Feb. 28, 1961 J. V. MacDONALD 2,972,980

BALL POINT PEN

Filed July 31, 1959

Fig. 1

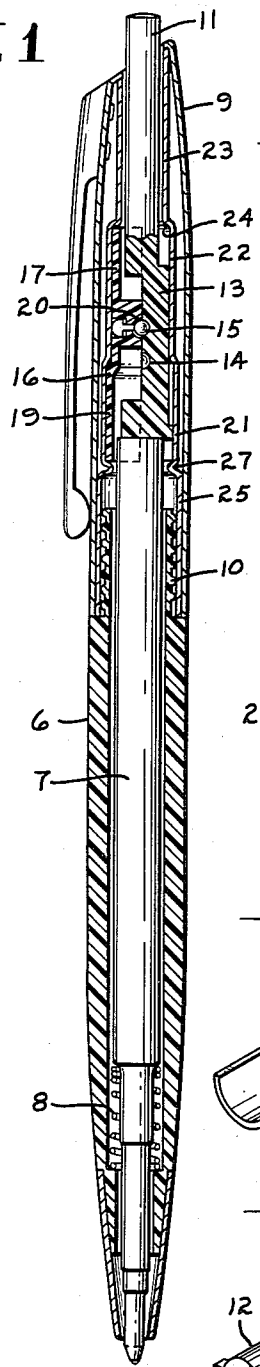


Fig. 3

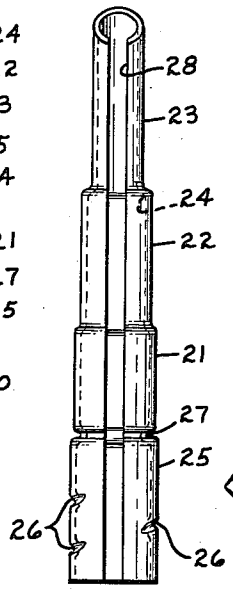


Fig. 4

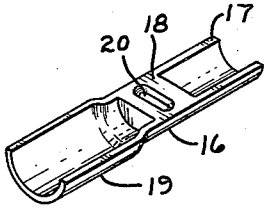


Fig. 5

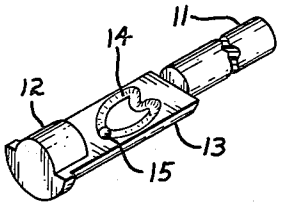


Fig. 2

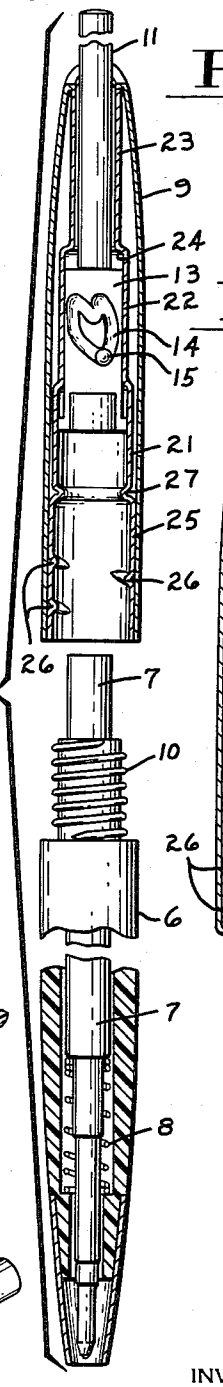
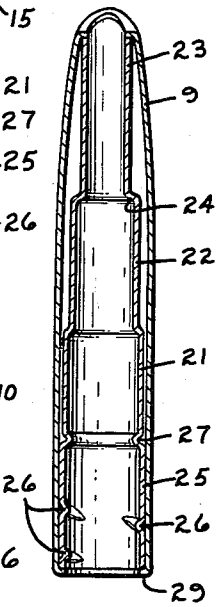


Fig. 6



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BALL POINT PEN

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2 Claims. (Cl. 120—42.03)

My invention relates to ball point pens and is an improvement on the particular type of pen where the push rod and retracting mechanisms are surrounded by a housing fixed permanently in the cap portion of the open end, and wherein the cap portion is removable as a unit from the barrel to allow replacement of the ink cartridge.

