

## PATENT SPECIFICATION

647,474



Date of Application and filing Complete Specification: April 14, 1947.

No. 9853/47.

Application made in United States of America on May 1, 1946.

Complete Specification Published: Dec. 13, 1950.

Index at acceptance:—Class 146(iii), A5f, A11(b: d4: k: x).

## COMPLETE SPECIFICATION

## Fountain Pens

We, THE GEORGE W. BORG CORPORATION, a corporation organized and existing under the laws of the State of Delaware, United States of America, of 469, East Ohio Street, Chicago, State of Illinois, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates in general to fountain pens and more in particular to fountain pens of the ball point type. The object of the invention is a new and improved pen of this character which is highly efficient, durable, and inexpensive to manufacture.

The various features of the invention will be described in detail in the ensuing specification, with reference to the accompanying drawing, in which:—

Fig. 1 is a cross-section of a complete fountain pen embodying the invention;

Fig. 2 is a side view of the ball retainer;

Fig. 3 is an end view of the ink cartridge;

Fig. 4 is a section through the ink cartridge on the line 4, Fig. 1;

Fig. 5 is a cross-section through the tip of the ball retainer on the line 5—5, Fig. 6; and

Fig. 6 is an end view of the ball retainer with the ball removed.

The parts are shown on a scale of 2 to 1 in Fig. 1. In Fig. 2 the scale is 10 to 1, in Figs. 3 and 4 the scale is 4 to 1, and in Figs. 5 and 6 the scale is 40 to 1.

Referring to Fig. 1, the barrel 10, the housing 11, and the cap 12 may be moulded of suitable plastic material and are shaped as shown in the drawing. The housing 11 is threaded into the barrel 10, the metal ring 13 being clamped between the end of the barrel and a shoulder on the housing. The cap 12 has a close fit on

the housing 11 and may be pressed on as far as the ring 13, where it is normally held by friction. The cap is provided with a clip 14, which is secured to the end of the cap by means of the spherical headed screw 15 and the nut 16.

The reference character 17 indicates the ball retainer, which is carried in the housing 11. The ball retainer has a press fit in the housing, from which it projects as shown in Fig. 1, and preferably has a knurled portion at the right-hand end which makes for a secure connection between the parts and eliminates any danger of the ball retainer rotating in the housing.

The ball retainer may be machined from a hard variety of brass rod, although it could be made of stainless steel or other suitable material. It comprises a cylindrical section and a conical tip symmetrical about its axis which makes an angle of about 8 degrees with the axis of the cylindrical section. The conical tip is, moreover, offset with reference to the cylindrical section, so that the axes intersect at a point beyond the ball 18. This is shown clearly in Fig. 5, where the dotted line 19 is the axis of the conical tip and the dotted line 20 is the axis of the cylindrical section. Due to the angular and offset location of the conical tip with respect to the cylindrical section, the junction of these parts, or the base of the conical tip, defines a plane which makes an acute angle with the axis of the cylindrical section. In the pen shown, this angle is about 45 degrees. The end of the housing 11 is cut off or formed with the same angle, so that when the ball retainer is assembled in the housing only the conical tip is exposed.

The described construction of the ball retainer overcomes an objection to prior ball pointed pens, which have to be held in a fairly upright position in order to

[Price 2/-]

Price 4s 6d

insure contact between the ball and the paper. Our improved pen may have the writing end of the barrel, i.e., the plane referred to in the preceding paragraph, formed to lie in a plane which is substantially parallel to the writing surface when the pen is held in the normal writing position.

The bores 21 and 22, shown in dotted lines in Fig. 2, are coaxial with the cylindrical section of the ball retainer and the former is threaded to receive the ink cartridge. The bore or ink channel 23 is coaxial with the conical tip and terminates in a ball receiving recess which will be described in connection with Figs. 5 and 6.

This ball recess is defined by a short cylindrical wall 24, which is slightly larger in diameter than the ball 18, and a tapered wall 25 which connects with the ink channel 23. The ball 18 has an annular bearing against the tapered wall 25 and is retained in the recess by a lip 26 of reduced diameter at the end of wall 24, produced by a spinning operation, and defining a plane which is perpendicular to the axis of the tip.

The bearing or seat for the ball 18 on the tapered wall 25 is intersected by a plurality of radial grooves such as 27, which provide channels for the flow of ink past the bearing. There is also a channel 28 which intersects the lip 26, which is provided to insure ample ink feed on the up stroke of the pen. In explanation of this, it may be stated that the ball rotates in a counter-clockwise direction, as seen in Fig. 5, on the up stroke and is in engagement with the upper part of the lip 26, due to the pressure on the paper, with the result that the lip tends to scrape the ink off the ball and thus interfere with the regular ink feed that would otherwise be produced by rotation of the ball. This difficulty is obviated by the channel 28. No corresponding channel on the lower side is required, because of the slight clearance between the ball and the lip 26. The ball engages the upper part of the lip on the down stroke as well on the up stroke.

