Nov. 29, 1966 E. HECHTLE 3,288,115

BALL-POINT PEN MECHANISM

Filed July 16, 1965

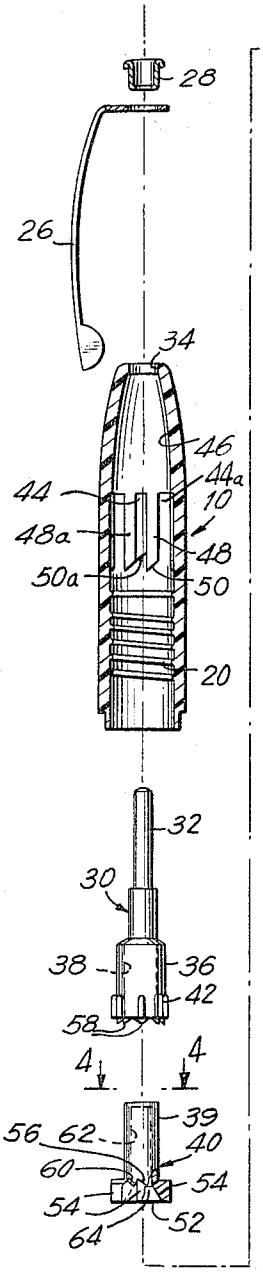


FIG. 3

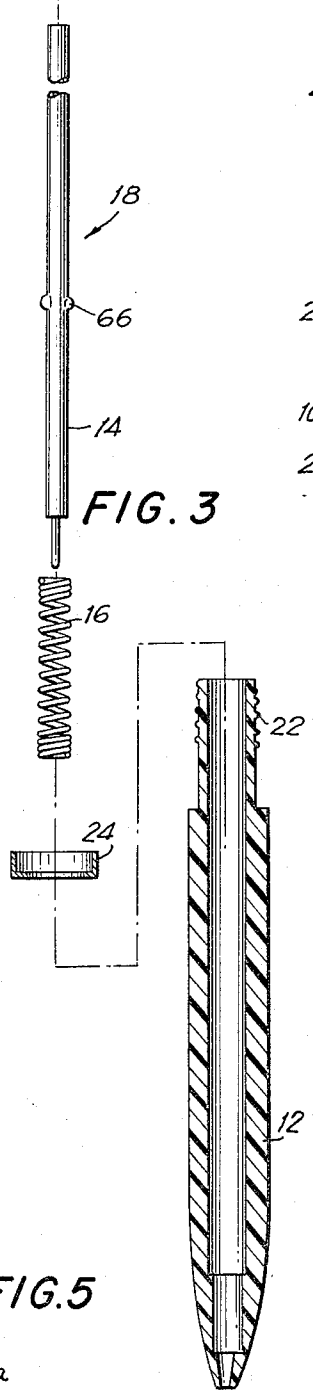


FIG. 1

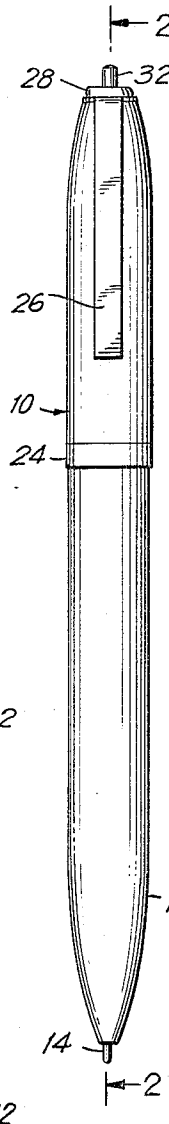
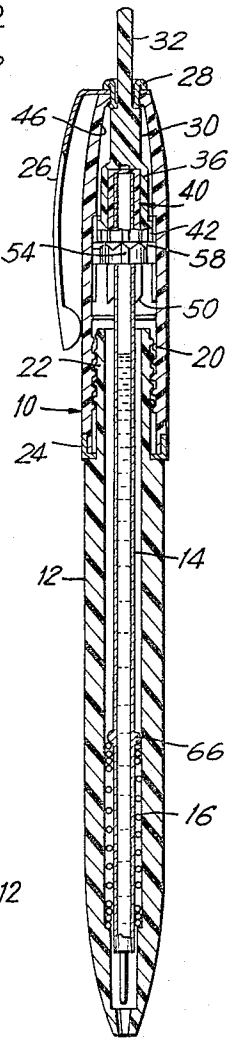


