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The present invention relates to writing instruments of the fountain pen kind which have a detachable writing unit. The invention relates more particularly to means which are capable of ensuring easy fitting or removal of the writing unit, that is to say of the element on which the writing member is fixed.

It is a known fact that in order to ensure that the three main sub-assemblies of a writing instrument are fixed together, namely the body, writing unit and cap, one of the most commonly used means consists in screwing the writing unit and cap onto the body.

This solution, which is advantageous in that it is easy to use, has the drawback of only being able to be used on pens where the diameter of the cap is significantly greater than that of the body, and in some instances this means that certain constraints are imposed from the point of view of aesthetics.

In order to combat this problem, a proposal has been made for the cap to be screwed onto the writing unit. In fact, it is possible for it to be given a diameter which is sufficiently reduced in order to compensate for the thickness of the cap, and in order for writing instruments to be produced wherein the surfaces of the body and of the cap are at the same level.

However, with a configuration such as this, any friction between the corresponding screwthreads of the body and writing unit has to be significantly greater than the friction between the writing unit and the cap, to prevent the body from being unscrewed from the writing unit when the cap is to be removed.

For this reason, a proposal has been made to secure the cap to the writing unit by fixing means other than by screwing, such as for example a ratchet mechanism WO-A-80/00557.

However, this latter kind of fixing is disadvantageous because when the cap is fitted or removed, a slight jolt is produced whereby spots of ink are likely to be cast onto the upper surface of the nib. Furthermore, it is a known fact that some caps are provided with an internal bell member which is responsible for maintaining a constant pressure between the inside of the cap and the reserve of the pen. Now, on being opened, the sudden withdrawal of the cap gives rise to a vacuum which causes the ink contained in the writing unit to be sucked in. This therefore increases the above-mentioned phenomena of ink drop castings.

The aim of the present invention is to propose a means for fitting together the various elements by screwing them, which means does not have the many drawbacks mentioned hereinabove.

To this end, the invention relates to a writing instrument comprising a tubular body, a cap and a writing unit provided with a writing member and capable of receiving an ink-refill cartridge, characterised in that it comprises:

- a connecting element which is free in respect of rotation with respect to said body and connected in respect of translation to said body;

- a control member which is accessible for the user from the outside of the writing instrument and which is fixed with respect to said connecting element;

- means providing for the connection of the connecting element and the writing unit in such a way that a rotary movement of said connecting element in a specific direction causes a longitudinal displacement of the writing unit in a direction which is also specific for fitting or removal thereof respectively; and

- means providing for the connection in respect of rotary movement of said writing unit and its freedom for displacement in translation with respect to said body.

In an advantageous embodiment of the invention, the connecting element will be an integral part of the writing unit.

The writing unit can be fixed to the body in respect of rotation, and can be free for translatory movement by means of a series of splines, for example, which are of a complementary profile and formed on the two pieces.

The present device enables the writing unit to be removed from the body of the fountain pen, for example in order to replace an ink-refill cartridge, without it being necessary for the cap to be removed first. The cap can therefore be used by the user to hold the writing unit during the removal operation, which, particularly if the writing units are small in size, will prevent fingers becoming dirty on contact with the nib. There follows a description of several embodiments of the invention, given together with the accompanying drawings, wherein:

Figure 1 shows a longitudinal section of a fountain pen, with the cap removed, and provided with a device according to the invention;

Figure 2 shows a variant of a fountain pen of this kind, wherein the connecting element is an integral part of the control member;

Figures 3 and 4 show longitudinal sections and transverse sections respectively of a specific kind of connection between the control member and the connecting element;

Figures 5 and 6 show a longitudinal section and transverse section respectively of a specific means for transforming rotational movement of the connecting element into a translatory movement of the writing unit;

Figures 7 and 8 show partial longitudinal sections of means which are capable of ensuring that the control member is fixed in respect of translatory movement and is free to rotate with respect to the body.

In Figure 1, the body 1 of a fountain pen basically comprises a writing unit 3, a control member 5 and a connecting element 7 for these two parts. A fountain pen of this kind also has a cap 2 (Figure 2).

The writing unit 3 is connected in rotation to the body 1, and it retains its freedom for translatory displacement with respect to the body by means of a series of splines 16 which are of complementary shape and formed on the pieces.

The control member 5, cylindrical in shape, is accommodated in a cavity 9 provided at the end of the body 1 opposite the writing unit. This control member consists of a pivoting gripping ring 11 and an internal circular boss 13.

The connecting member 7 is formed by a tube provided at one of its ends with an internal screwthread 15 and fixed at the other end thereof to the boss 13 of the control member 5.

It has a circular groove 17 lodged in an annular recess 19 of the body 1, and intended to ensure that it is connected in translatory movement to the body 1, whilst being left free to rotate therewith.

The writing unit 3 is formed by a cylindrical element enclosing various capillary systems which are needed for the writing instrument to function properly. It terminates at one end with a nib 21 and at the other end with a bevelled tip 23 capable of ensuring that an ink-refill cartridge 24 is pierced when it is put in position, and ensuring that this is subsequently held in place. The end of the unit 3 opposite the nib 21 has an outer screwthreaded portion 25 which is capable of receiving the inner screwthreaded end 15 of the connecting tube 7.

When the pen is in the position of use (Figure 1), in order to change the ink-refill cartridge 24, the gripping ring 11 is lifted and by using this as an aid, the control member 5 is rotated in the direction of unscrewing, whereby the tube 7 is caused to rotate. Since the writing unit 3 cannot rotate, but is able to be displaced in respect of translatory movement with respect to the body, rotational movement of the tube 7 is transformed into translatory movement, and the writing unit is displaced longitudinally until its screwthread 25 is no longer engaged with the screwthread 15 of the tube 7. It can then be removed from the body 1 so that the ink-refill cartridge 24 can be changed.

