United States Patent

Terasaki

[15] **3,700,340**

[45] **Oct. 24, 1972**

[54] **MULTICOLOR BALL-POINT PEN**

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[73] Assignee: **Nikko Pen Kabushiki Kaisha,** Tokyo, Japan

[22] Filed: **Sept. 8, 1970**

[21] Appl. No.: **70,080**

[52] **U.S. Cl.**.....**401/33,** 401/110

[51] **Int. Cl.**.....**B43k 5/16,** B43k 27/12

[58] **Field of Search**.....401/29–33, 110

[56] **References Cited**

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Primary Examiner—Lawrence Charles

Attorney—Holcombe, Wetherill & Brisebois

[57] **ABSTRACT**

The present invention relates to a ratchet-type multicolor ball-point pen, the rotatable cylinder of which is rotated by vertical movement of an actuating stem and which cylinder is provided with an inclined surface, a vertical surface, and a notch between said surfaces, said notch and inclined surface being adapted to cooperate with the tops of a plurality of ink-reservoirs, and shift said reservoirs successively into the writing position in response to vertical movement of the actuating stem.

5 Claims, 17 Drawing Figures

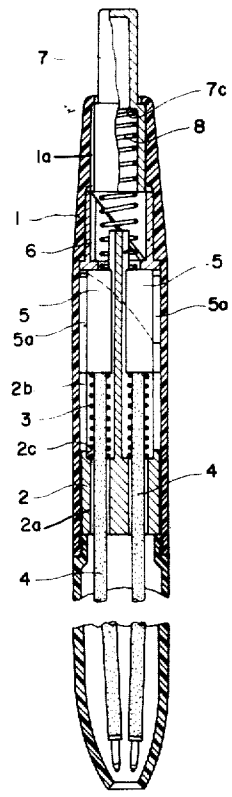


FIG. 1

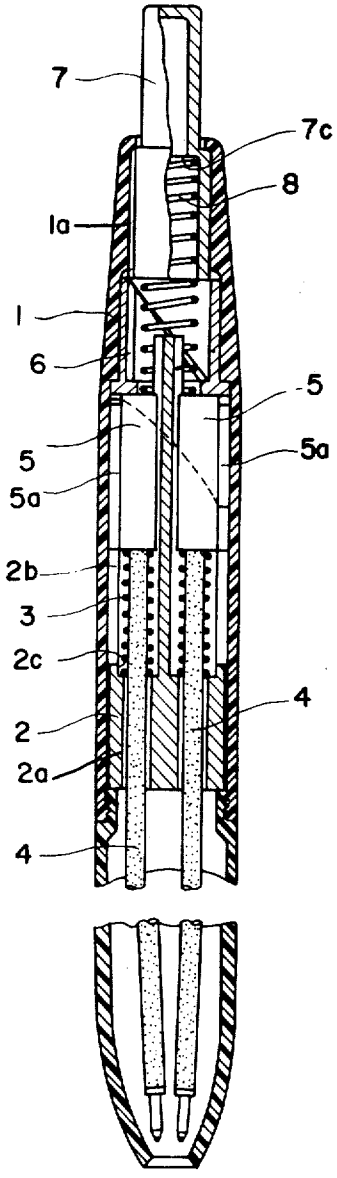


FIG. 2(A)

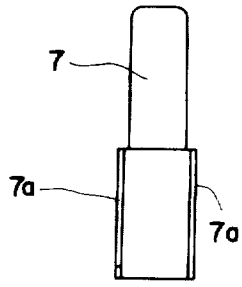


FIG. 2(B)

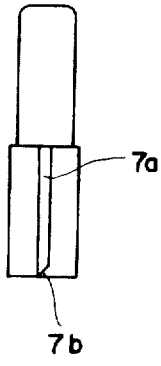


FIG. 2(C)

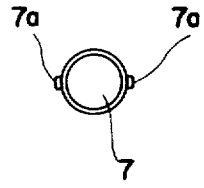


FIG. 3 (A)

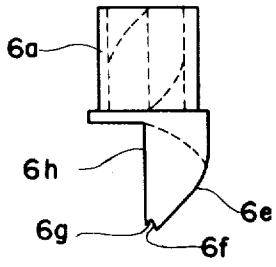


FIG. 3 (B)

