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GB 2329155 A **GB 2208215 A**
EP 1013474 A1

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(54) Title of the Invention: **Pen and theft resistant refill**
Abstract Title: **Pen and theft resistant refill**

(57) A pen 1 comprises a pen body 4 and a first refill element 2. The pen body has an external wall 6 surrounding a cavity 8. The first refill element 2 includes a nib 12 and an elongate ink tube 14 for supplying ink to the nib and is removably insertable into the cavity 8 so it may be replaced with a replacement refill element 102 when the ink runs dry. The pen body 4 has a passage 32 that extends through the wall 6 and into the cavity 8. The passage 32 is set at an oblique angle to the length of the inserted ink tube 14. The passage has a cross-section sufficient for an ink tube end portion 15 to be inserted through the passage to push the first refill element out of the cavity 8 so that a user may remove the first refill element 2 from the pen body. The replacement refill element 102 is then inserted into the cavity 8 to take the place of the user refill element 2.

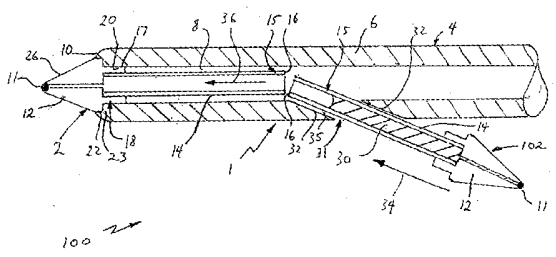

Fig. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 2007.

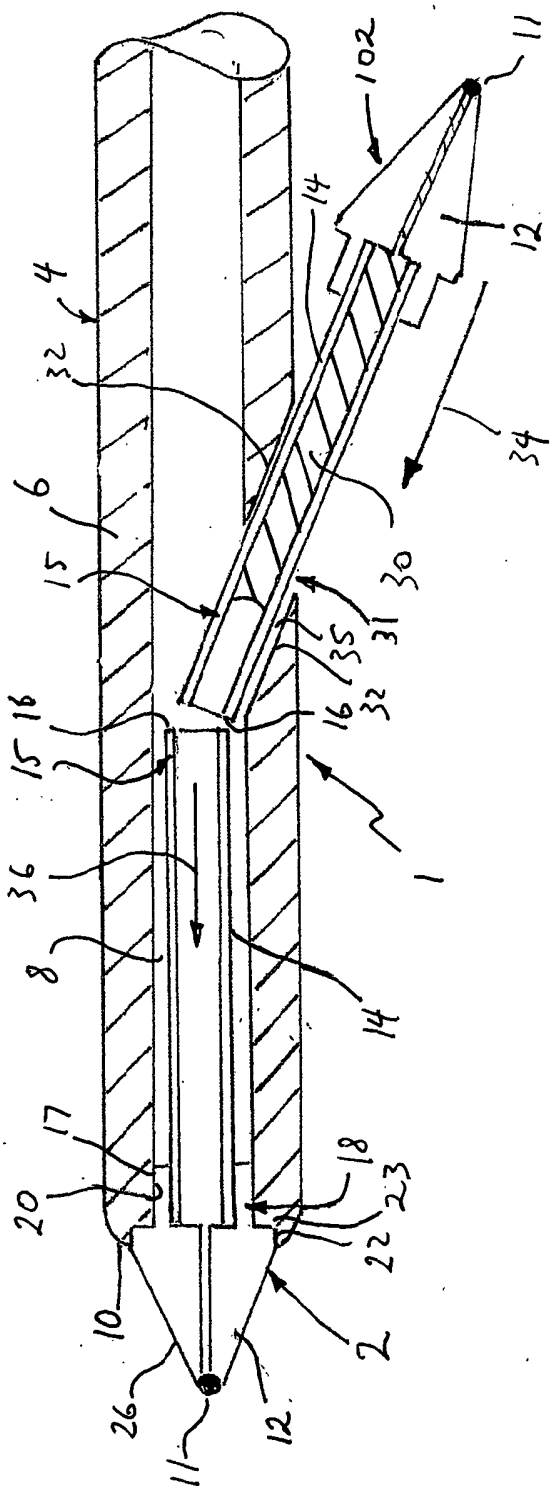
102
11
14
12
4
32
34
6
15
30
31
35
16
18
36
8
1
17
20
23
22
10
2
26
12
11
100

