Feb. 1, 1949. F. E. GRUBER 2,460,345

BALL POINT PEN

Filed Dec. 22, 1945

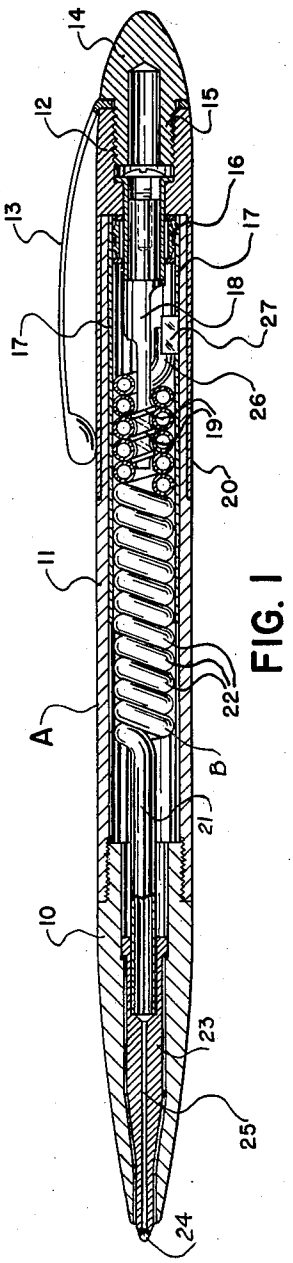


FIG. 1

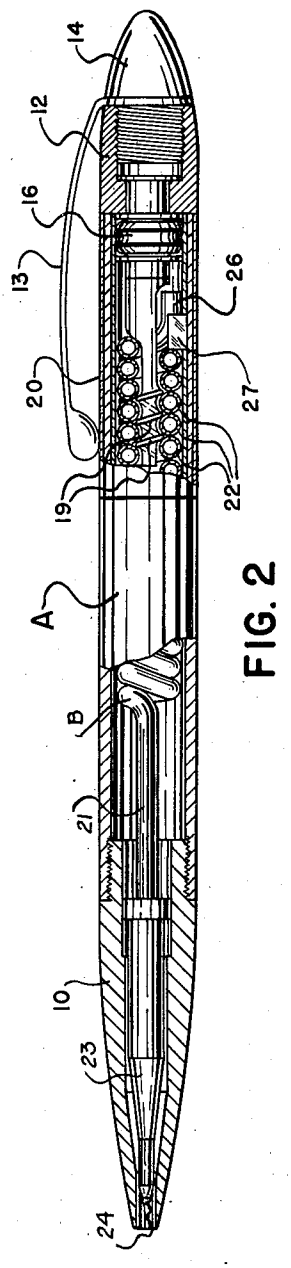


FIG. 2

INVENTOR

FRANCIS E. GRUBER

BY Thomas L. Fireh

ATTORNEY

Patented Feb. 1, 1949 2,460,345

UNITED STATES PATENT OFFICE

2,460,345

BALL POINT PEN

Francis E. Gruber, St. Paul, Minn., assignor to Brown & Bigelow, St. Paul, Minn.

Application December 22, 1945, Serial No. 636,790

3 Claims. (Cl. 120—42.03)

1

This invention relates to a fountain pen wherein the ink used therein is of a viscous nature and tends to travel through the ink chamber by capillary attraction to the writing tip. The writing tip is in the form of a ball which rotates in a socket. The viscous ink is picked up by the writing ball and carried by capillary attraction from the reservoir onto the ball and from the ball to the surface on which the pen is writing.

A feature resides in providing a unit ink reservoir of a tubular nature, the body of the reservoir being in the form of helical coils of hollow tubing and to the forward end of the unit I attach the writing end of the pen which supports the ball bearing freely rotatable in a socket on the extreme outer end of the unit.

A feature resides in providing a fountain pen with a replaceable ink chamber unit and writing end which are connected together as a complete unit and which may be replaced with a new unit whenever it is desired. The ink used in my pen is not of the freely flowing type like that ordinarily used in fountain pens employing a pen point. The ink is of a viscous nature with a surface tension so as to be attracted by capillary action causing the ink to travel toward the smaller opening in the chamber while atmospheric air is admitted to the larger or rear end of the unit. It is desirable that a complete volume of ink extend into the writing tip and it is important that the ink contact the ball without air space between the ball and the ink. The flow of the ink is limited by the surface tension and the ball acts to enhance the travel of the ink to the writing tip as the ink is used up in writing.

With a pen of this character, the writing operation is smooth and free on all sides so that the pen may be rotated into any position. The writing of my pen may be characterized as being smooth and free like the writing with a pencil. The ball bearing writing tip rolls freely over the surface being written upon and discharges the ink onto the surface in a smooth line.

A feature resides in providing a propelling and repelling means for the ink unit and writing tip which is adapted to be operated by rotating the rear end of the pen which operates a screw core member threaded to the inner surface of the coils of the ink reservoir and thus the ink reservoir and writing tip as a unit are propelled into writing position or withdrawn into the casing of the pen so as to conceal the writing end of the pen without need of a cap for covering the writing end when the pen is not in use.