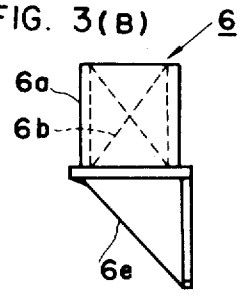


FIG. 3(D)

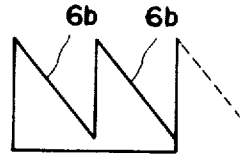


FIG. 3(C)

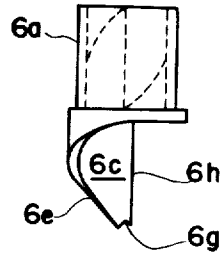


FIG. 4B

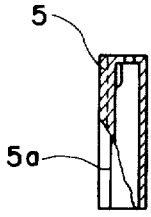


FIG. 4A

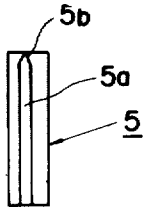


FIG. 5

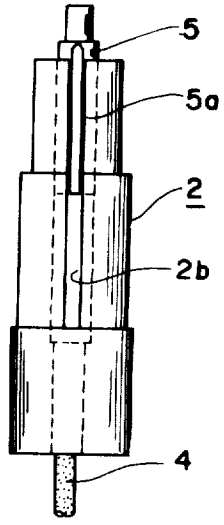


FIG. 6A

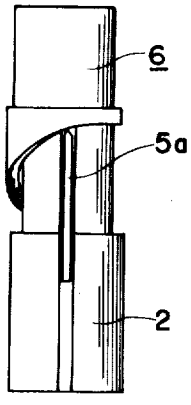


FIG. 6 B

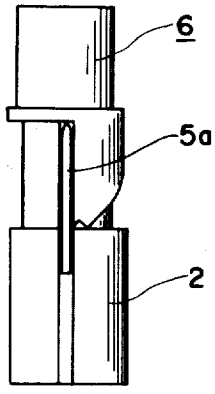


FIG 7B

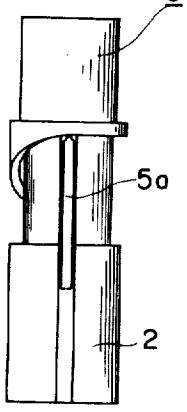


FIG. 7A

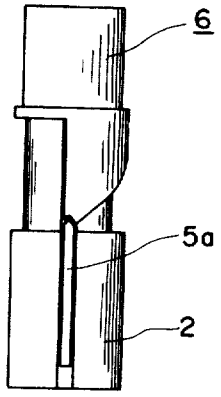


FIG. 8

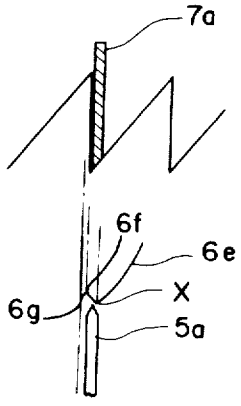
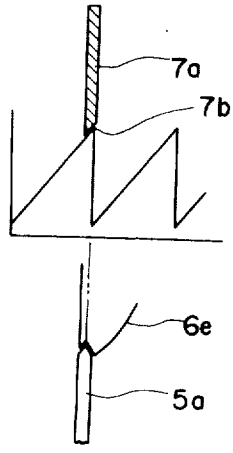


FIG. 9



MULTICOLOR BALL-POINT PEN

SUMMARY OF THE INVENTION

This invention relates to a ratchet-type multicolor ball-point pen.

The principal objective of this invention is to provide a ratchet-type multicolor ball-point pen so constructed that a rotatable cylinder operated by vertical movement of an actuating stem is provided with an inclined surface at its bottom, a vertical surface, and a notch between said surfaces, said inclined surface being positioned to engage caps attached to the tops of a plurality of ink reservoirs so that when said actuating stem is depressed, one of said reservoirs is shifted into the writing position.

Other objects of this invention will become apparent from reading the following description, with reference to the accompanying drawings.

In a conventional multicolor ball-point pen, either the operating members attached to the ink reservoir of the ball-point pen are respectively depressed by the finger, or a depressing stem is caused to act on an ink reservoir of the desired color, so that the depression of said stem holds the writing tip of said reservoir in a writing position. Applicant, however, knows of no ratchet-type multicolor ball-point pen heretofore devised in which an indiscriminate depression of the actuating stem can shift one of the ink reservoirs to the writing position.

