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2,557,409

FOUNTAIN PEN

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Fig. 1.

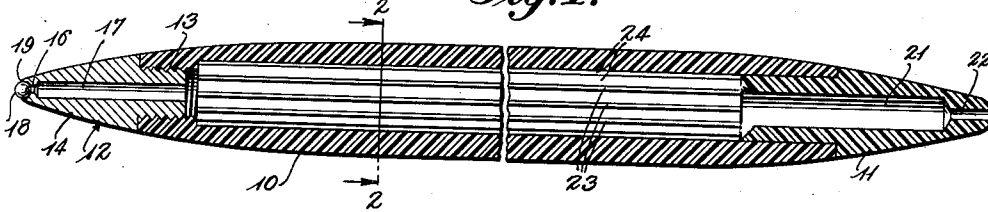


Fig. 2.

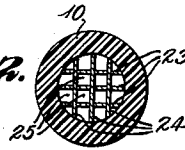


Fig. 3.

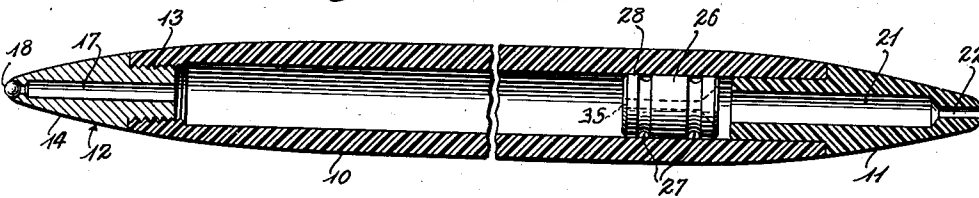


Fig. 4.

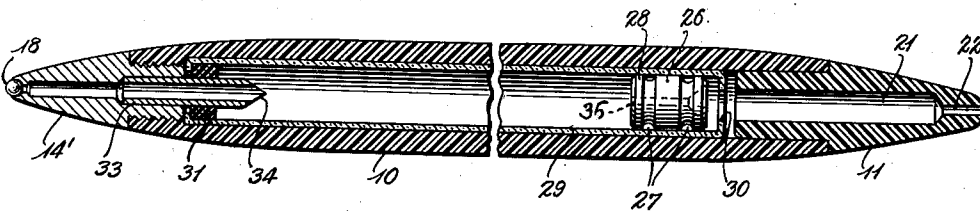
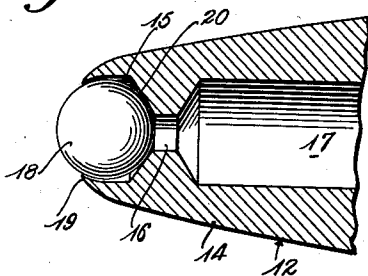


Fig. 5.



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FOUNTAIN PEN

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4 Claims. (Cl. 120—42.4)

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The invention relates to ball pointed pens and has as an object the provision of a pen of this type which utilizes ink of high viscosity, as ink paste, and has means whereby substantially all of the ink from a reservoir of large capacity may be used in writing.

It is a further object to provide a pen of the type referred to having means to avoid the formation of air bubbles in the ink.

It is a further object to provide a pen having provision for receipt of a renewable cartridge carrying a supply of ink.

It is a still further object to provide a pen of the type referred to comprising a plastic barrel and a metal writing tip.

Further objects of the invention will appear from the following description when read in connection with the accompanying drawings showing illustrative embodiments of the invention, and wherein—

Figure 1 is a longitudinal section much enlarged and broken away to shorten its length;

Fig. 2 is a transverse section on line 2—2 of Figure 1;

Fig. 3 is a view similar to Figure 1 showing a different form of the invention;

Fig. 4 is a still further similar view showing a cartridge form of the invention utilizing the principles of the form of Fig. 3; and

Fig. 5 is a greatly enlarged detail longitudinal section of the tip end of the pen.

As shown in Figure 1, the device comprises a plastic barrel pen, a removable tip 11 and a writing tip 12 shown as having screw threaded engagement with the barrel 10 as at 13. The structure of the tip 12 is more clearly illustrated in Fig. 5 wherein there is shown a metal body 14 having a ball chamber 15, a restricted passage 16 in communication with an enlarged passage 17 extending to the ink storage space within the barrel 10.

Seated in the ball chamber 15 is the writing ball 18 retained therein by swaging the material of the body 14 slightly about the ball as at 19. The fit of the ball 18 within the ball chamber, as retained by the swaging, is such as to provide a very slight clearance of the ball at its seat 20 so that the ball may freely revolve in the ball chamber to roll a line of ink onto paper when moved in contact therewith.

