

Mechanism of the Fleur-De-Lis Edison Pearl Fountain Pen

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ABOUT

This document describes the function, parts, construction, and use of the Fleur-De-Lis Edison Pearl Fountain Pen

(On Cover) Figure 1: The pen, uncapped.

Introduction

The Fleur-De-Lis Edison Pearl Fountain Pen is a writing instrument featuring an eyedropper-style liquid ink storage system, ink regulation feed, and a gold nib. The item is custom-manufactured by the Edison Pen Company of Ohio, and the design is an adaptation of the standard Pearl model manufactured by the company, featuring an engraving of a fleur-de-lis on the section. The mechanism is a modern implementation of the original fountain pen developed by Lewis Edson Waterman per US Patent 293,545. The Fleur-De-Lis Edison Pearl Fountain Pen is characterized by its red-black ebonite body, refillable ink reservoir, and non-hooded nib.

Principal Parts of the pen:

- Cap
- Body
- Section
- Nib

Function

The pen is designed to provide a regulated ink flow to the nib, which allows the pen to write on paper. Liquid ink is loaded into the body of the pen. The ink then flows through the feed, which regulates the ink rate via gravity and capillary action. The nib is the portion of the pen that touches the paper, and features functional ink regulation and ornamental engravings. The nib tines have flexibility that regulates the ink flow and the written line width. The end of the nib is coated with iridium, which is the portion of the pen that delivers ink as it touches paper.

The assembled pen is 5.375" long with the cap and 5" long without the cap. The diameter of both the body and the cap is .61". The mass of the assembled pen is 22g.

The majority of the pen is manufactured from ebonite, which is a hardened rubber that is milled on a lathe. The material is most often used as the body of bowling balls.

Principal Parts

Cap

The cap of the pen protects the nib of the pen when it is not being used, preventing evaporation of the ink. This .610" wide and 1.375" long portion is made of red-black striped ebonite. Cylindrically symmetric, the outer portion of the cap is polished to a smooth finish and the inner portion is unfinished and rough. The tip of the cap is conical, while the main body of the outer cap is slightly concave. The interior is cylindrical.



Figure 2: The pen, capped

The interior of the cap is quadruple-threaded and screws onto the body of the pen.

Body

The body of the pen functions as the ink reservoir. 5.50" in length and .610" in diameter, the cylindrically symmetric body is manufactured from red-black striped ebonite. Styled similarly to the cap, the exterior features a conical tip with a concave body. The exterior is polished to a smooth finish, and the interior is unfinished and rough.

The interior of the body is cylindrical in shape, and it serves to store the ink for the pen. With a capacity of 5 mL, the ink is refilled by unscrewing the body of the pen from the cap and section, then using an eyedropper to deposit the ink. Ink exits the body through the section.

The body has interior and exterior threading. The exterior is quadruple-threaded and screws onto the lid. The interior is single-threaded and screws onto the section.

Section

The section of the pen contains the technology that defines this pen as a fountain pen and allows users to interact with the device. The outer section is made for users to grip and manipulate the device. The feed, located inside of this section, regulates the flow of ink.

Outer Section

The outer section serves as the interface for the manipulation of movement and ink flow. It is manufactured from red-black striped ebonite and measures 1.2" in length and .45" in diameter.

The exterior is polished to a smooth finish and features a concavity intended for grip by the user's hand. The exterior has a fleur-de-lis engraving .40" in diameter filled with gold leaf. In the fully-assembled pen, this design aligns with the top surface of the nib.

The interior of the section is secured via permanent adhesive to the exterior of the feed.

Feed

The feed regulates the flow of ink. It is manufactured from black ebonite, and is characterized by a series of fins extending from the rear of the feed, which sits at the ink reservoir, to the front, which interfaces at the nib. The feed is 1.4" long and .40" wide.

