

June 21, 1960

J. L. MARCOTTE
WRITING IMPLEMENTS

2,941,510

Filed Dec. 27, 1955

2 Sheets-Sheet 1

Fig. 1. Fig. 2. Fig. 3.

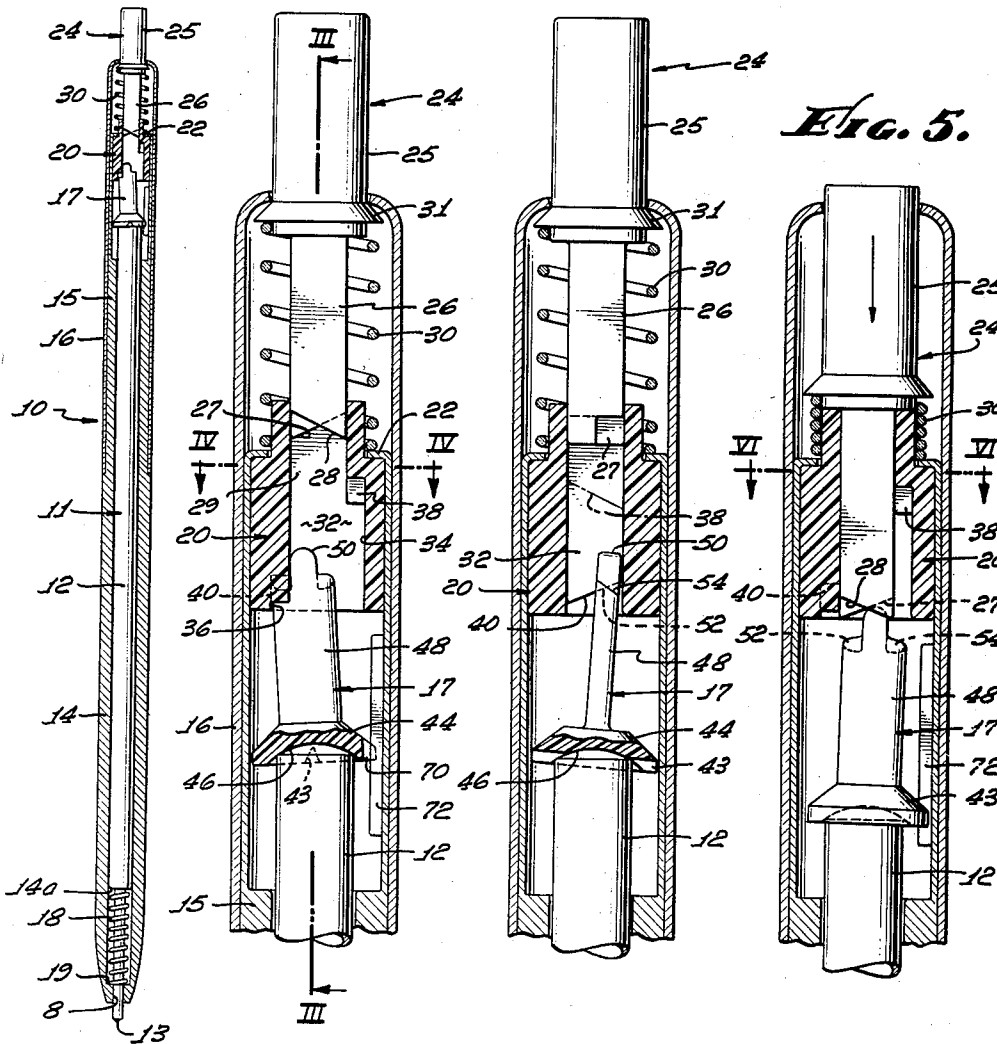


Fig. 4.

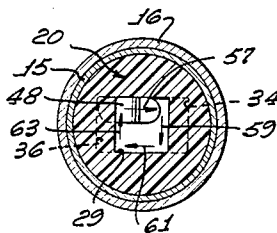
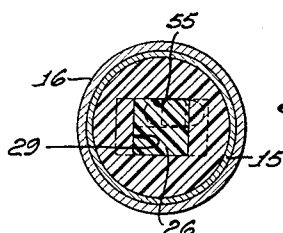


Fig. 6.



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Fig. 7.