FIG. 2



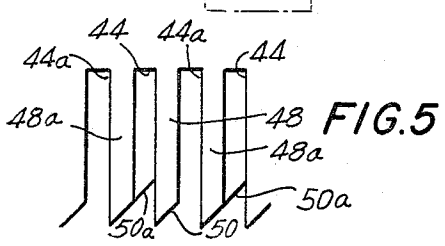


FIG. 5

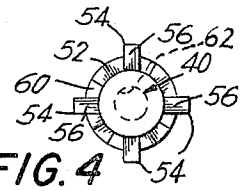


FIG. 4

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BALL-POINT PEN MECHANISM

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3 Claims. (Cl. 120—42.03)

This invention relates to a ball-point pen mechanism and more particularly to a pen mechanism for protracting and retracting the ink cartridge therein.

A pen mechanism that has been almost universally adopted employs a push button plunger that rotates a rachet which alternately engages and is disengaged from spaced apart teeth on the inner wall of the pen. Such a mechanism is illustrated in Patent Number 3,120,837 dated February 11, 1964.

It has been found that in assembling the various parts of the mechanism that the teeth on the rachet sometimes jam into the plunger and interfere with the rachet operation.

Accordingly, it is an object of the invention to provide a ratchet and plunger mechanism that will fit more smoothly, that can be assembled without jamming, and which operates with less wear than the present types.

Another object is to provide a ratchet which will disengage easily from the plunger despite the pressure of the retracting spring, and thus facilitate the protract-retract operation of the cartridge.

These and other objects are accomplished and new results achieved as will be apparent from the pen described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing in which:

FIG. 1 is a front elevation of the assembled pen;

FIG. 2 is a longitudinally sectioned view of the same, taken in the plane 2—2 of FIG. 1 and in the direction of the arrows;

FIG. 3 is an exploded partly sectioned view of the pen parts;

FIG. 4 is a top plan view of the ratchet; and

FIG. 5 is a diagrammatic developed view of the cap teeth and slots.

The pen illustrated comprises a cap **10**, and a barrel **12**, a cartridge **14**, a retract spring **16**, and a protract-retract mechanism **18** for operating the cartridge. The pen cap and barrel may be threaded as at **20** and **22** respectively for securing the parts in position. A band **24** is sometimes used to secure better alignment between the cap and barrel. The cap is preferably provided with a clip **26** which in the pen illustrated is secured to the cap by a hollow rivet **28**.

The protract-retract mechanism **18** comprises in part, a plunger **30**, terminating in an exposed push button **32** at one end, projecting through the opening **34** of the cap, and in a hub **36**, made hollow as at **38**, to receive the stem **39** of ratchet **40**.

The plunger **30** is preferably formed with eight laterally extending guides **42**, which are adapted to slide in slots **44** and **44***a* formed on the inner wall **46** of cap **10**. The slots are positioned between rails **48** and **48***a* terminating in tapered teeth **50** and **50***a* respectively. The guides **42** of plunger **30** are always positioned in the slots **44** and **44***a* providing a longitudinal non-rotative movement of the plunger in cap. In the form illustrated, slots **48** are less deep than slots **48***a* although, as shown in Patent 3,120,837, the slots may be of equal depth.

The ratchet **40** is provided with a hub **52** from which laterally extends four guides **54** each provided with a main tapered tooth **56** on the upper face thereof to engage the tapered teeth **50** and **50***a* of the rails **48** and **48***a* on the inner surface of the cap.