These features together with other details and

2

objects of the invention will be more fully and clearly hereinafter set forth in the specification and claims.

Figure 1 illustrates a longitudinal section through my pen.

Figure 2 is a similar view to Figure 1 with a portion of the pen casing broken away and a portion of the ink reservoir illustrated in section with the rear end of the pen.

The pen A is formed with an outer casing having a removable writing tip 10, a barrel portion 11, and a rotatable end cap member 12. The clip 13 is mounted on the cap 12 by the head 14 which is threaded at 15 to the cap 12.

The head 12 is adapted to be held rotatable to the rear end of the barrel 11 by the spring sleeve 16 which operates between the collars carried by the head 12 and which provides a frictional engagement with the inner sleeve 17 in the rear end of the casing or barrel 11.

The head 12 is provided with an extended core member 18 which is formed with threads 19 on the inner end of the same. The end 18 and the threads 19 are rotated when the cap 12 is rotated. The cap 12 is formed with an elongated sleeve 20 which rotates with the cap and the clip 13 and at the same time the threads 19 are rotated.

The ink reservoir unit B is formed by a hollow tubular member 21 which is formed with a series of coils 22, the forward end of the tube 21 is connected to the writing tip 23 and in the extreme forward end of the writing tip 23 I mount a ball bearing 24 which is the writing end of the unit B and which rotates freely in the writing tip 23.

The ink reservoir unit B is removable with the writing tip 23 and the ball 24 so that a new unit B may be inserted in the casing of the barrel 11 whenever it is desired.

The hollow tubular reservoir B is adapted to be filled with a viscous ink having a surface tension which allows the ink to be extended through the small passageway 25 in the writing tip 23 to the ball 24. When the unit B is filled with the ink the last two or three coils at the rear of the same are left empty to provide an air chamber in the rear end of the ink unit B which allows for expansion of the ink without the same oozing from the chamber. The rear end 26 of the coils 22 extends out longitudinally as illustrated in Figures 1 and 2 and is adapted to contact the rib 27 formed on the inner sleeve 17 to hold the unit B against rotation in the barrel 11. The threads 19 engage the coils 22 so that when the head 12

is rotated and the unit B is held against rotation by the rib 27, the entire unit B with the writing tip 25 and ball 24 is moved longitudinally forward or backward within the casing of the pen A.

When the writing ball 24 and the unit B are in the position illustrated in Figure 1, the pen A is in operative position with the ball 24 exposed out of the writing end 10 of the casing of the pen.

When the pen is not desired for use the cap 12 may be rotated to operate the threads 19 to draw the unit B into the barrel or casing of the pen A as illustrated in Figure 2. This operation conceals the writing ball 24 in the tip 10.

The viscous ink used in my pen is of a non-drying nature, therefore a cap is not required for the pen, however, it is desirable that the pen ball 24 be drawn into the tip end 10 so as to protect the user of the pen from getting ink onto articles when the pen is not in use.

The unit B is moved in its entirety with the writing ball 24 by turning the cap 12 which causes the threads 19 to move the unit B forward or backward as may be desired. Figure 2 shows the unit B retracted into the barrel of the pen A and with the writing ball 24 protected within the tip 10. The alternative form illustrated in Figure 3 shows the outer part of the tube 28 threaded at 29 so as to engage with the threaded collar 30 when the cap 12 is rotated.

I claim:

1. A fountain pen comprising an ink unit formed of a hollow tube, a series of coils formed in the body of said ink reservoir adapted to provide the main part of the reservoir, a tubular forward end projecting as a portion of said ink unit, a ball writing tip mounted in the forward end of said ink reservoir unit, a casing for enclosing said unit and adapted to support the same slidable therewithin, a rotatable cap for the rear of said casing, and a threaded core member operated by said cap to threadedly engage said ink unit to move the same longitudinally in said casing to conceal or expose said writing ball on the forward end of said ink reservoir unit.

2. A fountain pen including a casing, a replaceable ink unit, said casing being separable to permit a new ink unit to be inserted therein, said ink unit being formed of a hollow tube with the body portion thereof formed into a series of helical coils positioned adjacent each other, the rear end of said unit being open to the outer atmosphere, the forward end of said unit having a writing ball rotatably anchored therein, and means for moving said ink unit in said casing to expose and conceal said writing ball by a threaded engagement of said helical coils.

3. A fountain pen including a casing, a removable ink unit supported within said casing, said ink unit being formed of a hollow tube, a series of coils formed in said tube adjacent each other to form the main body portion of said unit, a writing ball bearing anchored on the forward end of said unit and threaded core means for engaging the rear of said unit to move said unit bodily backward or forward within said casing.

FRANCIS E. GRUBER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
954,415	Bowman	Apr. 12, 1910
2,400,679	Biro	May 21, 1946

FOREIGN PATENTS

Number	Country	Date
564,172	Great Britain	Sept. 15, 1944
573,747	Great Britain	Dec. 4, 1945