The ink cartridge comprises a tube 30, which may be made of brass or other suitable material which is wet by the ink, that is, the ink adheres to the metal so that the ink can flow by capillary action, and two small tubes 31 and 32 made of similar material. The tube 30 is flattened throughout the major portion of its length, as can be seen from Figs. 1 and 4, and is tapered at the ends 34 to receive the tubes 31 and 32, which may be secured in place by soldering. The small tube 31 is threaded at the end for connection with

the ball retainer 17.

These ink cartridges may be sold separately as a replacement item, filled with ink and with the ends closed by suitable plugs or caps. When the cartridge supplied with the pen becomes exhausted of ink the barrel 10 is unscrewed from the housing 11, exposing the ink cartridge, which is removed by unscrewing it from the ball retainer 17. The cap at the threaded end of a new cartridge is then removed and the cartridge is screwed into the ball retainer, after which the cap or plug can be removed from the other end of the cartridge. The operation is completed by screwing the barrel 10 on to the housing 11.

If the pen with the replacement ink cartridge should fail to write or should stop writing after a short period, the trouble will be due to an air bubble in the ball retainer, and is easily cured by blowing through the vent 33 at the end of the barrel, which forces out the air past the ball 18. It will be noted in this connection that, due to the provision of the groove 28 in the lip 26 at the tip of the ball retainer, the ball cannot act as a valve to prevent the escape of the air.

The operation of the pen will be readily understood from the foregoing, and will require no extended description. When the pen is in use for writing, the ball 18 rotates in its seat, as mentioned hereinbefore, and continuously transfers ink from the ink channel 23 to the paper or other material which is being written upon. As the ink is removed from channel 23 it is supplied from the ink cartridge, due to atmospheric pressure acting through tube 32, which keeps channel 23 and the space around the ball in its recess full until the ink becomes exhausted.

When the pen is carried in the pocket with the point uppermost, or is laid on its side, the ink does not run back into the cartridge, but due to capillary action it is retained and the ink channels remain full, ready to resume writing at any time.

The invention having been described, that which is believed to be new and for which the protection of Letters Patent is desired will be pointed out in the appended claims.

In Specification No. 564,172, there is claimed a writing instrument of the type comprising a reservoir for charging dense ink having an air intake, and a free-ball tip fed through a general conduit leading from said reservoir, wherein the ball feeding conduit reaches said ball branched into a plurality of channels or grooves extending to the neighbourhood of the end of the setting for said ball.

In Specification No. 573,747 there is claimed a writing instrument of the type in which a ball is mounted for rotation in a housing with part of the ball exposed 5 and is supplied with ink from a suitable reservoir, said reservoir being constituted by a capillary tube.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A fountain pen having a ball retainer comprising a cylindrical section and a tapered tip which is symmetrical about its axis and is inclined at an angle to the axis of said cylindrical section, said cylindrical section having an ink channel therein, and said tip having an axial ink channel which intersects the ink channel in the cylindrical section.

2. A fountain pen according to claim 1, characterised in that said tip is integrally formed with said cylindrical section, the axis of the tip being inclined to the axis of said cylindrical section at an angle of about 8 degrees.

3. A fountain pen according to claim 1, characterised in that said tip has a recess for a ball at the end thereof and in that the axis of said tip intersects the axis of said cylindrical section beyond said ball.

4. A fountain pen according to any one of the preceding claims, characterized by a housing of plastic material detachably secured to the barrel of the pen, the end of said housing forming an acute angle with the axis of said barrel, said ball retainer being metallic and projecting from said housing and the base of said tip being disposed substantially in the plane defined by the end of said housing.

5. A fountain pen according to claim

2, characterised by a tubular barrel having the writing end formed to lie in a plane which is substantially parallel to the writing surface when the pen is held in the normal inclined writing position, the cylindrical section of the ball retainer being enclosed in said barrel while the tapered tip projects therefrom, and the junction of said tip and cylindrical section being disposed substantially in said plane.

6. A fountain pen according to claim 1, characterized by a tubular barrel enclosing the cylindrical section of the ball retainer, the said tip projecting from the end of said barrel, and the said barrel having said end formed to substantially coincide with the junction of said tip and cylindrical section.