The lower edge of the plunger **30** terminates in eight teeth **58**, which also engage the tapered teeth **56** on the four guides **54** of ratchet **40**.

The invention is characterized by providing the upper edge of the hub **52** with an auxiliary set of eight circularly arranged tapered teeth **60**, for engaging the eight teeth **58** formed on the bottom edge of the hub **36** of plunger **30**.

Thus when ratchet **40** is inserted into the bore **38** of plunger **30**, the tapered teeth **58** of the plunger and the tapered teeth **60** of the ratchet will engage each other and align the parts as is shown in FIG. 2 preventing the sharp edges of tapered teeth **56** from cutting into the plunger and jamming the mechanism, preventing rotation of the ratchet.

A further advantage is that the plunger and ratchet teeth **58** and **60** respectively when engaged, will readily disengage to permit movement of the ratchet with respect to the cap and plunger without the need for an individual plunger spring to separate the parts as is shown in Patent No. 3,120,837 or for manual removal of the plunger from the ratchet.

The design of the teeth of the plunger, ratchet and cap, causes the ratchet to rotate slightly when released from the cap, and again when the ratchet teeth engage the cap. The ratchet teeth alternately move from the protracted position on teeth **50***a* into the retracted position when the ratchet teeth engage cap teeth **50** and slide into slot **44***a*. From either position, the plunger when again pressed, will free the ratchet from the cap, allowing the ratchet to rotate slightly until the teeth lock, and then when deposited once more on the cap to rotate slightly again until caught in the protract position or the retract position, depending on the position of the ratchet guides with respect to the cap slots.

Thus the ratchet rotates slightly when depressed by the plunger, and again on the cap teeth when the plunger is withdrawn, causing a circular movement that permits the cartridge to be alternately protracted and retracted.

The spring **16** operating on ears **66** of the cartridge, forces the cartridge continuously against the ratchet in bore **62**, the bevelled seat **64** being provided in the bottom of the ratchet for facility in inserting the end of the cartridge. The stem **39** of the ratchet helps to maintain alignment thereof throughout the protract-retract operation. The bevel of seat **64** is made possible by the extra hub diameter created by teeth **60**.

It will be seen that there is now provided a full uniform 360° contact between ratchet and the plunger teeth, except when the teeth engage on their tapered sides to initiate rotation. When the circular movement ceases, the 360° contact is resumed. The added contact between the auxiliary ratchet teeth and the plunger teeth also frees the plunger from the ratchet to permit movement of the ratchet on the cap teeth, without jamming with the plunger teeth.

I have thus described my invention, but I desire it understood that it is not confined to the particular form or use shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and therefore I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which objects of my invention are obtained and new results accomplished since the particular embodiment herein shown and described is only one of the many that can be employed to obtain these objects and accomplish these results.

What I claim is as follows:

1. A ball point pen having a cap, a barrel, a cartridge, a spring for urging the cartridge to a retract position, and a protract-retract mechanism comprising a plunger terminating in a set of teeth, a ratchet upon which the cartridge

is seated having a set of main teeth, and a set of teeth on the inner surface of the cap for alternately engaging and turning the main teeth of the ratchet to permit entry of the main ratchet teeth into the slots and for retaining the ratchet in retract position, said ratchet further provided with an inwardly positioned set of auxiliary teeth for contact with the plunger teeth when the plunger engages the ratchet.

2. The ball point pen of claim 1, wherein the auxiliary set of ratchet teeth extends continuously and circularly around the ratchet.

3. The ball point pen of claim 1 in which the main ratchet teeth are one half the number of the auxiliary ratchet teeth.

References Cited by the Examiner

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3,120,837	2/1964	Johnson	120—42.03
3,137,276	6/1964	Weisser	120—42.03

LAWRENCE CHARLES, *Primary Examiner.*