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SPECIFICATION

TITLE OF THE INVENTION

WRITING INSTRUMENT

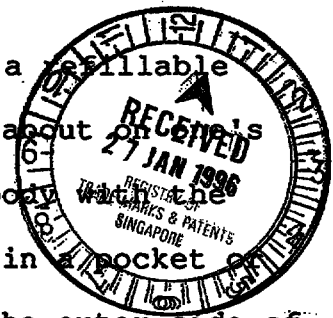
BACKGROUND OF THE INVENTION

5 This invention relates to a writing instrument such as a refillable pencil or mechanical pencil. More particularly, the invention relates to a writing instrument of the type in which a cap having a clip is detachably fitted on one end of an elongated cylinder
10 constituting the main body of a writing instrument.

Writing instruments of the aforesaid type having a main body and a cap have long been in wide use. The main body has a cylinder the front end (the writing end) of which is provided with a cap-fitting portion.

15 Contiguous with the cap-fitting portion on the cylinder is a gripping portion located rearwardly of the cap-fitting portion and having an outer peripheral surface provided with a number slip-preventing annular grooves juxtaposed in the axial direction.

20 When a writing instrument such as a refillable pencil or mechanical pencil is carried about by a person, the major portion of the main body with the exception of the tip thereof is placed in a pocket of the like, and a fabric or the like on the outer side of
25 the pocket is clamped between the main body of the cap and the clip of the cap fitted onto the tip of the cylinder constituting the main body of the writing instrument. The writing instrument is held in place by



the clipping force of the resilience clip.

However, a problem encountered with the conventional writing instrument of the kind described above is that
5 when the cap is subjected to an axially directed external force such as an upwardly acting force that attempts to detach the cap from the cylinder of the main body of the writing instrument while the instrument is being carried on one's person, the cap detaches from the fabric on the
10 outer side of the pocket and either or both of the cap and main body may fall out of the pocket.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a
15 writing instrument which solves the aforementioned problem without resulting in a more complicated shape and structure of the writing instrument, and without detracting from the external appearance thereof.

20 Another object of the present invention is to provide a writing instrument in which the cap will not become detached from a pocket or the like owing to application of an external force while the writing instrument is being carried about, thereby making it possible to
25 prevent the cap and the main body of the writing instrument from falling out of the pocket.

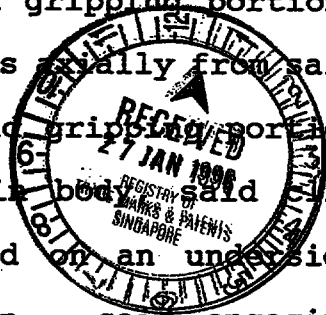
According to the present invention, the foregoing objects are attained by providing a writing instrument comprising:

