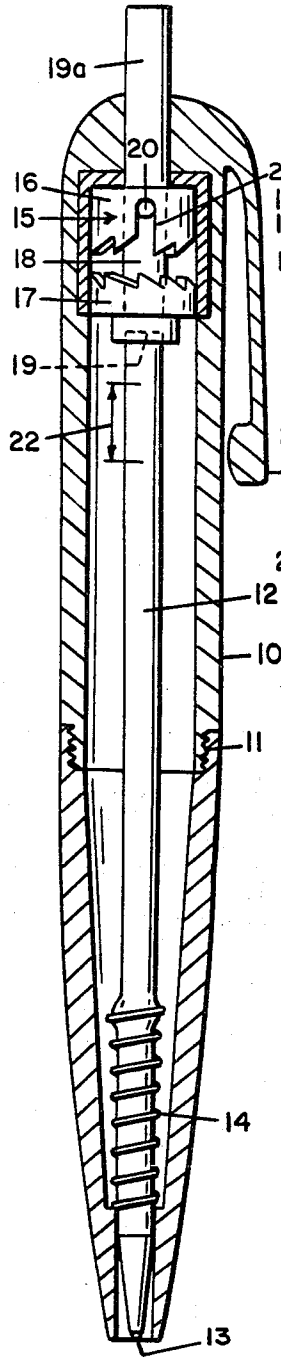
Dec. 31, 1968 N. A. KIRK 3,419,336

BALL POINT PENS

Filed July 18, 1966



PRIOR ART

FIG. 1.

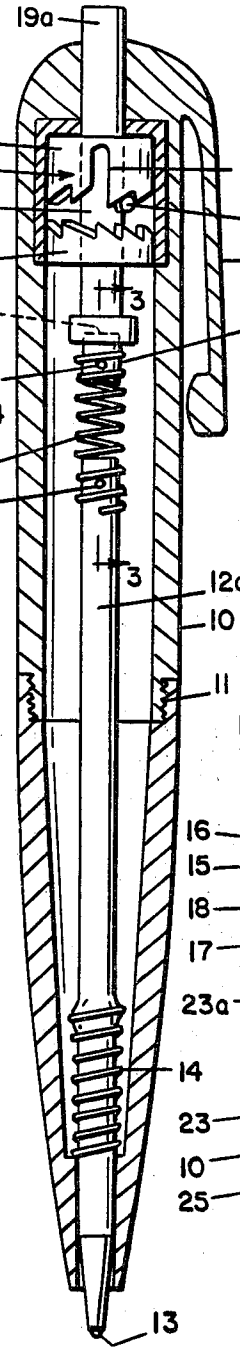


FIG. 2.

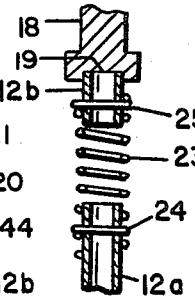
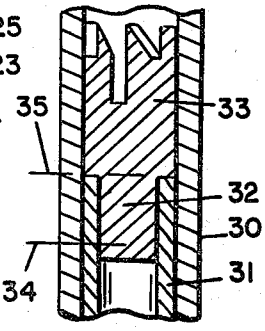


FIG. 3.

FIG. 5.

PRIOR ART



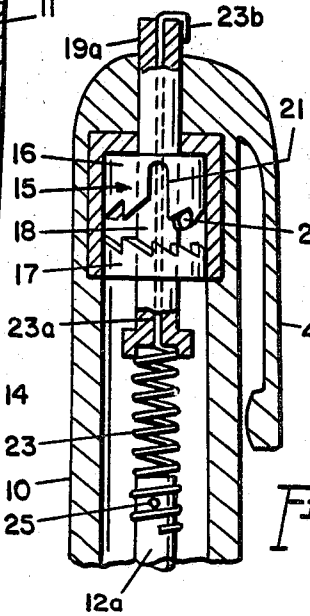


FIG. 4.

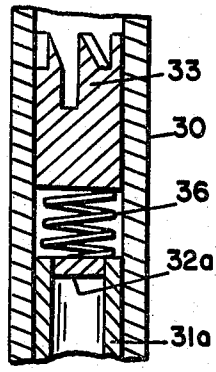


FIG. 6.

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BALL POINT PENS

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ABSTRACT OF THE DISCLOSURE

A barrel containing a projectable and retractable ink cartridge and also containing a projection-retraction mechanism separate and spaced from the inner end of the cartridge. A compression spring is interposed between the inner end of the cartridge and the projection-retraction mechanism to urge the cartridge outwardly and permit controlled inward movement thereof under application of writing pressure.