In order to set about refitting the writing unit 3, the reverse procedure is simply carried out.

Naturally, any other means can be used to provide the translatable connection and capacity to freely rotate, of the connecting element formed by the tube 7, with respect to the body 1.

Thus, as shown in Figure 7, the body 1' is provided on the internal wall thereof with a circular boss 27, the internal face of the control member 5' bearing against one face of the boss. The tube 7' is attached by force to the internal circular boss 13' of the control member 5', so as to ensure that these elements are completely fixed to one another.

The control member 5' and the tube 7' are thus totally free to rotate with respect to the body 1, but they are connected thereto for any longitudinal displacement.

In Figure 2, the writing unit 3' is extended inside the body 1' by a tubular portion 4 which itself ends with a screwthread 6 which is screwed onto a corresponding screwthread formed on the control member 5', in order to ensure that the rotary movement brought about by the control member is transformed into translatable movement of the writing unit 3'.

It is, of course, possible for this transformation to be produced by any other means, without coming outside the scope of the invention.

Thus, as shown in Figures 5 and 6, the body 1' is hollowed out by a bore 31, hexagonal in shape, and intended to receive a portion 33, complementary in shape, of a writing unit 3'. A tube 7', fixed to the control member (not shown in the drawings) is hollowed out by a helicoidal groove 34 which is intended to act as a guide for a lug 35, fixed to the writing unit.

When the device is in the position shown in Figure 5, in order to remove the writing unit 3, the tube 7' is turned, with the aid of the control member, in the direction of unscrewing. Since the writing unit 3' is fixed in

rotation with the body 1', the lug 35 is under constraint to become displaced in the groove 34, and the writing unit gradually emerges from the body of the pen so as to become removed therefrom just as the lug arrives at the entrance 37 to the groove 33. Positioning is effected by an inverse manoeuvre.

In order to avoid the writing unit becoming jammed on the body, and in order to facilitate subsequent removal thereof, it is advantageous to limit the gripping connection thereof by fixing the control member 5' to the connecting tube 7' by the intermediary of a torque limiting device.

Thus, in Figures 3 and 4, the control member 5' consists of a ratchet wheel 41 which meshes on a part of the tube 7' which is of complementary shape. This latter will be cleaved over a certain length so that a specific degree of elasticity is conferred thereupon.

During fitment, when the gripping torque applied by the user exceeds the resisting torque of the teeth of the ratchet wheel 41 on the tube 7', the ratchet escapes and begins to rotate. Therefore, it is not possible to exceed a given torque. On being removed, since the teeth of the ratchet are turned in the opposite direction, the torque to be provided prior to release will be much greater than before. Thus, it is certain that an unscrewing torque will be available which is greater than the gripping torque.

Figure 8 shows an embodiment of Figure 2 wherein the cylindrical portion 8' of the control member 5' is always screwed into a suitable internal screwthread of the tube 7'. In this variant, however, the outer face of the portion 8' and the inner face of the body 1' are hollowed out in positions opposite to the two annular grooves, 46 and 47 respectively, which together define a recess intended to receive an annular ring 48 which thus ensures that the control member 5' is fixed in respect of translatory movement and is free to rotate with the body 1'. Thus, when the control member 5' is completely unscrewed, it is prevented from becoming detached from the writing instrument.

In its various embodiments, the invention therefore provides simple means for assembling and re-assembling the writing unit.

CLAIMS

1. A writing instrument comprising a tubular body (1, 1'), a cap (2) and a writing unit (3, 3') fitted with a writing member (21) and capable of receiving an ink refill cartridge (24), characterised in that it comprises:

- a connecting element (7, 7') which is free in respect of rotation with respect to said body (1) and connected in respect of translation to said body;

- a control member (5, 5') which is accessible for the user from the outside of the writing instrument and which is fixed with respect to said connecting element (7, 7');

- means providing for coupling of the connecting element (7, 7') and the writing unit (3, 3') in such a way that a rotary movement of said connecting element in a specific direction causes a longitudinal displacement of the writing unit (3, 3') in a direction which is also specific for fitting or removal thereof respectively); and

- means providing for the connection in respect of rotary movement of said writing unit (3, 3') and its freedom for displacement in translation with respect to said body (1, 1').

2. A writing instrument according to claim 1 characterised in that said writing unit (3) and said body (1) are connected in respect of rotary movement and free in respect of translation by way of splines (16) of complementary shape which are disposed in facing relationship.

3. A writing instrument according to claim 1 characterised in that said control member (5') bears against an internal projection (27) of the body (1).

4. A writing instrument according to one of claims 1 to 3 characterised in that said control member (5') and said body (1') comprise annular grooves (46, 47) which are disposed in facing



relationship and into which a ring (48) is engaged.

5. A writing instrument according to claim 1 characterised in that said connecting element (7) forms an integral part of the control member (5').

6. A writing instrument according to claim 5 characterised in that said writing unit (3') is extended in the interior of said body (1') by a tubular portion (4) which is fixed by means of a screwthreaded portion with respect to the control member (5').

7. A writing instrument according to claim 6 characterised in that a portion of said writing unit (3') is locked in respect of rotary movement in a bore (31) of said body (1') and comprises a lug (35) engaged in a helical groove in said tube (7').

8. A writing instrument according to claim 7 characterised in that a torque limiting device is interposed between the control member (5') and the connecting element (7').

9. A writing instrument according to claim 8 characterised in that the torque limiting device comprises a ratchet wheel (41) engaging on a portion of corresponding shape of said tube (7').