laterally traveling movement across the bore of said body, a back-bar having one end extending freely within the bore of said body, means for connecting the free end of said back-bar to the end of said presser-plate near the nib and means for manually moving said presser-plate carrier longitudinally within the bore of said body to cause said presser-plate to be moved laterally of the bore of said body and compress said ink sac from its closed end towards its open or ink ejecting end.

2. A sac self-filling fountain pen comprising in combination, a body having a bore therein, a pen nib, ink feed means, a knob closing one end of said body, a collapsible ink sac arranged within the bore of said body, a presser-plate extending longitudinally over said ink sac, a carrier of trapezoidal form arranged within the bore of said body, means for slidably connecting the extending end of said presser-plate remote from the nib to said carrier, said carrier being adapted for guiding said presser-plate in a laterally traveling movement across the bore of said body, a back-bar, means for connecting one end of said back-bar to the end of said presser-plate near the nib, a slotted connection between the opposite end of said back-bar and said carrier, and means for retracting said carrier in order to collapse said ink sac from its closed end towards its open end.

3. A sac self-filling fountain pen comprising in combination a body with a bore therein, a nib-pen and feed bar holder seated within an end of said body, a collapsible ink sac, a threaded plug secured to the open end of said ink sac and having detachable connection with said holder, a manually rotatable body closure knob, a threaded shank extending from said knob within said body, a presser-plate carrier of trapezoidal form, means for connecting said presser-plate carrier with threaded shank so that, upon rotation of said knob, said carrier will be caused to travel longitudinally within the bore of said body, and ink sac collapsing means arranged within the bore of said body and extending longitudinally over said ink sac comprising a presser-plate slidably connected at its end remote from the nib to an inclined part of the trapezoidal carrier and a back bar having one end hingedly secured to the other end of said presser plate and its other end having a slotted connection with said carrier, and whereby said ink sac will be collapsed from its closed end towards the threaded plug secured in the opened end thereof.

4. A sac self-filling fountain pen as claimed in claim 3, in which a presser-plate carrier is of wire bent to form a trapezoid and including a loop wherethrough extends for attachment a component associated with the knob.

5. A sac self-filling fountain pen as claimed in claim 3, in which a back-bar freely engages the presser-plate carrier, for the purpose specified.

6. A sac self-filling fountain pen, comprising in combination, a body with a bore therein having a reduced diameter at one end, a nib-pen and feed bar holder fitted within one end of said body, a collapsible ink sac, a screw-threaded plug secured to the open end of said ink sac and having detachable connection with said holder, a manually rotatable knob having a threaded shank screwed into the end of said body remote

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from the nib and at the end said bore having a reduced diameter, a presser-plate carrier of trapezoidal form, means for connecting said presser-plate carrier with said threaded shank of the rotatable knob so that rotation of said knob will cause said carrier to travel longitudinally within the bore of said body, ink sac collapsing means consisting of a presser-plate disposed longitudinally of said body bore over the ink sac and one end of said presser-plate being slidably connected with an inclined part of said trapezoidal carrier, a stop formed by the reduction in diameter of said body bore at the knob end of said body, a back bar disposed longitudinally within said body bore over the ink sac and having its end nearest the nib pen connected in swivel fashion with the end of said presser-plate remote from its connection with said trapezoidal carrier, and the other end of said back bar having a slotted connection with

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said trapezoidal carrier to permit of its abutment with said stop, the arrangement being such that said sac may be collapsed progressively from its closed end inwards to the ink ejecting end.

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