This invention relates to new and useful improvements in ball point pens of the general type having an ink cartridge reciprocable in a barrel and a cam-like mechanism for reciprocating the cartridge so as to alternately project and retract the ball point of the cartridge to and from a writing position.

The cam-like cartridge reciprocating mechanism in a conventional pen of this type is usually so arranged that the cartridge is positively locked against retraction when the ball point is projected, thus permitting writing pressure to be applied to the ball point. However, this results in a very hard writing action due to friction between the ball point and the paper, and free flow of ink from the cartridge to the ball point is impaired. Moreover, firm finger pressure must constantly be applied to the barrel of the pen in order to produce the required writing pressure at the ball point, thus causing finger and hand fatigue when the pen has been used for even a short period of time and also materially detracting from the writing speed.

It is, therefore, the principal object of this invention to eliminate the disadvantages above outlined and to assure a highly improved, softly cushioned writing action in which the ball point glides over rather than firmly presses against the paper, so that free flow of ink to the ball point is at all times factlitated and hand fatigue is greatly reduced.

This object is attained by the provision of resilient means for biasing the carriage outwardly when the ball point is in its projected, writing position, such resilient means being yieldable to permit controlled retraction of the cartridge by application of writing pressure to the ball point. Thus, the cartridge is resiliently cushioned, so to speak, and the ball point is resiliently biased against the paper in a manner which permits it to glide over surface irregularities without undue friction or hard writing contact, while freely receiving an adequate ink supply. Also, since the ball point is biased against the paper in a cushioned manner by the resilient means, application of firm finger pressure to the barrel of the pen is unnecessary, and the pen may be simply and easily guided without noticeable hand fatigue.

Another important feature of the invention resides in the provision of means for adjusting the resiliency of the aforesaid resilient means, whereby the strength of the resilient bias at the ball point may be varied to suit individual requirements.

The nature of the invention is such that it may be conveniently and inexpensively embodied in conventional ball point pens of various types, either as original equipment or as modification or attachment. Its cushioned writing action involving a minimum of hand fatigue permits faster writing for longer periods of time, so that considerable time saving can be effected. Actual comparison tests have shown that by writing with the improved pen of the invention, ten seconds may be saved during five minutes of writing time, which on the basis of an eight-hour day and a five-day week amounts to a saving of approximately sixty-four hours per year. Apart from its time saving characteristics, the cushioned and free writing action renders the pen of the invention particularly well suited for use by chlirden and persons suffering from arthritis.

With the foregoing more important object and features in view and such other objects and features as may become apparent as this specification proceeds, the invention will be understood from the following description taken in conjunction with the accompanying drawings, wherein like characters of reference are used to designate like parts, and wherein:

FIGURE 1 is a longitudinal sectional view showing a conventional ball point pen for purposes of orientation and relationship of the invention thereto, the ball point being shown in its retracted position;

FIGURE 2 is a view similar to that in FIGURE 1 but illustrating one embodiment of the invention in the pen, the ball point being shown as projected;

FIGURE 3 is a fragmentary longitudinal sectional detail, taken substantially in the plane of the line **3—3** in FIGURE 2;

FIGURE 4 is a fragmentary longitudinal sectional view showing a modified embodiment of the invention;

FIGURE 5 is a fragmentary longitudinal sectional view showing another conventional type of a pen for purposes of orientation; and

FIGURE 6 is a view similar to that in FIGURE 5 but illustrating the invention embodied in the pen of that figure.

Referring now to the accompanying drawings in detail, for purposes of general orientation FIGURE 1 illustrates a conventional ball point pen having the usual barrel **10** composed of two sections which are separably connected together as at **11**, the barrel containing a reciprocable ink cartridge **12** with a ball point **13** which, upon reciprocation of the cartridge, is alternately in the retracted position shown in FIG. 1 and the projected or writing position shown in FIG. 2. The cartridge is resiliently biased to its retracted position by the usual spring **14** inside the barrel, and suitable mechanism **15** is provided for reciprocating the cartridge so as to alternately project and retract the ball point. The mechanism **15** may be of any one of several different conventional types and, for illustrative purposes, is shown as comprising a pair of cam members **16**, **17** disposed in spaced opposing relation in the upper end portion of the barrel and having a plunger **18** slidable therethrough, the lower end of the plunger abutting the upper or inner end of the cartridge **12** as at **19**, while the upper end portion of the plunger projects outwardly from the barrel and constitutes an actuating element or finger-piece **19***a*. The plunger **18** is equipped with a transverse pin **20** which is receivable in deep recesses or slots **21** of the cam member **16** when the ball point **13** is retracted, as shown in FIG. 1. When the actuating element **19***a* is pushed inwardly to project the ball point **13**, the pin **20** slides out of the slot **21** into engagement with the cam member **17** which causes the plunger **18** to partially rotate, and upon releasing of finger pressure on the element **19***a*, the spring **14** pressing the cartridge **12** inwardly or upwardly causes the plunger **18** to slide upwardly until the pin **20** engages the shallow notches of the cam member **16**, thus sustaining the ball point **13** in its projected position as shown in FIG. 2 until the element **19***a* is again pressed to permit the pin **20** to

