[Second Edition.]

AMENDED SPECIFICATION

Reprinted as amended in accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated the twenty-sixth day of August, 1946, under Section 21, of the Patents and Designs Acts, 1907 to 1946.

PATENT SPECIFICATION

Application Date: Aug. 18, 1943. *No. 13406/43.* **571,698**

Complete Specification Accepted: Sept. 5, 1945.

COMPLETE SPECIFICATION

Writing Instrument.

I, LASZLO JOZSEF BIRO, a citizen of Hungary, of Oro Street, No. 3040, Buenos Aires, Argentine Republic, 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:—

This invention relates to improvements in fountain pens of the ball-tip type, and particularly to means for providing a regular ink feed to the ball constituting the active or writing element of said instrument.

The most suitable ink for ball-tip fountain pens is so-called "dense ink" which is very adhesive, and the ball, in rotating, will transfer to the exterior a regular and sufficient quantity to make neat and normal strokes.

Although dense, such ink is sufficiently fluid to pass through small orifices, and it is therefore difficult to prevent leakage while still providing a permanently open air intake and one object of this invention is to prevent leakage even when the pen is held with the air intake downwardly.

In the case of a barrel-shaped reservoir, the mass of ink will change its position as the instrument is moved about, so that when the tip of the pen is raised contact between the ink and the ball is lost and the bubbles formed may not disperse entirely and may interrupt the normal working of the instrument. Another object of this invention is to overcome this difficulty.

Another object of this invention is to provide an ink reservoir wherein gravity does not alter the position of the ink and wherein the charge is kept in a satisfactory condition and forms a continuous vein of liquid, to provide a continuous feed as and when required without delay or interruption.

A still further object is to provide an ink reservoir of simple structure which will at the same time be strong.

A still further object is to provide means for replacing the charge of ink by having detachable reservoirs.

A still further object is to provide a simple writing instrument of the fountain-pen type which will not require auxiliary means for causing the ink to reach the writing ball.

According to the present invention an instrument of the said type is provided in which the ink reservoir is formed by one or more conduits starting at an air intake and after following an extended path, communicating with the recess for said ball, the said conduit or conduits being of so small a cross section that a suitable ink cannot escape from the air intake under the effect of gravity.

According to one method of carrying the invention into effect the ink reservoir is constituted by one or more conduits arranged in the form of a helical coil.

The above and other objects and advantages of the present invention will become apparent from the following description, when read in conjunction with the accompanying drawings illustrating, by way of example, some of the preferred embodiments of the invention, and wherein:

Figure 1 is a view of one form of the writing instrument, partially in section so as to disclose the interior thereof.

Figure 2 is a cross-sectional view taken along the line N—N of Figure 1.

Figure 3 is a schematic view of a helical conduit constituting the ink reservoir of the writing instrument.

Figure 4 and Figure 5 show further embodiments.

Figure 6 is a schematic view of another form of conduit.

Figure 7 shows a further embodiment,

[*Price* 1*s.*]

wherein the reservoir is constituted by a detachable member within the fountain-pen casing; and

Figure 8 is a view showing the separation of the reservoir.

The same reference characters are used to indicate like or corresponding parts or elements throughout the drawings.

As may be seen from the drawings, *a* is the casing of the writing instrument terminating in a tip *b* carrying the writing ball 1. This ball is suitably mounted so as to project sufficiently to engage the writing surface. The ball is held by its housing 2 sufficiently tightly to form a closure but the ball is free to rotate and hold a coating of ink which will pass out of the instrument when the ball is rotated in writing.

In order to constitute the housing for said ball 1, said tip *b* is provided with a recess 3 with which the ink feeding channel 4 receiving the liquid from the reservoir *c* communicates.

Said reservoir *c* is constituted by at least one conduit 5, which is preferably helical and, as shown in the drawings, starts at the air-intake 6, extending to the feeder 4.

In the embodiment of Figure 1, the reservoir *c* is formed by combining a body 7 and a cylinder 8 constituted by the casing *a*. For this purpose, said body 7 is threaded so as to provide a helical channel 5^1. The throat of said channel 5^1 is relatively small, for example of a section of less than 5 mm^2. The body 7 will cooperate with the cylinder 8 so that when said body 7 is housed within said cylinder, the channels 5^1 will be closed by the said cylinder 8. Under these conditions said channels 5^1 will form a coil-like conduit capable of containing a continuous vein of liquid ink.

The schematic embodiment of the coil is clearly shown in Fig. 3, wherein the conduit is represented by a helically coiled tube having a small section.