a detachable cap; and

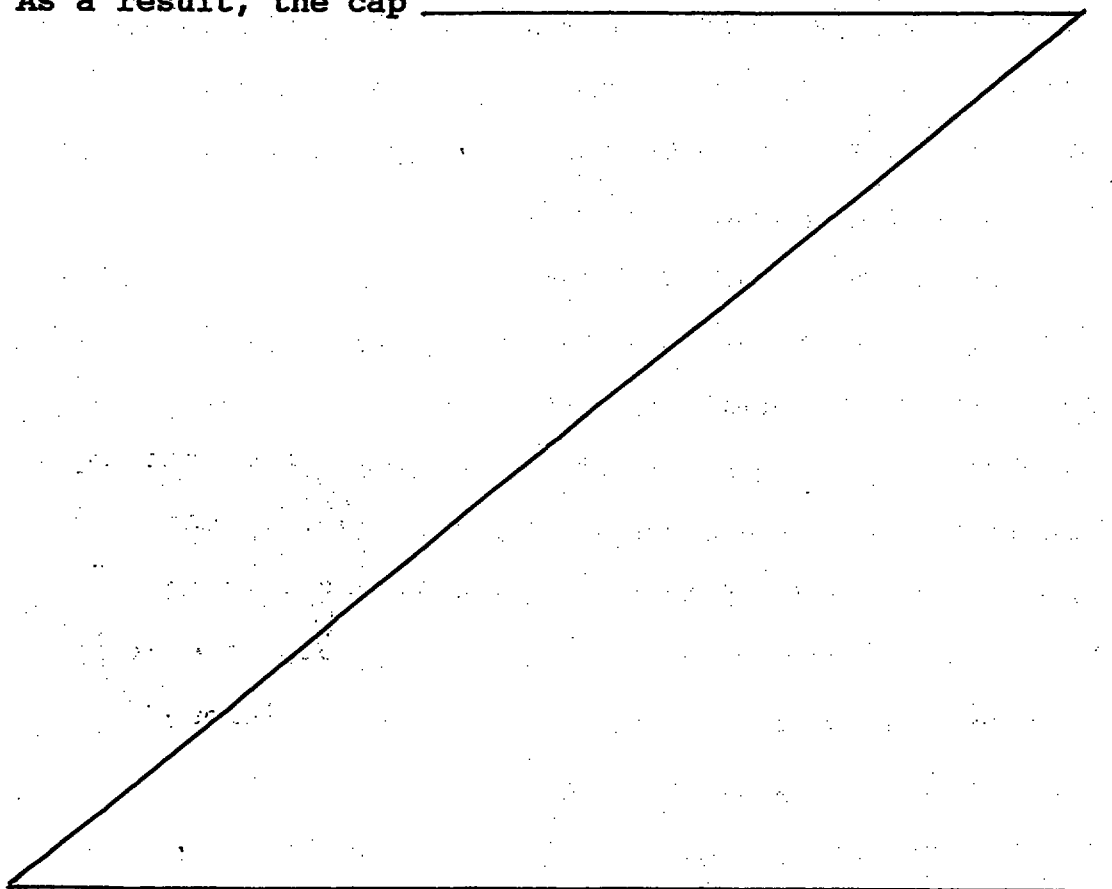
5 an elongated tubular main body including a cylinder provided with, near a writing end of said main body, a cap-fitting portion, and a gripping portion;

said gripping portion being further from the writing end than the cap-fitting portion, and said gripping
10 portion having an outer diameter larger than that of said cap-fitting portion so that an annular step exists between the gripping and cap-fitting portions and the gripping portion, on an outer peripheral surface, being provided with a plurality of axially juxtaposed annular
15 slip-preventing grooves; and

said cap being detachably fittable on said cap-fitting portion of said cylinder, said cap having an outer diameter equal to that of said gripping portion, said cap including a clip which extends axially from said
20 cap so as to reach a point above said gripping portion when said cap is fitted to said main body, said clip having an engaging projection formed on an underside thereof facing said gripping portion, said engaging projection engaging with one of said slip-preventing
25 grooves of said gripping portion when said cap is fitted to said main body.



The writing instrument of the invention is such that when the instrument is carried about on one's person, the engaging projection protruding from the underside of the portion of the clip extending rearwardly of the cap
5 deforms the fabric on the outer side of a pocket or the like and presses the fabric against the slip-preventing grooves provided on the outer peripheral surface of the gripping portion of the cylinder constituting the main body of the writing instrument. Thus the engaging
10 projection and the gripping portion of the cylinder engage each other via the fabric clamped between them. As a result, the cap



and the main body of the writing instrument can be prevented from falling out of the pocket or the like even if the clip is subjected to an upwardly directed external force attempting to dislodge the cap or writing instrument main body from the fabric.

Further, the cap and the main body of the writing instrument are prevented from falling out of a pocket or the like by utilizing the slip-preventing grooves provided on the gripping portion of the cylinder. Thus, the grooves used in the prior art merely for the purpose of preventing slipping are made to function also as means for preventing the cap, etc., from falling off. As a result, there is no increase in the number of component parts and the shape of each component part is not made more complicated.

Since the gripping portion of enlarged outer diameter is formed below the cap-fitting portion of the cylinder with the step portion intervening between them, the cap can be fitted onto the fitting portion to the prescribed depth by bringing the end face of the cap at its opening into abutting contact with the step portion. The cap will not readily loosen with respect to the cylinder, and the engaging projection of the clip provided on the cap can be accurately positioned opposite the slip-preventing grooves.

Furthermore, since the outer diameter of the open end of the cap is made equal to the outer diameter of the gripping portion of the cylinder, the gripping



portion and the cap are perfectly flush. This means that when the writing instrument is inserted into a pocket or the like, the cap will not catch on the upper edge of the fabric on the outer side of the pocket, and therefore the force applied to the cap to extract the writing instrument from the pocket can be reduced. In addition, the overall writing instrument with the exception of the clip can be made slender in shape, thereby providing the writing instrument with an attractive external appearance.

