April 7, 1959 R. T. JOYCE 2,880,702

BALL-POINT PEN

Filed July 23, 1956

FIG. 1.

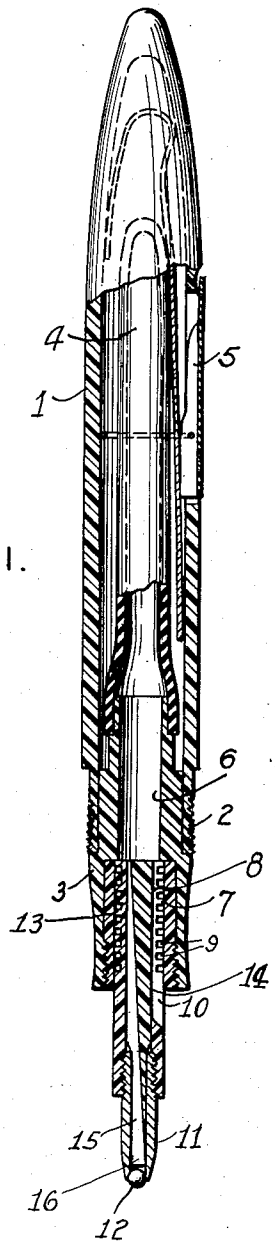
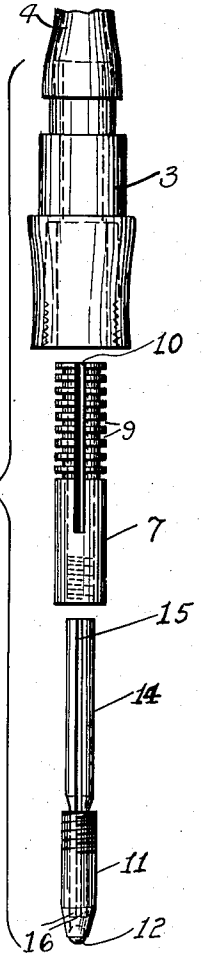


FIG. 2.



INVENTOR
ROBERT T. JOYCE
BY Frank Groom Kirtz
ATTORNEY.

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BALL-POINT PEN

Robert T. Joyce, Kansas City, Mo.

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1 Claim. (Cl. 120—42.4)

This invention relates generally to ball-point pens, but more particularly to a pen having a ball-point ink applicator to which fluid ink is fed from a dip-fill reservoir located within the pen structure.

One of the important objects of the invention is to so construct such a pen that ordinary fluid ink is used as the writing medium, instead of the usual type of ink of much higher viscosity commonly used with such pens.

Another object of my invention is to so construct such a pen that will minimize the probability of ink leakage during either the writing use of the pen or when the latter is being carried.

An added object of the invention is to construct such a pen with an ink-collector sleeve therein and through which the ink-reservoir means is filled from a source of fluid-ink supply, and wherein said sleeve has a plurality of intercommunicating annular grooves about its exterior, in the path of ink passage during said filling operation, so that any ink collected in said grooves may flow back into said reservoir while the pen is held upright in the pocket and to thereby empty said grooves.

A further object of my invention is to so construct such a pen that ink will be fed by capillary action from the reservoir means to said ball point, to eliminate excess flow of ink to the ball point and danger of flooding or leaking thereat.

In the drawings, wherein like or corresponding reference characters represent like or corresponding parts,

Figure 1 is a longitudinal cross-sectional view, partly in elevation, through the pen; and

Figure 2 is an elevational view, showing some of the parts disassociated from one another.

Referring more particularly to the drawings, wherein I have illustrated the preferred embodiment of my invention, there is shown a fountain pen that employs a rotatable ball as the writing applicator thereof, but which is of quite different construction than that of the known ball-point pens and has many advantages over the latter.

This pen has the usual elongated barrel **1** of any suitable material and of a generally hollow shape and may have screw threads **2** at its forward or open end for receiving a demountable cap (not shown).

This barrel receives an ink-reservoir means for holding the desired supply of fluid ink whose viscosity is much lower than that used in ball-pens, said reservoir means comprising a plug element **3** detachably mounted at the forward end of said barrel and carrying a collapsible rubber sac **4** that may be evacuated and filled by any suitable means carried by the barrel, as for instance the lever mechanism **5**. This element **3** has an axial bore therethrough that is in registry with the opening into said sac.