The embodiment shown in Fig. 4, comprises a helical conduit similar to that of Fig. 1, but with the difference that channel 5^1 is formed by a screw-thread provided on the inner wall of cylinder 8. In this case, the body 7 is smooth and, upon being inserted into the threaded wall forming the channel 5^1, said body 7 will close the channel and form a helical conduit 5, capable of containing a vein of liquid ink extending from the air-intake 6 to the feeding channel 4. In this embodiment the air-intake 6 is protected by a cap 9 having an orifice 6^1.

Figure 5 shows a further embodiment of the invention, similar to that of Fig. 1 in that the reservoir consists of a conduit formed by a cylinder 8 and body 7, except that in this instance, the threaded body 7 has two adjacent channels following the same helical course, after the fashion of a screw with two threads. The starting point of each channel will constitute an air-intake 6, and both the screw-threads terminate at the feeding channel 4, as shown.

Figure 6 illustrates a further embodiment of the invention, wherein the conduit 5, instead of being helical, is formed by annular convolutions which are not circumferentially closed, but communicate in series so as to form a coil which, when charged with ink, will contain a vein of liquid extending from the air-intake 6 to the feeding channel for said ball 1.

In the embodiment of Figs. 7 and 8, the reservoir *c* is formed in a member which is independent of the casing *a* and detachably housed within the said casing. In this instance, the reservoir *c* is formed by a member c^1 having a cylinder 10 terminating in a nozzle 10^1, through which the tube 4^1 of feeder 4 is screwed. Within said cylinder 10, is a body 7 which, being threaded as in the embodiment of Fig. 1 co-operates with the walls of said cylinder 10, so as to form a helical conduit 5 terminating at the tube 4^1 so that when charged with ink, it will contain a vein of liquid which will reach the ball 1 in the same manner as in the previous embodiments.

Inasmuch as the casing *a* will serve as a casing for the member c^1 constituting the reservoir *c*, it will be sufficient to detach said casing as shown in Fig. 8, in order to remove the member c^1. In order to remove said member c^1 it should be unscrewed from tube 4 when it will be free for removal and replacement. Thus, when the ink in the fountain-pen has been exhausted, the charge may be replaced through the simple replacement of said member and body 7, together constituting the reservoir.

From the foregoing it may be seen that in any of the embodiments illustrated in the different figures, the reservoir c is constituted by a conduit starting at the air-intake 6 and ending at the feed channel 4.

In charging the writing instrument with dense ink, all the cavities of the system constituted by the channels should be filled, or in other words, there should be a full charge, from the air-intake 6 to the ball 1.

Inasmuch as the conduit 5 of said reservoir *c* is of small section, when charged with ink it will contain an uninterrupted vein of liquid, as if it constituted an extension of channel 4. Due to this and

to the relatively adjusted arrangement of said ball 1 in the setting 2, whereby the tip of the instrument remains closed, the ink cannot discharge by gravity.

Notwithstanding the adjustment of the setting 2, the ball 1 will act as an intermediary means between the ink charge and the writing surface, since due to the adhesive properties of the ink, upon rotating said ball it will be coated therewith, said coating passing out of the instrument so as to define perfectly regular strokes.

As the ink is used through use of the instrument, the charge in the form of a vein of liquid will be displaced so as to occupy the space of the portion carried out by the ball.

Said vein of liquid remains uninterrupted and is displaced as a whole the rear terminal thereof being in contact with the atmosphere by means of said air-intake 6, and therefore the continuity thereof will subsist as the ink is used, and there will be no risk of interruptions.

The vein of ink reaches the ball through the feeding channel 4, and is always in contact therewith so that the feed will be permanent and the instrument will at all times be ready for use.

Inasmuch as the reservoir *c* is formed by a coil of small section the instrument may be placed in any position and used in any manner without the vein of liquid being affected by gravity.

It is obvious that in carrying the invention into practice, several changes in construction and detail will occur to those skilled in the art, without departing from the scope of the invention as clearly set forth in the appended claims.

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

1. Improvements in writing instruments of the ball-tip type, wherein the ink reservoir of said instrument is formed by one or more conduits starting at an air intake and, after following an extended path, communicating with the recess for said ball, the said conduit or conduits being of so small a cross section that a suitable ink cannot escape from the air intake under the effect of gravity.

2. Improvements in writing instruments as claimed in Claim 1, wherein the conduit or conduits constituting the reservoir is or are in the shape of a helical coil.

3. Improvements in writing instruments as claimed in Claim 1 or Claim 2 wherein the conduit forming the ink reservoir is formed by the combination of a threaded body snugly fitted within a cylinder formed by the casing of the instrument.