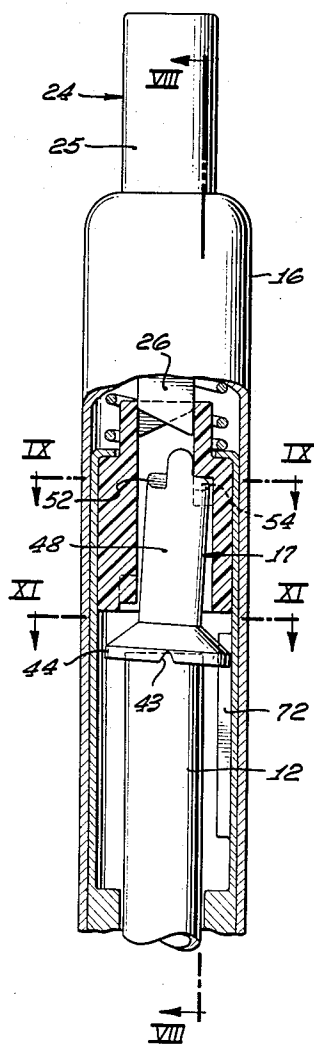


Fig. 8.

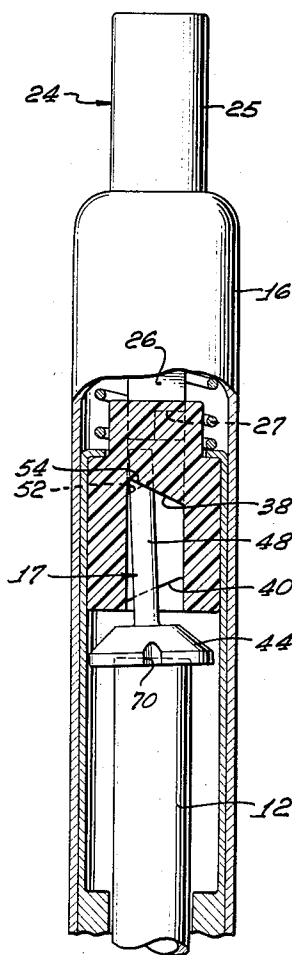


Fig. 10.

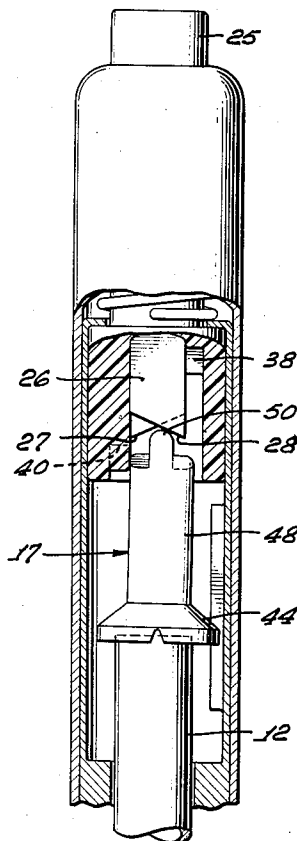


Fig. 9.

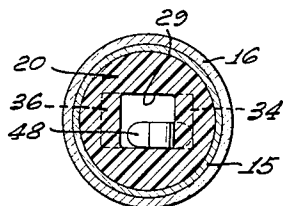
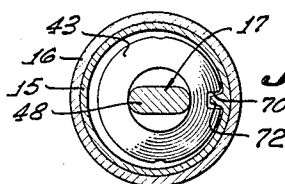


Fig. 11.



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5 Claims. (Cl. 120—42.03)

This invention relates to writing instruments of the type in which the tip is retractable, and is particularly concerned with an improved ball point pen of this type.

It is customary in ball-pointed writing pens to so mount the writing tip that it can be readily retracted or withdrawn when not in use, and just as easily extended when it is to be used. Although ball pens with retractable tips have been known for many years, the commercial manufacture of ball pens at the rate of several million per month, while maintaining quality and performance characteristics attractive to the purchasing public, has presented problems which heretofore have not been solved.

A principal difficulty has resided in the large number of separate parts that have generally been required in the construction of a smoothly functioning retractable tip. Because of their number and small size, these parts frequently get out of alignment, and the retracting mechanism may cease to function. Moreover, the parts often require tiny pivot mountings, or are difficultly moldable, so that production costs have soared on a mechanism only remotely concerned with writing efficiency.

A further problem created primarily by the complexity of design of most prior tip-retracting mechanisms has been the large amount of space occupied by the retracting mechanism itself. A particular resulting difficulty has been an inability to use in the pens, interchangeably, cartridges of normal or "standard" length (as used in non-retractable pens) without unduly enlarging or lengthening the pen. Accordingly, shorter cartridges have been required, necessitating manufacture, sale and distribution to the public of two styles of refill or replacement cartridges, often to the annoyance and confusion of all concerned.