be received in another of the deep slots **21** in the retracted position of the ball point.

It may be emphasized at this point that the mechanism **15** as shown and described is merely illustrative of the environment with which the invention may be associated. Such mechanisms assume various different forms, all well known in the art, and the invention may be used in conjunction with any of them, as long as the cartridge **12** is reciprocable in the barrel **10** and as long as some form of cam mechanism with a press-and-release actuating element is utilized for projecting and retracting the cartridge.

In any event, it will be apparent that when the conventional pen of FIG. 1 is in its writing position wherein the plunger pin **20** engages the shallow notches of the cam member **16** as in FIG. 2, the ink cartridge **12** is solidly and positively locked against retraction by abutment of the cartridge with the plunger **18** at **19**, and by engagement of the pin **20** with the cam member **16**. Under these conditions the ball point **13** cannot be retracted and when writing pressure is applied thereto, considerable friction is created between the ball point and the paper which causes hard writing and also impairs free flow of ink to the ball point. Moreover, firm finger pressure must be applied to the barrel of the pen in order to attain the writing pressure at the ball point, and this in turn produces finger and hand fatigue as well as loss of speed in writing.

The invention eliminates these disadvantages by providing a resilient bias or cushion for the cartridge and ball point when the latter is in its writing position, whereby the ball point may be sustained in contact with the paper under a smooth, gliding action by the resilient bias alone, while the hand is used merely for guiding the pen and holding it in such proximity to the paper as to facilitate the resilient bias of the ball point on the paper as already described.

Several different embodiments of the invention are disclosed, one of the now being described with reference to FIGS. 1–3. This embodiment is particularly well suited as a modification of a conventional pen, wherein the ink cartridge **12** of FIG. 1 is first modified by cutting out a short length of its inner end portion, as represented at **22** in FIG. 1. This leaves the main cartridge body **12***a* and a tip **12***b* as shown in FIGS. 2 and 3, and the space therebetween (left by the cut out portion **22**) is spanned by resilient means in the form of a compression spring **23**. In order to prevent the spring **23** from sliding off the cartridge portions **12***a*, **12***b*, these portions are provided with transverse keeper pins **24**, **25**, respectively, which are seated between the convolutions of the spring as well be apparent. The spring **23** is somewhat stronger than the cartridge retracting spring **14** and when the actuating element **19***a* is pressed inwardly to project the ball point **13** to the position of FIG. 2 the inward sliding of the plunger **18** is transmitted through the spring **23** to the cartridge while the spring **14** becomes compressed. It is to be understood that in the writing position of FIG. 2 the pin **20** is already seated against the cam member **16** as shown so that the spring **23** cannot operate to return the pin **20** into the deep slot **21**. Thus the ball point **13** is sustained in its projected position by the spring **23** which provides a resilient bias or a cushioned floating action at the ball point **13** in contact with the paper. In writing the pen is simply and easily held and guided by the hand in closed proximity to the paper so that the spring **23** may resiliently urge the ball point into a writing contact yet the ball pin is free to retract while passing over surface irregularities in a manner which is controlled by the resilient bias of the spring **23**. Thus an easy gliding action of the ball point over the paper is attained as distinguished from hard solid writing pressure of a conventional pen.

When the ball point is to be retracted after writing the actuating element **19***a* is again depressed so that the pin **20** of the mechanism **15** recedes into one of the deep slots **21** by the combined effort of the springs **14** and **23**.