In one widely-used construction of the above type of pens, there was a tubular housing surrounding the push rod and retracting mechanism, an internally threaded sleeve assembled into the end of the housing to confine the retracting mechanism against endwise movement and a third element attached to the upper end of the housing serving as a guide for the upper end of the push rod.

The principal object of my invention is to reduce the cost of manufacture, particularly by replacing such tubular shell, threaded sleeve and upper guide piece by a single piece which can be economically manufactured from thin sheet metal.

One fault of the older three-piece assembly was the difficulty of providing a permanent attachment between the threaded sleeve and the interior surface of the cap. This was accomplished by gluing, but due to manufacturing tolerances, the space between the cap and the threaded sleeve might be too much to permit a reliable glued joint. This fault is eliminated in my improved construction.

In the accompanying drawings, I have shown for purpose of illustration one embodiment which my invention may assume in practice. In these drawings:

Fig. 1 is a vertical section of a ball point pen equipped with my improvement;

Fig. 2 is a similar section with the retracting mechanism in a different position and also showing the cap separated from the barrel;

Fig. 3 is a side view of the one-piece shell;

Fig. 4 is a perspective view of the control member of the retracting mechanism;

Fig. 5 is a perspective view of the push rod; and,

Fig. 6 is a vertical section of the one-piece shell and cap showing a modified form of assembly.

The pen may be generally described as having a barrel 6 for receiving the ink cartridge 7 which is normally urged upwardly by a spring 8 and having a cap 9 adapted to be attached to the upper threaded end 10 of the barrel which is of reduced diameter.

The type of push rod and retracting mechanism which I have illustrated does not, per se, form a part of the invention and is well-known in the art. It comprises a push rod having an upper manipulating end 11 and a larger lower end 12 with a semi-cylindrical middle portion 13 which is shaped to cooperate with the control member of the retracting device.

On the flattened surface of the portion 13, there is a cam groove 14 in which travels a ball 15. The cam groove 14 as best seen in Fig. 2 is heart-shaped thus providing for right and left guide channels joined at an apex at the lower end of the cam groove and at their upper ends joined to a reentrant angle through reversing

locks. Also, as shown, the axis of the heart-shaped cam groove 14 is biased relative to the axis of the pen so that the lower apex of the groove will lie slightly to the right of the pencil axis and the apex of the top reentrant angle will lie slightly to the left of the pen axis. The retracting mechanism includes the control member, generally designated 16, which interfits the push rod with the upper smaller portion 17 fitting around the small diameter portion 11 of the push rod, the flat face 18 fitting against the middle portion 13 of the push rod and the larger diameter lower portion 19 interfitted with the lower larger part 12 of the push rod.

The control member 16 is confined against movement within the shell housing as will be described later. This control member 16 has a horizontally extending groove 20 in which the ball 15 can move only in a lateral direction as controlled by the heart-shaped cam groove 14 in the push rod. It is to be understood that the push rod is normally urged upwardly at all times under the influence of spring 8 working through the cartridge which abuts one end of said push rod. When the pen point is to be held in retracted position as shown in Fig. 2, the ball 15 will be located in the lower apex of the heart-shaped cam channel 14.

In order to move the pen point from a retracted position to a protracted position as seen in Fig. 1, it is only necessary to manually depress the manipulating end 11 of the push rod whereupon the ball 15 will ride up the right guide channel to its upper reversing lock. When the push rod is released, the ball 15 will be guided to a position in the apex of the re-entrant angle and held there by reason of the upward tension exerted on the push rod by spring 8.

When it is desired to release the pen point and return it to retracted position, it is only necessary to manually depress the end 11 at the push rod to a position where the ball 15 will ride up into the left reversing lock of the cam re-entrant angle and then released whereupon the ball will ride down the left guide channel as the push rod is being automatically raised by spring 8 to a stop position when the ball is re-located in the lower apex of the cam channel 14.

My improved shell housing has an intermediate portion of two diameters—one indicated at 21 adapted to fit around the lower part of the push rod and retracting mechanism assembly, and a smaller diameter portion 22 fitting around the upper portion of this assembly. The shell housing, further, has a long upper extension 23 which bears against the internal surface of the cap at its upper end so as to confine and guide the manipulating end 11 of the push rod, and there is an internal shoulder 24 between the portions 22 and 23 against which the upper edge of the control member 16 bears to prevent its movement within the shell housing.

