Feb. 21, 1939.

B. W. HANLE

2,148,236

FOUNTAIN PEN

Filed May 23, 1936

Fig. 1.

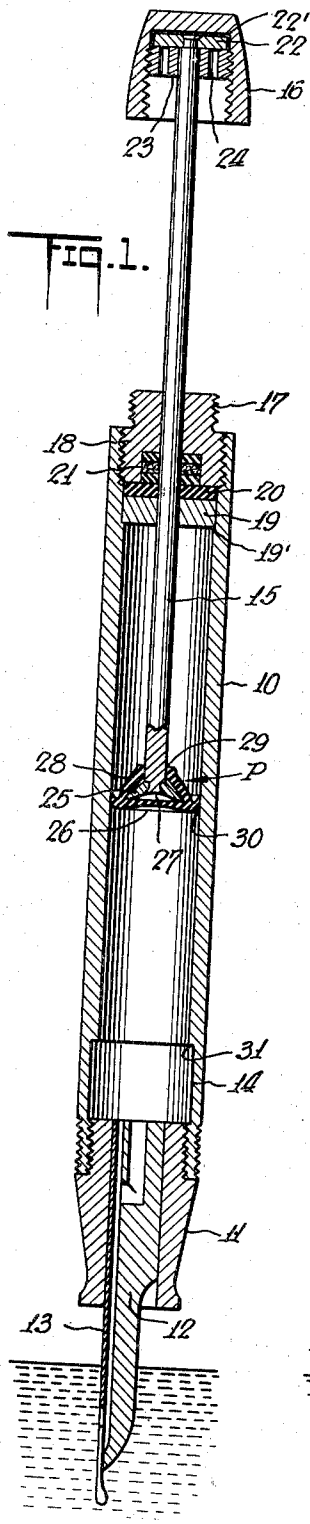


Fig. 2.

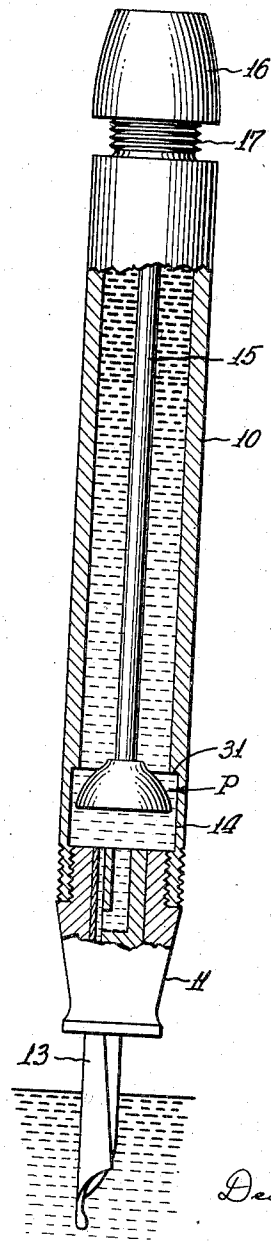


Fig. 3.

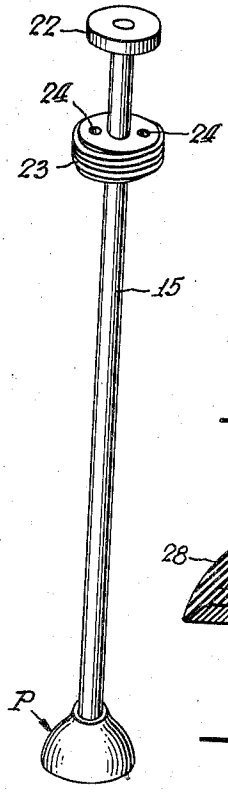


Fig. 4.

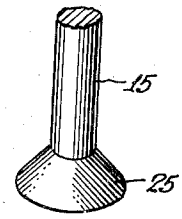


Fig. 5.

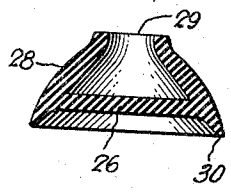
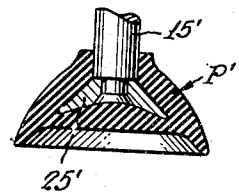


Fig. 6.



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UNITED STATES PATENT OFFICE

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FOUNTAIN PEN

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Application May 23, 1936, Serial No. 81,373

6 Claims. (Cl. 120—47)

My present invention relates to fountain pens of the vacuum plunger type.

Among the objects of the invention are to provide a pen of the above type, generally conventional in construction, but with a simplified vacuum producing plunger, of fewer parts and less cost than conventional structures, but of enhanced effectiveness.

In the accompanying drawing, in which is shown one of various possible embodiments of the several features of the invention,

Fig. 1 is a view of the pen in longitudinal cross-section, showing the same in the process of refilling,

Fig. 2 is a view similar to Fig. 1 showing the pen substantially at the instant that it has become completely filled,

Fig. 3 is a perspective view of the plunger construction, devoid of the operating cap,

Fig. 4 is a fragmentary perspective view on a larger scale of the lower end of the plunger,

Fig. 5 is a perspective view of the rubber plunger member also on a larger scale, and,

Fig. 6 is a fragmentary view in transverse cross-section and on a larger scale of an alternative embodiment of plunger.

Referring now to the drawing, the pen in its general construction is of the conventional vacuum type and comprises a barrel 10 to the forward end of which is attached the conventional section 11 with the feed 12 and nib 13.