In order to accommodate individual requirements it is desirable to adjust the length of the spring **23** within certain limits so as to correspondingly vary the strength of the resilient bias at the writing point. This adjustment may be attained by simply rotating the spring **23** with respect to the cartridge body **12***a* so that the effective span of the spring between the cartridge portions **12***a* and **12***b* is increased or decreased as desired. In this connection it will be appreciated that when the spring **23** is rotated while the cartridge body **12***a* is held stationary the engagement of the spring with the pin **24** will cause the spring to become telescoped to a greater or lesser extent over the cartridge body thus varying the effective span of the spring between the cartridge portions **12***a* **12***b* as aforesaid. Of course in so doing the cartridge tip **12***b* should remain relatively stationary with respect to the spring which may be assured by crimping the end of the spring around the tip **12***b* so that rotation of the spring relative to the tip cannot occur. Such crimping of the spring is also desirable from the standpoint of prohibiting undesired adjustment of the spring **23** which could be brought about by incidental rotation of the tip **12***b* through the abutment **19** when the plunger **18** is partially rotated by actuation of the element **19***a*. To avoid this possibility the spring, **23** may be crimped at both ends, that is, on the tip **12***b* and on the cartridge body **12***a*, although it will be understood that the crimping of the spring on the body **12***a* will not interfere with adjustment of the spring when such adjustment is purposely made, as already explained.

Reference is now drawn to a modified arrangement of the invention shown in FIG. 4 which is very similar to the embodiment just described, except that a whole end portion of the cartridge has been cut off without leaving the tip **12***b*. The spring **23** is applied to the cartridge body **12***a* as already mentioned, but in this instance the spring is provided with a straight extension **23***a* which extends through an axial bore formed in the plunger **18** and terminates in a finger-piece **23***b* at the actuating element **19***a*. The finger-piece **23***b* is thus externally accessible and may be used for rotating the spring **23** for purposes of adjustment, without the necessity of taking apart the pen in order for the spring adjustment to be made. It will be appreciated that the plunger **18** is rotatable about the spring extension **23***a*, so that rotation of the plunger does not produce an undesired adjustment of the spring.

FIGS. 5 and 6 illustrate another modification utilizing the invention in a pen of a different type wherein, in accordance with prior art, the pen barrel **30** contains a reciprocable cartridge **31** having a plug **32** at its upper end, the plug being enlarged to form a cam member **33** as a component of the cartridge reciprocating mechanism. In modifying this type of a pen to suit the invention, the cartridge **31** and plug elements **32**, **33** are removed from the barrel **30** and are cut along the line **34** of FIG. 5, so that a portion **32***a* of the plug remains in the cartridge body **31***a* to seal the ink therein. Another cut is then made along the line **35** to separate the cam member **33** from the cartridge, portions of the cartridge and plug between the lines **34**, **35** being discarded so as to leave a space for a compression spring **36** which is inserted in the barrel **30** between the cam member **33** and the plugged end **32***a* of the cartridge, as shown in FIG. 6. The spring **36**, of course, functions in the same manner as the aforementioned spring **23**, although in the arrangement of FIG. 6 the resiliency of the spring **36** is not adjustable.

It may be noted at this point that while the embodiments of FIGS. 1–3 and 4–5 have been described in terms of modifications of conventional pens, it is obvious that the construction of the invention may also be utilized in newly manufactured pens as original equipment.

While in the foregoing there have been described and shown various preferred embodiments of the invention, other modifications may become apparent to those skilled

in the art to which the invention relates. Accordingly, it is not desired to limit the invention to this disclosure, and various modifications and equivalents may be resorted to, falling within the spirit and scope of the invention as claimed.

What is claimed as new is:

1. In a retractable and yieldable ball point pen, the combination of a barrel, a projectable and retractable ink cartridge provided in said barrel, a projection-retraction mechanism disposed in the barrel as an entity separate from said cartridge and spaced longitudinally from the inner end of the cartridge, a compression spring interposed between the inner end of the cartridge and said projection-retraction mechanism whereby to resiliently urge the cartridge outwardly and whereby to permit controlled inward yielding movement of the cartridge under application of writing pressure thereto, said spring constituting sole operative connection between the cartridge and said projection-retraction mechanism, and means for adjusting the resiliency of said spring.

2. The device as defined in claim 1 wherein said spring has one end portion thereof rotatably telescoped over the inner end portion of said cartridge, said adjusting means comprising a lateral projection provided on the inner end portion of the cartridge between adjacent convolutions of said spring whereby the effective length and consequently the resiliency of the spring may be adjusted by rotation thereof relative to said cartridge.

3. The device as defined in claim 2 together with means manipulable from the exterior of said barrel for rotatably adjusting said spring.

4. The device as defined in claim 3 wherein the other end portion of said spring is straight and passes through said projection-retraction mechanism to the outside of said barrel, and a finger-piece provided on the projecting end of said spring whereby to constitute said means for rotatably adjusting the spring.

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