The revolution of the ball is facilitated by the lubrication of the ink paste. Because the material of the body 14 must be swaged about the ball, it is desirable that this portion of the pen be made of metal. It is of course possible to make the tip

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14 integral with the body 10 in which case the body 10 must be also made of metal.

The ink used in this type of pen is of high viscosity, or of pasty character. The ink applied to a surface in the act of writing is fed to the restricted passage into contact with the ball by hydrostatic pressure and is rolled upon the surface by the ball as it revolves while moved along the writing surface to produce lines of writing.

The feed action is demonstrated by using the pen to write on a vertical surface or in any position with the reservoir below the ball. The pen will write in this position for some time, or until the ink on the ball and in contact therewith in the passage 16 is exhausted, and will resume immediately if the reservoir is elevated for a moment. The fact that writing is immediately resumed when the reservoir is elevated shows that the ink has not left the passage 16 when the pen is inverted, which prevents air from entering the reservoir, and ink from escaping through vent 22. Without the vent 22, or its equivalent, hydrostatic pressure could not act to supply ink to the passage 16. The vent opening 22 is made short and the air passage is enlarged at 21 to avoid obstruction of an extended small passage by foreign matter.

Tests with a large reservoir having the entire surface of a cross section thereof unbroken and exposed to entering air show that so constructed, a thick coating of the viscous ink will cling to the inner surface of the barrel, and a pipe will form at the axis thereof. When writing is suspended this coating will close the pipe and entrain an air bubble which will interrupt action when the bubble reaches the passage 16.

To avoid the formation of bubbles, in the form of Figures 1 and 2 there is shown a plurality of restricted passages 25 provided by introduction into the reservoir of a grid of plate members 23, 24 which in common supply the passage 17.

In the form of Figures 3 and 4, formation of bubbles is prevented by introduction of a freely sliding piston 26, vented by a central restricted passage 35. The piston 26 is lubricated and sealed at its outer surface by the ink, and will follow the ink down in the reservoir.

The restricted passage 35 in the piston 26 will be at all times full of ink to prevent air bubbles forming between the ink body and the piston, but this passage 35 may be used for refilling the ink reservoir when necessary.

While not essential, it is preferred to provide the piston with channels 27. A small surplus of lubricating ink, by gathering in these channels

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will act to more effectually seal the reservoir at the surface of the piston.

In the form of the invention shown in Fig. 4, there is provided a cartridge 29, which may be of glass, plastic, or any substance which is resistant to the ink used, carrying therein a body 26 and provided with an opening 39 in communication with the vent passages 21, 22 of the tip 11.

When the filled cartridge 29 is supplied to the user of the pen its lower end is sealed by a body 31 formed as for instance of sponge rubber. A piercing instrument 32 is permanently carried in the tip 14' and when the cartridge 29 is inserted after removal of the tip 11 and forced downward against the cutting edge 34 of the tube 33 the plug 31 is pierced allowing ink to flow to the ball 18. The cartridge may be readily removed by a hook instrument inserted through the opening 30.

For a full understanding of the action of the pen it should be observed that in the act of writing longhand the ball is revolved in all directions at short intervals of time. Except in the act of ruling straight lines, the ink is never rolled from the ball from a single zone entirely around the ball.

Minor changes may be made in the physical embodiments of the invention within the scope of the appended claims without departing from the spirit of the invention.

I claim:

1. A fountain pen of the ball pointed type comprising, in combination: a nib functioning ball; a reservoir from which ink is fed to said ball; a closely fitting piston slidable in said reservoir to follow the body of ink therein in its motion toward the ball; said piston formed with a vent opening.

2. A fountain pen of the ball pointed type comprising, in combination: a nib functioning ball; a reservoir from which ink is fed to said ball; a closely fitting piston slidable in said

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reservoir to follow the body of ink therein in its motion toward the ball; said piston formed with a vent opening and vent means to admit air to the interior of the reservoir at the end of the piston remote from the ball.

3. In a fountain pen of the ball pointed type utilizing ink of high viscosity: a barrel formed with a reservoir conduit and with air inlet means adjacent its end remote from the ball, said conduit extending in the shortest possible path from the air inlet to the end adjacent the ball; a closely fitting piston freely slidable in said reservoir and having a vent opening to permit the escape of air bubbles.

4. The structure of claim 3 with the piston formed with a circumferential groove to provide an ink seal.

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