A sleeve **7** is positioned at the forward end of said element **3** and has an axial bore **8** therethrough that communicates with and is in registry with the bore **6** but is of slightly smaller diameter than the latter bore and for a purpose about to be described.

This sleeve is provided with a series of longitudinally spaced-apart grooves **9** that extend circumferentially about the external periphery, and there is a very narrow or restricted width slit **10** through the side wall of said sleeve, somewhat as shown, said slit extending from the rearmost end of said sleeve to a point that is slightly in advance of the forward end of said element **3**, this slit providing a channel through which fluid ink may flow upon proper actuation of the lever **5**.

A hollow tubular tip member **11** is threadedly interconnected to the forward end of said sleeve and a ball **12** is rotatably mounted in the same to form the applicator transferring ink to the writing surface.

A second sleeve **13** encircles said first sleeve with frictional engagement therebetween to hold said parts in assembled relation and forming the external bounding wall for the ink intake channel hereinbefore mentioned.

A feed rod **14** of generally elongated form is frictionally held in said sleeve **7** and has its forward end projecting into said tip member **11** to terminate adjacent the ball **12**, somewhat as shown, said forward end of the rod preferably having a frictional fit with the interior of said tip member **11**. It is to be noted that this rod has a longitudinally extending slot **15** thereinto from its peripheral face, for the full length of said rod, but with only the foremost portion of said slot cut entirely through the rod to provide a pair of spaced-apart prongs **16** at said forward terminal end.

This slot forms a channel through which the fluid ink may feed from the reservoir means to the ball, and may be of somewhat larger minimum cross-sectional area than that of the slit. By way of illustration, the width of said slit is approximately .002".

In use, the reservoir may be filled by dipping the forward end into the source of liquid ink supply, and then by actuating the lever **5** the ink from the latter is drawn into said reservoir through the filling channel slit **10**. This slit is so restricted that there is no leakage through its foremost end even when the pen is held, point downward, and of course, when the pen is held with the point upward, any surplus ink that is in said collector grooves will flow downwardly into the reservoir to empty said grooves.

Of course, if the pen should become heated from any cause so as to temporarily increase the volume of liquid therein, said ink can overflow into said collector grooves to take care of such excess and thus minimize the probability of undesired ink leakage from the pen, and as soon as the cause of such volume expansion ceases, the ink thus stored in said grooves can re-flow back into said reservoir again.

By using a feed rod thus grooved, and by having the foremost portion of said rod very closely adjacent the ball, movement of the latter in writing wipes off ink from within the slot in said rod, and by a capillary action draws fluid from the reservoir as needed during writing.

The thickness of the writing and the freedom of ink feed depends on the diameter of the ball and its clearance in its mounting.

Inasmuch as it is sometimes desired to write with lines of other widths, it is possible to have a set of units to be detachably mounted in the foremost end of the main pen structure, each unit consisting of the elements **7**, **11**, **12**, **13** and **14** and being selectively interchangeable to provide writing ends to the main pen structure or base.

I claim:

In a ball-point pen for using fluid ink, a tip element rotatably carrying an applicator ball therein, a barrel, an ink reservoir means within said barrel and provided with an axial bore, a tip-holding sleeve having external longitudinally spaced-apart ink-collector rings, said sleeve

being mounted at the forward end of said reservoir means and provided with an axial bore communicating with said first-mentioned bore but being slightly smaller in diameter than the latter and provided with a relatively restricted slit through its side wall and that extends from its rearmost end to a point forwardly beyond the adjacent end of said barrel, and an elongated feed rod held lengthwise in said sleeve by frictional engagement and having a forward end extending into said tip element to closely adjacent said ball, said rod having a transverse tapered slot thereinto extending the full length of the rod, the rear end of said tapered slot being only partially through said rod and with the forward end of the slot being entirely through the latter, a pair of spaced-apart tapering prongs adjacent the forward end of said tapered slot and separated by said tapered slot, the rear narrower end of said tapered slot communicating with said bore through said reservoir means to provide a channel for feeding ink from the latter to said ball.

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