Fig. 1

Pen and Theft Resistant Refill

BACKGROUND

a. Field of the Invention

This invention relates to a pen with a theft resistant refill.

b. Related Art

Pens with refills are in widespread use worldwide - however where the pen is for communal use by the general public the refill element of the pen is vulnerable to theft. Although the pen may be secured to a writing station by means of a wire or chain, it is still possible for a person to remove the refill, leaving behind an empty pen body. The missing refill element may be replaced, but in the meantime the pen cannot be used by other members of the public.

It is therefore an object of the present invention to provide a pen and theft resistant replaceable refill element.

SUMMARY OF THE INVENTION

According to a first aspect of the present invention there is provided a pen comprising a pen body and a first refill element, the pen body having an external wall surrounding a cavity in the pen body and the first refill element including a nib and an elongate ink tube for supplying ink to the nib, the ink tube extending away from the nib towards an end portion of the ink tube and being removeably insertable into the cavity so that the first refill element may be replaced with a replacement refill element similar to the first refill element when the ink runs dry and the pen body having a passage that extends through the wall and into the

cavity, wherein the passage is set at an oblique angle to the length of said inserted ink tube and has a cross-section sufficient for an ink tube end portion of said replacement refill element to be inserted through the passage and into the cavity to push the first refill element in a direction out of the cavity so that a user may remove the first refill element from the pen body.

The replacement refill element may then be inserted into the cavity to take the place of the used refill element.

This arrangement makes it possible to provide a pen in which a used refill element cannot be easily removed by hand alone but can be conveniently removed by the use of another refill thus deterring or preventing the theft of the refill element by the public.

In a preferred embodiment of the invention, the passage is oriented towards the end portion of the first refill element.

The first refill element preferably makes a friction fit with the cavity, the friction fit being sufficiently strong and the nib and pen body being so shaped so that it is not possible for a user of the pen to remove the first refill element by only using fingers pulling on the nib, thus deterring or preventing the theft of the refill element by the public.

In a preferred embodiment of the invention, the ink tube is flexible so that the ink tube end portion of the replacement refill element inserted into the passage may bend into contact with the end portion of the first refill element.

The nib preferably has a tapered tip, and full insertion of the first refill element into the pen body hides all parts of the first refill element inside the body except the tapered tip of the first refill element. This helps to ensure that a member of the public cannot get a good grip on the tapered tip to remove it from the body.

According to a second aspect of the present invention, there is provided a refillable pen system comprising a pen according to the first aspect of the invention and at least one replacement refill element, the replacement refill element(s) being substantially identical in form to the first refill element.

In a preferred embodiment of the invention, the end portion of the replacement refill element comes into contact with the end portion of the first refill element when the replacement refill element is used to push the first refill element in a direction out of the cavity.

Each end portion may have an end face, in which case, the end face of the end portion of the replacement refill element comes into contact with the end face of the end portion of the first refill element when the replacement refill element is used to push the first refill element in a direction out of the cavity.

According to a third aspect of the invention, there is provided a method of replacing a used refill element with an unused refill element in a refillable pen, each refill element having a writing nib and an ink tube for providing ink to the nib and the pen having a pen body and an elongate cavity inside the pen body for holding a refill element and having a passage therethrough directed at an oblique angle to the cavity, the method comprising the steps of:

inserting an ink tube of an unused refill element through the passage and into the cavity;

- using said inserted ink tube to push the ink tube of a used refill element held by the cavity to aid removal of the used refill element prior to replacement by an unused refill element.