The shell housing also includes a lower portion 25 which is of somewhat larger diameter than the adjacent portion 21 so as to fit snugly inside the cap 9. This lower portion may be internally threaded but preferably has only a partial or interrupted thread resulting from the indentations 26. At the lower end of the portion 21, there is an indented section 27 spaced from the upper shoulder 24 just enough to confine the control member 16 against endwise movement.

The shell housing has a longitudinally-extending slot or slit 28 throughout its length so that the indented section 27 and the partial threads 26 can be formed in a flat piece of material and the whole shell formed about a mandrel in one operation. This results in a shell having springy walls so that the push rod and retracting mechanism assembly can be inserted endwise from the lower end until the indented section or shoulder 27 snaps under the control member 16, thus locking all

the parts in place. In this manner, no separate threaded insert is required at the lower end, nor is any extra guide piece required at the upper end as in the case where the shell housing is formed or drawn as a solid shell. In such case, it is understood that for practical reasons, the upper small diameter portion could not have the desired length to act as a guide for the push rod which necessitated the use of an extra guide member.

With this construction, it will also be apparent that the whole shell assembly can be readily assembled in the cap with the lower large portion 25 fitted tightly against the inner surface of the cap 9 regardless of normal manufacturing tolerances; this is because the walls, being springy, allow the bottom end of the shell to be made large enough so as to insure at all times a tight bearing against the cap 9. This facilitates and makes more reliable any glued joint.

In the modification shown in Fig. 6, the glued joint may be eliminated by a positive lock between the shell housing and the cap 9, since the walls of the shell housing may spring inwardly enough to interlock behind a shoulder 29 which may be formed in the end of the cap.

As the result of my invention and in view of the above description, it will be evident to those skilled in the art that a very substantial saving in the cost of manufacture of pens of this type has been attained. Furthermore, a more reliable and durable construction results from the invention.

What I claim:

1. In a cap for a ball point pen adapted to be attached to the pen barrel, which includes a push rod slidably mounted within said barrel having a manipulating portion extending through the upper end of the cap, retracting mechanism inside the cap cooperating with said push rod to latch the same in projected or retracted position, said retracting mechanism including a control member slidably fitting against said push rod; the improvement which consists of a one-piece housing for said push rod and retracting mechanism, said housing consisting of a tubular member with a slit extending throughout its length and having a lower portion of such diameter as to fit snugly within the lower end of said cap, said lower portion having internally formed means adapted to interengage with the pen barrel, an intermediate portion surrounding and confining said retracting mechanism with the upper end of said control member bearing against an internal shoulder of the housing, and a relatively smaller diameter upper portion beyond said shoulder extending into engagement with the upper portion of the cap and serving as a guide for the upper end of the push rod, the walls of the tubular member having an inwardly indented section at the bottom of said intermediate portion to confine said control member against endwise movement, the walls of the tubular housing member being sufficiently springy to permit spreading to allow the assembled push bar and control member to pass endwise by said indented section during assembly of the parts.

2. In a cap for a ball point pen adapted to be attached to the pen barrel, which includes a push rod slidably mounted within said barrel having a manipulating portion extending through the upper end of the cap, retracting mechanism inside the cap cooperating with said push rod to latch the same in projected or retracted position, said retracting mechanism including a control member slidably fitting against said push rod; the improvement which consists of a one-piece housing for said push rod and retracting mechanism, said housing consisting of a tubular shell having a series of at least four progressively increasing diameter sections from its upper to its lower end, there being an inwardly extending shoulder at the point of juncture of the two lower sections, the uppermost smallest diameter section serving as a guide for the manipulating portion of the push rod, the two intermediate sections with said shoulders serving as a housing for the retracting mechanism and also confining the control member against longitudinal movement, said housing having a slot throughout its length that permits it to be expanded to receive the retracting mechanism and contracted to maintain the assembly of the parts of such retracting mechanism and also permits telescopic slip fit into the open end of said cap with the lower longer section of the shell bearing against the inner surface of the cap, and means for permanently retaining said lower longer section within the cap.

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