The present invention provides a ratchet-type multicolor ball-point pen by combining a nonrotatable, vertically slidable actuating stem, capped ink-reservoirs, and a rotatable cam or rotor which rotates about a fixed point.

FIG. 1 is a longitudinal section taken through a pen according to this invention;

FIG. 2(A) shows an actuating stem in elevation;

FIG. 2(B) is a side view of said stem taken from the right of FIG. 2(A);

FIG. 2(C) is an end view of said stem;

FIG. 3(A) is a front view of the rotor of the pen;

FIG. 3(B) is a side view of the rotor, taken from the left of FIG. 3(A);

FIG. 3(C) is a rear view of the rotor;

FIG. 3(D) is a developmental view of the inclined surfaces provided within the top part of the rotor;

FIG. 4(A) is a front view of a cap to hold an ink-reservoir;

FIG. 4(B) is a partial longitudinal section through the cap of FIG. 4(A);

FIG. 5 is an elevational view of the joint in which the ink-reservoirs are inserted; and

FIGS. 6–9 illustrate the relationships between the actuating stem, the rotor, and the cap, at various stages of operation.

The drawings show a two-color ball-point pen, comprising a hollow pen-holder 1 made in two parts screwed together near the middle of the pen. A joint 2 is seated within the pen-holder and provided with two longitudinal bores 2*a* for receiving ink-reservoirs. The walls of these bores are provided with longitudinal slots 2*b* near their upper ends, and formed with shoulders 2*c* which support the bottom ends of coil springs 3. Each ink-reservoir 4, having a writing tip at its bottom is inserted in one of the bores 2*a* of the joint and the top of each reservoir is covered by a cap 5. The cap 5 carries

external longitudinal ribs 5*a* which taper to a sharp outer edge. Each rib 5*a* engages in a guide groove 2*b*. Each coil spring 3 is compressed between a cap and the joint. Reference numeral 6 indicates a substantially cylindrical rotor, the upper part 6*a* of which is provided with two internal inclined surfaces 6*b*, as shown in FIG. 3(D), separated by a vertical surface. The lower portion 6*c* of the rotor abuts the cap rib 5*a* which projects through a slot 2*b* in the joint and carries a group of inclined surfaces having the function of depressing or releasing the caps, thereby bringing the pen into a writing or non-writing condition. Specifically, the lower portion 6*c* of the rotor has curved part-cylindrical surface 6*e*, a first inclined surface 6*f* and a second oppositely inclined surface 6*g* which cooperate to form a notch. The surface 6*f* adjoins the lower most part of the surface 6*e* and a vertical surface 6*h* leads from said second surface 6*g* to the upper portion of the surface 6*e*. These inclined surfaces occupy almost half the area of said rotor, the other half being flat. The rotor 6 is mounted for rotation about a fixed point within the pen-holder. Specifically, a shoulder within the pen-holder engages a shoulder on the rotor 6 and the lower end of the rotor is supported by the top of the joint. The actuating stem 7 projects out of the top of the pen-holder. The rib 7*a* at the bottom of this stem slidably engages the longitudinal groove 1*a* in the pen-holder. The bottom of the rib 7*a* in the actuating stem 7 has an inclined surface 7b which abuts the inclined surface 6*b* of the rotor 6*a*. A coil spring 8 abuts the top of the cap 5 and the inner shoulder 7*c* of the actuating stem 7, so as to bias the stem 7 upwardly.

When the actuating stem 7 is depressed, it does not rotate, and the inclined surface 7*b* at the bottom of the stem rib 7*a* is in contact with the inclined surface 6*b* of the rotor 6, so that the actuating stem turns the rotor 6 counterclockwise, as viewed from above, through a predetermined angle. And, since the inclined surface 6*e* at the bottom of the rotor contacts the cap rib top 5*b* (see FIG. 6(A)), rotation of the rotor causes the cap rib top 5*b* to move downwardly against the resistance of the coil spring 3.