The lower end of the barrel has its bore somewhat enlarged as at 14 and the plunger rod 15 has a grip cap 16 thereon to be threaded upon the protruding threaded extension 17 of the gland plug 18 in use of the pen. Plug 18 is pressed against a disk 19 cemented against a shoulder 19' in the barrel and spaced from plug 18 by an interposed rubber gasket washer 20, and gland disks 21 some of rubber and some of felt are lodged under axial compression in a corresponding axial socket in plug 18. The rod 15 passes centrally through the several disks 20 and 21, to preclude the leakage of ink from the upper end of the pen in reciprocation of plunger rod 15.

Preferably metal disk 22 is rigidly secured to the upper end of the rod 15 by upsetting the latter and is rotatably lodged within cap 16 and preferably within a larger socket 22' in said cap and rests against a nut 23 threaded into the cap and provided with openings 24 therein for a fastening tool. By this construction it is apparent that in the rotary movement of threading and unthreading the cap 16 the rod 15 does not turn so that no effort need be exerted in this operation to turn the rod 15 within the tight gland structure 20—21 or to turn the plunger P, hereinafter described, within the pen barrel, and the wear and possible looseness of the resilient parts that might be incurred by such forcible rotation are avoided.

An important feature of the present invention is the construction of the plunger P and its association with the plunger rod 15. The rod has an enlargement or head 25 and the plunger proper is a unitary piece of rubber which completely encloses said head, as shown. In a preferred embodiment, the head comprises a cupped, preferably a conically shaped rigid metal disk 25 through the middle of which extends the reduced tip 27 of the plunger rod, which is upset for rigid assembly thereto.

The rubber plunger member in a preferred embodiment, is a unitary hollow flexible approximately conical or hemispherical piece including an imperforate disk base 26 and a generally conical though somewhat convex side wall 28 to approximate a hemisphere, with a central opening 29 at its apex or pole. That opening is preferably considerably smaller than that of the head 25 and the hollow rubber member is thus readily stretched over said head, so that the latter is completely enclosed within the rubber plunger unit, the aperture 29 encircling the rod 15. The conical side wall 28 of the rubber unit preferably extends over the convexity of the head, and the bottom disk 26 preferably engages the periphery of the head 25. The rubber plunger is of external diameter substantially larger than that of the head and its edge is somewhat thickened peripherally as at 30.

The complication and expense of multi-part clamping disks with backings, and the likelihood of loosening thereof, not to mention the bulk of such plungers and the consequent reduction in ink capacity of the pen, all are obviated by the present invention. The simple unitary hollow rubber structure stretched over the enlarged head on the plunger rod becomes inherently connected to the rod with sufficient security for all practical purposes.

In use, when the pen is to be refilled, the plunger is drawn outward as suggested in Fig. 1, by unscrewing and pulling on grip cap 16. In this pulling action, the rubber plunger, flexes at its rim 30 to allow air or ink to pass downward thereabout. In the downward thrust on cap 16, with the nib under ink as shown in Figs. 1 and 2, the rubber of the plunger must inherently stretch about the head 25 and its enlarged rim 30 crowds

into the space between the head 25 which acts as a core and the barrel wall as shown in Fig. 1, to afford a particularly effective packing for expelling the air therebelow, to bubble up from under the ink in the well. The vacuum thus created in the barrel, above plunger P, is immediately satisfied as soon as the plunger passes the shoulder 31, defining the barrel enlargement 14. The ink now rushes in from the well to fill the barrel. Thereupon, the cap 16 is threaded into place.

While it is preferred to provide the plunger with a generally hemispherical piece of resilient rubber, it is within the scope of the invention directly to mold the soft rubber plunger P in the general form shown in Fig. 6 about the head 25' and the lower end of rod 15.

It will thus be seen that there is herein described an article in which the several features of this invention are embodied, and which article in its action attains the various objects of the invention and is well suited to meet the requirements of practical use.

As many changes could be made in the above construction, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. A fountain pen of the self-filling vacuum plunger type, which includes a barrel having an enlargement in its bore near the section end and a plunger rod therethrough; in which the plunger rod has a rigid cupped head at its lower end and the plunger comprises an approximately hemispherical hollow flexible upper unit, with an aperture at its pole to accommodate the plunger rod, with said head in the interior of the hollow plunger structure, the base of said hollow structure having a peripheral flange rendering the lower surface thereof concave.

2. A fountain pen of the self-filling vacuum plunger type, which includes a barrel having an enlargement in its bore near the section end and a plunger rod therethrough; the combination therewith of a rigid head at the lower end of said rod and a flexible rubber plunger having a peripheral flange portion and completely enclosing said head, the latter serving as a core for limiting the major flexure to the peripheral portion thereabout.

3. A fountain pen of the self-filling vacuum plunger type, which includes a barrel having an enlargement in its bore near the section end and a plunger rod therethrough, said rod having a cupped rigid head at the lower end thereof and an all-rubber plunger completely enclosing said head, encircling the rod above the head and having the central portion of its lower end extending substantially in a plane across the concavity of the lower face of the rigid head.

4. A plunger for a vacuum fountain pen comprising a plunger rod having a head at its lower end, circular in periphery, and a soft rubber plunger unit engaging and enclosing said head, through which the rod extends the lower face of said plunger unit engaging the face of said head and having a unitary peripheral enlargement thereabout.

5. A plunger for vacuum fountain pen comprising a rod, a generally conical head rigidly secured to the lower end of the rod with its convexity upward, a flexible rubber plunger member completely enclosing said head and presenting an approximately conical upper face about the rod and a circular lower face of diameter substantially larger than that of said head, said lower face having a peripheral enlargement.

6. A fountain pen comprising a barrel, a plunger rod in said barrel, and a substantially conical plunger of resilient material connected to the lower end of said rod, and having a peripheral flange at the base thereof in fluid sealing engagement with the inner periphery of said barrel.

BENJAMIN W. HANLE.