The unused refill element used to the aid removal of the used refill element may then be used as the replacement for said used refill element. In this way, the unused refill element to be used as the replacement refill element is used as a tool to aid removal of the used refill element.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be further described, and by way of example only, with reference to the accompanying drawing in which:

Figure 1 is a section of a refillable pen system according to a preferred embodiment of the invention, showing how an unused refill element is used to aid removal of a used refill element from a cavity within a pen body.

DETAILED DESCRIPTION

Figure 1 shows a refillable pen system 100 pen having a pen 1 that has a replaceable refill element 2 together with at least one unused refill element 102. The refill element 2 has been depleted of ink and is therefore ready for replacement.

The pen 1 has a hollow, generally elongate cylindrical body 4 which has an external wall 6 that is annular in cross-section over most of its length. The wall 6 defines an internal cylindrical cavity 8. The cavity 8 extends between a writing or nib end 10 of the pan and an opposite end (not shown) where the cavity is closed off.

The refill element 2 has a nib 12 with a ball point writing tip 11 and a hollow cylindrical ink tube 14 for holding a quantity of ink, which in this example has all been used up. The ink tube 14 extends in a straight line along an axis of the cavity away from the nib 12 towards an opposite end portion 15 of the ink tube, which terminates at an end face 16. Ion this example, the end face is an annular edge of the ink tube, but could be a continuous end face, for example of a ventilated stopper or plug (not shown) extending across the ink tube 14.

There is slack space between the ink tube and surrounding wall 6, but a cylindrical seat 18 of the nib 12 is held securely inside the cavity 8 by a friction fit between a

cylindrical surface 17 of a nib seat portion 18 and an inner surface 20 of the cavity.

The nib seat portion 18 includes a stepped cylindrical outer portion 22 having a greater diameter than the cylindrical surface 17 and which is fully concealed by a similarly stepped portion 23 of the pen body closest the nib end 10. This is done to conceal any surfaces or interfaces which would otherwise present a person fingers with a means of getting a secure hold on the nib or prising the nib 12 away from the pen body 4.

The nib 12 therefore presents only a smooth conical outer surface 26 beyond the nib end 10. The conical surface in this example is tapered at an angle of about 28° to the axis of the cavity 8 and it is preferred if this angle is no less than about 25°, again to prevent a person from getting a secure grip of the nib surface 26.

Therefore, full insertion of the refill element 2 into the body 4 hides all parts of the refill element 2 inside the body 1 except the angled tip 26 of the refill element 2, removing the ability of the user to effectively grip the refill element 2 and remove it from the body 4.

The ink tube 14 of the refill element 2 extends into the body 4, and is preferably flexible being made of nylon or similar material but can alternatively be rigid.

The replacement refill element 102 is substantially identical to the used refill element 2, except not yet having been depleted of ink 30 inside the ink tube 14.

The removal of the used refill element 2 from the body 4 is achieved by the insertion of the opposite end portion 15 of the unused refill element 102 into an orifice 31 formed into the body 4. This orifice 31 leads to a cylindrical cross-section passage 32 that extends at an oblique angle to the axis of the cavity 8 and inserted in tube 14 of the used refill element 2. The passage 32 is preferably as shown, positioned and directed at an angle which directs the end face 16 of the unused ink tube 14 of the new refill element 102 to directly abut the end face 16 of

the ink tube 6 the old refill element 2. There is a clearance gap 35 between the passage 32 and new ink tube 14 sufficiently small that the passage guides the new inserted ink tube into contact with the old ink tube 2 inside the cavity 8.

Pressure exerted by hand on the new refill element 102 in the direction of the arrow 34 forces the old refill element 2 from the pen body 4 in the direction of the arrow 36. This permits the nib 12 of the used refill element 2 to be gripped by hand and fully removed from the cavity 8.