Other features and advantages of the present invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an overall view showing the external appearance of a writing instrument according to an embodiment of the present invention;

Fig. 2 is an enlarged longitudinal sectional view, a portion of which is deleted, showing the writing instrument of Fig. 1;

Fig. 3 is an exploded perspective view showing the writing instrument of Fig. 1;

Fig. 4 is an enlarged transverse sectional view taken along line A-A of Fig. 2;

Fig. 5 is an enlarged transverse sectional view

taken along line A-A of Fig. 2; and

Fig. 6 is a partially enlarged sectional view showing the writing instrument of Fig. 1 clipped on a pocket.

5 DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of a writing instrument according to the present invention will now be described in detail with reference to the accompanying drawings.

As shown in Figs. 1 through 5, a writing instrument
 10 embodying the present invention comprises a main body 1 and a cap 2. The main body 1 of the writing instrument has a cylinder 3. The latter includes a main cylinder 4 having a front end 4a (where "front" refers to the side on the writing end of the instrument), and a grip
 15 cylinder 5 screwed onto the front end 4a of the main cylinder 4 so as to be secured thereto. The grip cylinder 5 has a front end formed to include a cap fitting portion 5a, and a gripping portion 5c, the diameter of which is larger than that of the cap fitting
 20 portion 5a. The gripping portion 5c is formed below the cap fitting portion 5a with a step portion 5b intervening between them. The cap fitting portion 5a has a tapering outer peripheral surface and a wall thickness which becomes gradually smaller toward the
 25 front end. The gripping portion 5c has a number of annular slip-preventing grooves 5d axially juxtaposed on its outer peripheral surface, and the front portion of the inner peripheral surface of the gripping portion 5c



is formed to have a plurality (six in this embodiment) of axially extending small projecting ribs 5e spaced apart equidistantly in the circumferential direction.

The main cylinder 4 has an intermediate portion 4c between front and rear ends 4a, 4b thereof and is formed so that the outer diameter of the intermediate portion 4c is equal to that of the gripping portion 5c of the grip cylinder 5. The rear end 4b (where "rear" refers to the side opposite the writing end of the instrument) of the main cylinder 4 is formed so that its outer diameter is smaller than that of the intermediate portion 4c, the outer peripheral surface of the lower end portion 4b is provided with a plurality of annular ribs 4d, and the inner diameter of the rear end 4b is made slightly larger than that of the intermediate portion 4c.

A rear cylinder 6 has an outer cylinder 6a that is press-fitted onto the lower end 4b of the main cylinder 4, a rear portion 6b the diameter of which is reduced via a step portion 6c which comes into abutting contact with the rear end of the main cylinder 4, and a core-retaining inner cylinder 6d which projects forwardly of the step portion 6c. The inner cylinder 6d is situated within the rear end 4b of the main cylinder 4 and has a front end portion which tapers freely toward the central axis thereof. The inner cylinder 6d is of reduced wall thickness and is formed to include a notch 6e at its front end portion.

With the exception of the front end of the grip cylinder 5 and the core-retaining inner cylinder 6d of the rear cylinder 6, the inner diameter of the cylinder 3 is made slightly larger than that of a holding cylinder 8 of a refill core 7, described below.

The refill core 7 is so adapted that a pencil lead 9 is secured in a reduced-diameter portion of the holding cylinder 8 in such a manner that the pencil lead 9 protrudes from the tip of the holding cylinder 8. The holding cylinder 8 has an enlarged-diameter portion formed to include a plurality (four in this embodiment) of axially extending ribs 8a spaced apart equidistantly in the circumferential direction, and a front end of reduced diameter.

The interior of the cylinder 3 houses up to ten of the refill cores 7 in such a manner that the reduced-diameter front end of each holding cylinder 8, as well as its pencil lead 9, is inserted into the enlarged-diameter portion of the holding cylinder 8 in front of it, as illustrated in Fig. 2. The leading holding cylinder 8 of the refill core 7 is held resiliently by the front end portion of the grip cylinder 5. The rearmost holding cylinder 8 of the refill core 7 is held resiliently by the core-retaining inner cylinder 6d of the rear cylinder 6.