When the actuating stem has been pushed down to the limit, the cap rib top 5*b* assumes the position illustrated in FIG. 8, that is displaced from the intersection X between the surface 6*f* and the surface 6*e*, and slightly on the side of the surface 6*f*. When your finger releases the actuating stem 7, the stem 7 is urged upwardly by the coil spring, and as the cap rib 5*b* is also being urged upward by the force of the coil spring 3, the rotor 6 is further rotated by the distance between the intersection of the surface 6*f* with the surface 6*e* and the surface 6*g* and consequently the cap rib 5*b* strikes the surface 6*g* (see FIGS. 7 (A) and 9). In this position, the rib top 5*a* engages the surface 6*g*, while the ink-reservoir associated therewith is supported in a lowered position, ready for writing. On the other hand, the other ink-reservoir, as seen from FIG. 7(B) showing the position of its cap, assumes a retracted position. If, in this position, the stem 7 is pushed slightly down, with the lower stem rib surface 7*b* in contact with inclined surface of the rotor top, the rotor will be turned to an extent proportional to the extent of depression. This rotation causes the disengagement of the surface 6*g* of the rotor from the top of the cap rib 5*b*, resulting in the

position shown in FIG. 6(B). With the other cap in the position shown in FIG. 6(A), both ink-reservoirs are then retracted.

Repetition of such a ratcheting action will switch the two ink-reservoirs alternately between writing and non-writing positions and extend and retract them repetitively.

In the case of a three-color ball-point pen, the inclined surface of the rotor is divided into three parts, the surface 6e subtends an angle of 120°, and the joint is designed to hold three ink-reservoirs.

As described above, the construction according to this invention is such that a plurality of ink-reservoirs are provided with a cap having a rib at the top; the rib of this cap extends radially away from the axis of the pen-holder; and this rib contacts the inclined surface of the rotor. With this arrangement, it is possible to make a plurality of ink-reservoirs pop successively out of or back into the pen-holder for writing.

What is claimed is:

1. A ratchet-type multicolor ball-point pen comprising:

an elongated casing,

a plurality of ink-reservoirs mounted in said casing for individual sliding movement longitudinally of said casing along substantially parallel lines between a retracted position and a writing position,

first resilient means biassing each reservoir toward its retracted position,

a unitary actuating member mounted for translational sliding movement longitudinally of said casing between a raised position in which one end thereof projects from said casing and a depressed position,

second resilient means biassing said actuating member toward its raised position, and

a rotor mounted in said casing between said actuating member and said reservoirs for rotation about an axis occupying a fixed position, the face of said rotor facing said actuating member being provided with ratchet teeth positioned to be engaged by said actuating member to rotate said rotor when said actuating member is depressed, and the face of said rotor facing said reservoirs being provided with a cam surface positioned to engage cooperating means carried by said reservoirs and shaped to successively advance a reservoir to its writing position as said rotor turns during depression of said actuating member, support said reservoir in said writing position when said actuating member is once depressed, and withdraw said support when said actuating member is next depressed, permitting said first resilient means to return said reservoir to its retracted position.

2. A ball-point pen as claimed in claim 1 in which said cam surface is contoured to maintain one of said reservoirs in its advanced position while the other is retracted, when said rotor is in a first angular position, and to permit both reservoirs to be retracted when said rotor is in a second angular position.

3. A ball-point pen as claimed in claim 1 in which said cam surface comprises an inclined portion which engages said cooperating means as a reservoir is being advanced to its writing position and a notch at the end of said inclined portion having a sloping side adjacent said inclined portion, into which notch said cooperating means projects only part way when that reservoir is being supported in its writing position after said actuating member is depressed, said rotor being rotated by contact between said cooperating means and sloping notch side as said cooperating means moves further into said notch until it strikes the other side of said notch when said actuating member is released sufficiently to disengage said actuating member from said ratchet teeth, and the intersection between said sloping notch side and said inclined cam surface being so located relative to said ratchet teeth that the rotation of said rotor by said cooperating means brings a different ratchet tooth into alignment with the tooth-engaging portion of said stem.

4. A ball-point pen as claimed in claim 1 in which said stem is provided with a longitudinal rib, the lower end of which engages a ratchet tooth when said stem is depressed.

5. A ball-point pen as claimed in claim 1 in which the cooperating means on each reservoir is a longitudinal, radially projecting rib carried by the cap of said reservoir.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,700,340 Dated October 24, 1972

Inventor(s) SHINGAN TERASAKI

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

[30] Foreign Application Priority Data
September 18, 1969 Japan SHO 44-88342

Signed and sealed this 6th day of March 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334