Once the old refill element 2 is removed from the body 4 the new refill element 102 can be removed from the orifice 31 and fully inserted into the cavity 8 at the writing end 10 of the body 4 ink tube first to replace the removed old refill element 2 has been removed.

The invention therefore provides a pen with a refill element that can only be effectively removed by the use of another similar refill element, thus deterring or preventing the theft of the refill element inside the pen by the public.

CLAIMS

1. A pen comprising a pen body and a first refill element, the pen body having an external wall surrounding a cavity in the pen body and the first refill element including a nib and an elongate ink tube for supplying ink to the nib, the ink tube extending away from the nib towards an end portion of the ink tube and being removeably insertable into the cavity so that the first refill element may be replaced with a replacement refill element similar to the first refill element when the ink runs dry and the pen body having a passage that extends through the wall and into the cavity, wherein the passage is set at an oblique angle to the length of said inserted ink tube and has a cross-section sufficient for an ink tube end portion of said replacement refill element to be inserted through the passage and into the cavity to push the first refill element in a direction out of the cavity so that a user may remove the first refill element from the pen body.

2. A pen as claimed in Claim 1, in which the passage is oriented towards the end portion of the first refill element.

3. A pen as claimed in Claim 1 or Claim 2, in which the first refill element makes a friction fit with the cavity, the friction fit being sufficiently strong and the nib and pen body being so shaped so that it is not possible for a user of the pen to remove the first refill element by only using fingers pulling on the nib.

4. A pen as claimed in any preceding claim, in which the ink tube is flexible so that the ink tube end portion of said replacement refill element inserted into the passage may bend into contact with the end portion of the first refill element.

5. A pen as claimed in any preceding claim, in which the nib has a tapered tip, and full insertion of the first refill element into the pen body hides all parts of the first refill element inside the body except the tapered tip of the first refill element.

6. A refillable pen system comprising a pen, the pen being as claimed in any

preceding claim and at least one replacement refill element, the replacement refill element(s) being substantially identical in form to the first refill element.

7. A refillable pen system as claimed in Claim 6, in which the end portion of the replacement refill element comes into contact with the end portion of the first refill element when the replacement refill element is used to push the first refill element in a direction out of the cavity.

8. A refillable pen system as claimed in Claim 7, in which the end portion of each refill element has an end face, and the end face of the end portion of the replacement refill element comes into contact with the end face of the end portion of the first refill element when the replacement refill element is used to push the first refill element in a direction out of the cavity.

9. A method of replacing a used refill element with an unused refill element in a refillable pen, each refill element having a writing nib and an ink tube for providing ink to the nib and the pen having a pen body and an elongate cavity inside the pen body for holding a refill element and having a passage therethrough directed at an oblique angle to the cavity, the method comprising the steps of:

inserting an ink tube of an unused refill element through the passage and into the cavity;

- using said inserted ink tube to push the ink tube of a used refill element held by the cavity to aid removal of the used refill element prior to replacement by an unused refill element.

10. A method as claimed in Claim 9, in which the unused refill element used to the aid removal of the used refill element is used as the replacement for said used refill element.

11. A pen substantially as herein described, with reference to or as shown in the accompanying drawing.

12. A refillable pen system comprising a pen and at least one replacement refill element, substantially as herein described, with reference to or as shown in the accompanying drawing.

13. A method of replacing a used refill element with an unused refill element in a refillable pen, substantially as herein described, with reference to or as shown in the accompanying drawing.

Application No:	GB0915214.1	**Examiner:**	Mr Marc Collins
Claims searched:	1-13	**Date of search:**	9 December 2009

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	GB 2329155 A (PEIRCE)
A	-	EP 1013474 A1 (KOTOBUKI & CO LTD)
A	-	GB 2208215 A (HELIX GROUP LTD)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

Worldwide search of patent documents classified in the following areas of the IPC

B43K

The following online and other databases have been used in the preparation of this search report

EPODOC, WPI

International Classification:

Subclass	Subgroup	Valid From
B43K	0007/00	01/01/2006