As shown in Figs. 1, 2 and 3, the cap 2 has a substantially cylindrical cap main body 10 the outer diameter of which is equal to that of the gripping



portion 5c of cylinder 3. The outer peripheral surface of the crown of cap main body 10 is unitarily provided with a base end 11a of a clip 11. The clip 11 is formed extending from the base end 11a toward and beyond the opening of the cap main body 10 in a direction parallel to the axis of the cap. A substantially semicircular plate-shaped engaging projection 11b is formed on the underside of the clip 11 near the tip on the portion thereof extending axially beyond the opening of the main body 10.

A support plate 12 having a center hole 12a is formed on the inner periphery of the crown 10a of cap main body 10. A plurality (four in this embodiment) of small ribs 10b are formed in equidistantly spaced relation in the circumferential direction on the inner peripheral surface of the main body 10 on the crown side of the support plate 12. A columnar eraser 13 is press-fitted into the crown 10a of main body 10 from an opening on the crown side and is held within the crown 10a with its outer peripheral portion engaging the ribs 10b. As a result, the eraser 13 is prevented from turning about its axis and from falling out in the axial direction.

The crown 10a of cap main body 10 is provided on its outer peripheral surface with a cover mounting portion 10c of reduced outer diameter. A generally bowl-shaped cover 14 is detachably fitted onto the mounting portion 10c and serves to cover the eraser 13.

The cap main body 10 of the cap 2 constructed as set forth above is fitted onto, and is resiliently held by, the cap fitting portion 5a of the grip cylinder 5 provided on the front end of the cylinder 3 of the main body 1 of the writing instrument, and the portion of the leading core 7 projecting from the front end of the grip cylinder 5 is covered by the cap main body 10. Under these conditions, the open end of the cap main body 10 is in abutting contact with the step 5b of the grip cylinder 5 provided on the cylinder 3 and the engaging projection 11b provided on clip 11 engages one of the slip-preventing grooves 5d of gripping portion 5c with almost no gap between the engaging projection and the groove.

In this embodiment, the main cylinder 4 and the gripping cylinder 5 constituting the cylinder 3, the rear cylinder 6, the holding cylinders of the cores 7, the cap main body 10 constituting the cap 2, and the cover 14 are molded articles consisting of synthetic resin, and the grip cylinder 5, rear cylinder 6 and cap main body 10 are formed of a material exhibiting resilience.

Further, the main cylinder 4 of cylinder 3 is white in color, the grip cylinder 5, the rear cylinder 6 and the eraser 13 are of the same color, such as green, or are similar in color, and either or both of the cap 2 and cover 14 are transparent, thus providing an attractive external appearance.



In order to carry about the refillable pencil of this embodiment, the main body 1 of the writing instrument is inserted into a jacket pocket 15 from above, as shown in Fig. 6, and fabric 15a on the outer side of the pocket 15 is resiliently clamped between the clip 11 on one side and the cap main body 10 and cylinder 3 of the writing instrument main body 1 on the other side.

Under these conditions, the engaging projection 11b on the clip 11 deforms the fabric 15a on the outer side of the pocket 15 and presses the fabric against one of the annular slip-preventing grooves 5d provided on the outer peripheral surface of the gripping portion 5c of cylinder 3. As a result, the engaging projection 11b and the cylinder 3 are engaged via the fabric 15a. Consequently, the cap 2 and the main body 1 of the writing instrument can be prevented from falling out of the pocket 15 even if the clip 11, which is situated on the outer side of the fabric 15a, is subjected to an upwardly directed external force attempting to dislodge the cap or writing instrument main body from the fabric.

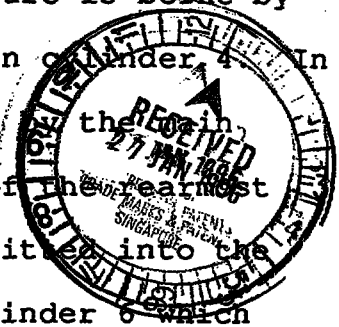
The use of the refillable writing instrument according to this embodiment will now be described.

The cap main body 10 of the cap 2 is detached from the cap fitting portion 5a of the grip cylinder 5 provided on the front end of the cylinder 3 of main body 1, and the pencil lead 9 of the leading refill core 7 is used to write on paper or the like while the writer

grasps the gripping portion 5b of the grip cylinder 5.

During writing, writing pressure is applied from the front end of the pencil lead 9 of the leading core 7 toward the rear of the writing instrument main body 1.