7. A fountain pen according to claim 1 or 2, characterized by said tip being metallic with a ball retaining recess therein, said recess being defined by a cylindrical wall at the outer end and a tapered wall connecting said cylindrical wall with said ink channel, the ball in said recess having an annular bearing on said tapered wall, and a plurality of grooves in said tapered wall intersecting said bearing to convey ink past the same.

8. A fountain pen according to any one of claims 1 to 7, wherein said tip is a conical tip.

9. A fountain pen according to any one of the preceding claims, characterized by a circular ball retaining lip at the smaller end of said tip, said lip defining a plane to which the axis of the tip is perpendicular, a ball seat formed in the tip, and a writing ball retained in said seat by said lip.

Dated this 14th day of April, 1947.

MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]

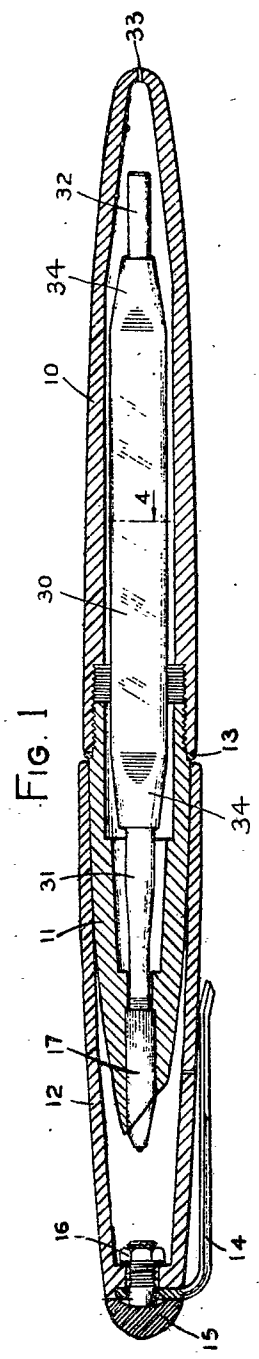


FIG. 1

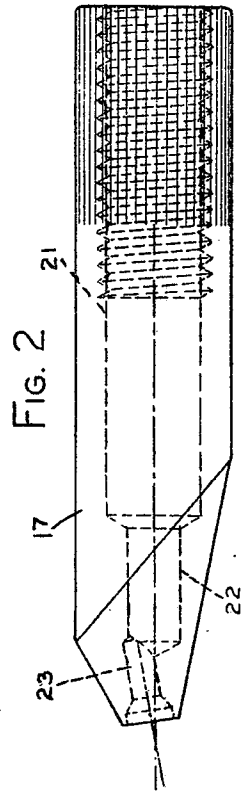


FIG. 2

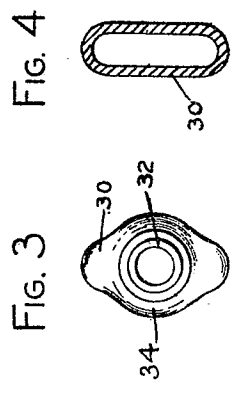


FIG. 3

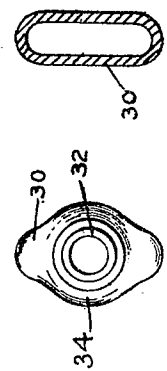


FIG. 4

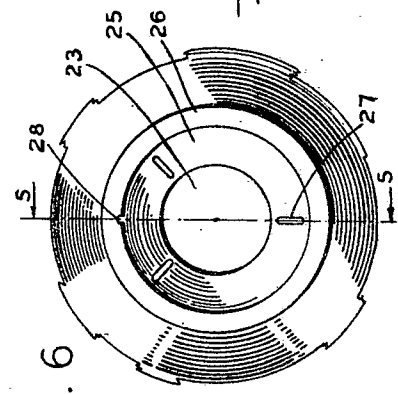


FIG. 6

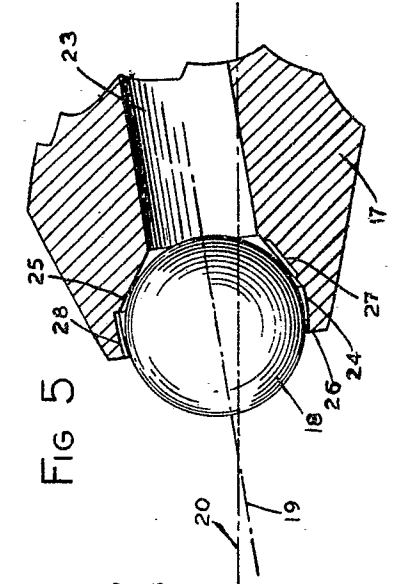


FIG. 5