4. Improvements in writing instruments as claimed in Claims 1 or 2 wherein the conduit forming the ink reservoir is formed by the combination of a body snugly fitted within an inwardly threaded cylinder constituting the casing of the instrument.

5. Improvements in writing instruments as claimed in Claim 1, wherein said reservoir is constituted by a plurality of helical conduits terminating at the feed channel for said ball.

6. Improvements in writing instruments as claimed in Claim 1, wherein said ink reservoir is formed within a member detachably fitted within the casing of said instrument.

7. Improvements in writing instruments as claimed in Claims 1 and 6 wherein said member fitted within said casing is screwed to a tube constituting an extension of the ball feeding channel.

8. Improvements in writing instruments as claimed in Claim 1, wherein the conduit of said reservoir is formed by unclosed, annular convolutions successively communicating with each other.

9. Improvements in writing instruments as claimed in Claim 1, wherein said conduit is smaller than 5 mm^2 in section.

Dated this 17th day of August, 1943.
ERIC POTTER & CLARKSON,
Chartered Patent Agents,
Eighteen Park Row, Nottingham.

Abingdon: Printed for His Majesty's Stationery Office, by Burgess & Son.
[Wt. 8268A.—9/1947.]

I Certify this, including the Drawing forming part thereof, to be a true Copy

28 NOV 1949

Acting for Comptroller.

The Patent Office,
25, Southampton Buildings
LONDON, W.C.2.

to the relatively adjusted arrangement of said ball 1 in the setting 2, whereby the tip of the instrument remains closed, the ink cannot discharge by gravity.

Notwithstanding the adjustment of the setting 2, the ball 1 will act as an intermediary means between the ink charge and the writing surface, since due to the adhesive properties of the ink, upon rotating said ball it will be coated therewith, said coating passing out of the instrument so as to define perfectly regular strokes.

As the ink is used through use of the instrument, the charge in the form of a vein of liquid will be displaced so as to occupy the space of the portion carried out by the ball.

Said vein of liquid remains uninterrupted and is displaced as a whole the rear terminal thereof being in contact with the atmosphere by means of said air-intake 6, and therefore the continuity thereof will subsist as the ink is used, and there will be no risk of interruptions.

The vein of ink reaches the ball through the feeding channel 4, and is always in contact therewith so that the feed will be permanent and the instrument will at all times be ready for use.

Inasmuch as the reservoir *c* is formed by a coil of small section the instrument may be placed in any position and used in any manner without the vein of liquid being affected by gravity.

It is obvious that in carrying the invention into practice, several changes in construction and detail will occur to those skilled in the art, without departing from the scope of the invention as clearly set forth in the appended claims.

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

1. Improvements in writing instruments of the ball-tip type, wherein the ink reservoir of said instrument is formed by one or more conduits starting at an air intake and, after following an extended path, communicating with the recess for said ball, the said conduit or conduits being of so small a cross section that a suitable ink cannot escape from the air intake under the effect of gravity.

2. Improvements in writing instruments as claimed in Claim 1, wherein the conduit or conduits constituting the reservoir is or are in the shape of a helical coil.

3. Improvements in writing instruments as claimed in Claim 1 or Claim 2 wherein the conduit forming the ink reservoir is formed by the combination of a threaded body snugly fitted within a cylinder formed by the casing of the instrument.

4. Improvements in writing instruments as claimed in Claims 1 or 2 wherein the conduit forming the ink reservoir is formed by the combination of a body snugly fitted within an inwardly threaded cylinder constituting the casing of the instrument.

5. Improvements in writing instruments as claimed in Claim 1, wherein said reservoir is constituted by a plurality of helical conduits terminating at the feed channel for said ball.

6. Improvements in writing instruments as claimed in Claim 1, wherein said ink reservoir is formed within a member detachably fitted within the casing of said instrument.

7. Improvements in writing instruments as claimed in Claims 1 and 6 wherein said member fitted within said casing is screwed to a tube constituting an extension of the ball feeding channel.

8. Improvements in writing instruments as claimed in Claim 1, wherein the conduit of said reservoir is formed by unclosed, annular convolutions successively communicating with each other.

9. Improvements in writing instruments as claimed in Claim 1, wherein said conduit is smaller than 5 mm² in section.

Dated this 17th day of August, 1943.
ERIC POTTER & CLARKSON,
Chartered Patent Agents,
Eighteen Park Row, Nottingham.

Abingdon: Printed for His Majesty's Stationery Office, by Burgess & Son.
[Wt. 8268A.—9/1947.]

I Certify this (including the Drawing forming part hereof) to be a true Copy
Beg Crewe
Acting for Comptroller.
28 NOV 1949
The Patent Office,
25, Southampton Buildings,
LONDON, W.C.2.