- 5 The writing pressure is borne by the holding cylinder 8 of the leading core 7. Since the holding cylinder 8 is resiliently retained in the cap fitting portion 5a of the grip cylinder 5, the writing pressure is in turn borne by the main cylinder 4 to which the grip cylinder
- 10 5 is secured by being screwed thereon. The holding cylinder 8 of the leading core 7 is supported on the immediately underlying holding cylinder 8 of the next core 7, this holding cylinder 8 is supported on its underlying holding cylinder, and so forth. Therefore,
- 15 the writing force is transmitted to the holding cylinder that is second from the rear. This holding cylinder 8 received by the front end of the core-retaining inner cylinder 6d, the front end of which enlarges
- 20 diametrically so that the writing pressure is borne by the inner peripheral surface of the main cylinder 4. In addition, the writing pressure is borne by the rear end of the inner cylinder 4 via the holding cylinder 8 of the rear core 7, which cylinder is resiliently fitted into the inner cylinder 6d, and via the rear cylinder 6 which
- 25 resiliently retains this holding cylinder 8.
- Accordingly, the writing pressure applied to the leading core 7 is borne by the main cylinder 4 upon being dissipated, whereby the leading core 7 will not retract



or flex sideways owing to the writing pressure.

- When the pencil lead 9 of the leading core 7 becomes unusable because of wear or breakage, the writer grasps the front end of this holding cylinder 8 and
- 5 pulls it forwardly out of the cylinder 3. The holding cylinder 8 thus extracted is then pressed from its tip into the holding cylinder 8 of the rearmost core 7, whereby each core 7 is advanced so that the core 7 which was second from the front is made the leading core.
- 10 Writing may then be performed using the pencil lead 9 of this core. Thereafter, by repeating this operation, a large number of characters can be written using all of the cores 7 provided within the cylinder 3. When all of the cores 7 become unusable, new cores 7 can be loaded
- 15 in the cylinder 3 to replace the unusable cores 7.

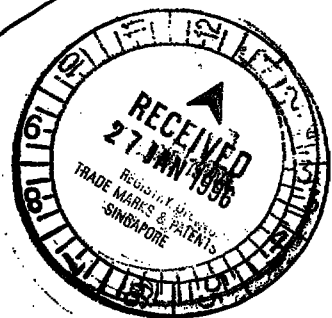
The eraser 13 is used upon removing the cover 14 from the cover mounting portion 10c of cap 2. After the eraser 13 has been used, the cover is again fitted onto the mounting portion 10c.

- 20 In this embodiment, the support plate 12 provided on the cap main body 10 is furnished with the center hole 12a, as shown in Figs. 2 and 3. This makes it possible to remove the eraser 13 from the crown 10a of the cap main body 10 by passing a slender rod through
- 25 the center hole 12a from the open end of the cap main body 10 and forcing out the eraser 13 by means of the rod.

In the present invention, the illustrated

embodiment is such that the main cylinder and grip cylinder of the cylinder are separate bodies. However, these can be molded as a single part. In addition, the clip and the cap can be made separate bodies, and these
5 can be fixed together or connected to each other and constrained in the axial direction. Furthermore, the slip-preventing grooves and the cross-sectional shape of the engaging projection of the clip can be modified as required, and the engaging projection can be made to
10 press against the slip-preventing grooves.

Further, the present invention is not limited to a refillable pencil but is applicable also to a wide variety of writing instruments, such as a mechanical
15 pencil, ball-point pen, etc.



CLAIMS

1. A writing instrument comprising:

a detachable cap; and

5 an elongated tubular main body including a cylinder provided with, near a writing end of said main body, a cap-fitting portion, and a gripping portion;

said gripping portion being further from the writing end than the cap-fitting portion, and said gripping
10 portion having an outer diameter larger than that of said cap-fitting portion so that an annular step exists between the gripping and cap-fitting portions and the gripping portion, on an outer peripheral surface, being provided with a plurality of axially juxtaposed annular
15 slip-preventing grooves; and

said cap being detachably fittable on said cap-fitting portion of said cylinder, said cap having an outer diameter equal to that of said gripping portion, said cap including a clip which extends axially from said
20 cap so as to reach a point above said gripping portion when said cap is fitted to said main body and said clip having an engaging projection formed on an underside thereof facing said gripping portion, said engaging projection engaging with one of said slip-preventing
25 grooves of said gripping portion when said cap is fitted to said main body.



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2. A writing instrument substantially as herein described with reference to the accompanying diagrammatic drawings.