The feed design was patented, US Patent 293,545, in 1884 by Lewis Edson Waterman. The outer fins passively use capillary action to

provide a constant flow of ink. The center of the feed has a channel from the nib to the body that allows for the flow of air to displace the ink as it flows to the nib. Without this channel, a vacuum would form as ink left the body, preventing the smooth flow of ink. The central channel is hole through the center of the feed that is too narrow for the flow of water, so only air may flow through it. It runs from the ink reservoir to the breather hole on the nib.

The feed does not directly interface with the body, but the ink in the body may flow into the feed through the section. The section extends out from the tip of the outer section. There, the section connects to the nib using friction between the nib and the section. The nib lies flush on the feed, and the nib serves as the exit point for ink in the feed and as the entrance point for air into the central channel.

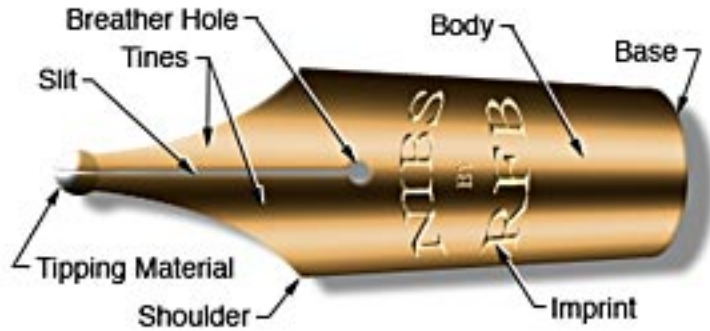
Nib

The nib delivers ink from the feed to the paper. This part of the pen is made from 18 karat gold and features both ornamental and functional design aspects. The nib is .65" long and .35" wide. It is manufactured from sheets of gold, which are cut using a laser and folded to yield a proper concavity. This concavity from this folding is



Figure 3: The section, as it is attached to the nib and body.

largely ornamental, but it allows the full bottom of the nib to lie on the top of the feed. The base of the nib extends into the feed, where it is secured by friction between the ebonite and the gold. The surface is polished and smooth.



The body of the nib is engraved with the logo of the manufacturer. In the center of the nib lies the breather hole, which allows for air to flow into the central channel of the body.

Figure 4: Nib Diagram (Source: richardspens.com)

From the breather hole to the tip of the nib lies the slit, which bisects the nib into two tines (*see figure 4*). The gap between the tines creates a capillary for the flow of ink to the tip of the nib. Due to the malleable nature of gold, the tines are slightly flexible, allowing users to bend them slightly during use to increase the width of the ink line deposited by the pen.

At the end of each of the tines, an iridium ball is fused onto the tip. This small amount of iridium serves as a hard barrier between the gold and the paper that prevents the erosion of the tip during use. The iridium serves as the contact point between the pen and the paper, and the gap between the two balls of iridium determines the thickness of the line of ink deposited. The round nature of the iridium reduces friction during use.

Conclusion

The Fleur-De-Lis Edison Pearl Fountain Pen:

- Stores ink in the body
- Regulates the flow of ink in the feed
- Allows user control through the outer section
- Varies line thickness using the tines of the nib
- Deposits ink with uniform flow onto paper using the iridium-tipped end of the nib

Filling the Pen

Background: In order to use the fountain pen, it must be filled with ink. Properly reloading the body with ink allows for the pen's repeated use. This method can be used whenever the ink level is below full.

Prerequisites: Pen, fountain pen ink, eyedropper

Directions:

1. Unscrew the cap

Caution: Ink may remain in the body of the pen – be sure that the body is kept upright to prevent spills

2. Unscrew the section from the body

Warning: Use only ink that is specified for use in fountain pens. Incorrect inks, including "India Inks" and "quill inks" could corrode or clog the pen.

3. Use the eyedropper to add ink to the body until the ink level is 0.5" from the top of the body.
4. Screw the section onto the body.
5. Clean off any ink that may have become deposited on the exterior of the pen.
6. Write with the pen to ensure proper flow. If no ink flows, re-cap the pen and lightly flick it, with the cap away from you to saturate the feed with ink.

Results: The pen is fully filled and will write for approximately thirty pages before the next refill.