In the device described in my copending application Serial No. 374,497, now Patent 2,865,331, of which this application is a continuation-in-part, these problems have been solved by means of a novel retracting mechanism employing an operating plunger which upon coaction with a specially molded body and cam follower permits successive movements of the plunger to impart axial and lateral motion to the upper end of a writing unit and thereby extend and hold the writing tip in extended and retracted positions at the will of the operator. Although millions of pens successfully employing this device have been manufactured to date, the construction described hereafter is deemed to have further desirable features and a somewhat different mode of operation which, in certain forms of the invention, permit a reduction in the overall diameter of the barrel and a reduction in the length of barrel occupied by the mechanism. Molding and assembly are simplified and the thrust of the usual retraction spring is utilized more effectively.

According to one form of the invention, the plunger is provided with two inclined cam faces, each capable of coaction with an uppermost or distal portion of the cam follower, here also called a thrust member, wobbler or latch. The cam follower in turn is provided with a pair of inclined or curved cam surfaces oriented for coaction with corresponding inclined stop shoulders formed in the body. A lower cartridge-engaging or base portion of the cam follower is shaped, preferably as a concave surface, in such a way that depression of the plunger into contact with the follower or latch causes the uppermost portion

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of the cam follower to tilt, rock or wobble about the base portion. As a result of these rocking, tilting or wobbling movements, axial projecting and retracting movements of the cartridge can be accomplished without appreciable lateral movement of the cartridge. Moreover, engagements of the various surfaces occur in such manner that noise and wear of the parts is considerably reduced.

It is an object of the invention, therefore, to provide a retracting mechanism for ball point pens that permits cartridges of normal or standard length to be used in a pen body scarcely longer than the cartridge, and by which an effective, self-locking, retracting and projecting operation is at all times insured.

Another object is to provide such a retracting mechanism for ball point pens which incorporates camming means associated with an operating plunger, cam follower, and body in such a way that vertical movements of the writing cartridge are facilitated without appreciable lateral movement thereof.

Another object of the invention is to provide in a ball point pen a projecting-retracting mechanism of simple and rugged construction which is economical to manufacture and unlikely to get out of order.

Another object is to provide an instrument of the type described that is composed of a minimum number of parts, which parts are of simple and sturdy design and are easy to assemble and disassemble.

Another object is to provide a mechanism which is easy to operate, positive and dependable in operation, inherently incapable of jamming or binding, and capable of withstanding a large number of operations without failure.

Other objects and advantages of the present invention will be apparent from the following description and from the drawings in which:

Fig. 1 is a longitudinal view in section and in elevation of one exemplary form of retractable writing instrument, with the tip in projected position;

Fig. 2 is an enlarged view in section and in elevation of the upper body of the device of Fig. 1;

Fig. 3 is an enlarged view in section and elevation along the line III—III of Fig. 2;

Fig. 4 is a view in longitudinal section along the line IV—IV of Fig. 2;

Fig. 5 is a view similar to Fig. 2 showing the position of the parts an instant after the plunger has been depressed to initiate a retracting operation;

Fig. 6 is a view in longitudinal section along the line VI—VI of Fig. 5;

Fig. 7 is an enlarged view in section and elevation, similar to Fig. 2, showing the position of the parts with the tip in retracted position;

Fig. 8 is a view in section and elevation along the line VIII—VIII of Fig. 7;

Fig. 9 is a view in longitudinal section along the line IX—IX of Fig. 7;

Fig. 10 is a view similar to Fig. 7 showing the position of the parts upon depressing the plunger to move the tip into projected position; and

Fig. 11 is a view in longitudinal section along the line XI—XI of Fig. 7.

Briefly, the exemplary writing instrument illustrated in the drawings comprises a shell or housing containing a writing cartridge and a retracting mechanism capable of selectively and sequentially moving the cartridge between a projected position and a retracted position, the retracting mechanism occupying a minimum of axial space within the shell and having radial dimensions permitting the shell to be of substantially less diameter than has heretofore been practicable. According to the invention, the retracting mechanism includes a cam follower, latch member or "wobbler" device which rocks, tilts or

leans to one side of the axis of the instrument when the cartridge is in projected position and tilts or leans to the opposite side of the axis when the cartridge is in retracted position, thereby permitting the cartridge to remain and move in a virtually vertical direction at all times. This new mode of operation is accomplished by a novel and simple means and permits the use of long, high capacity cartridges.

The illustrated writing instrument 10 includes a writing cartridge 11 which is shown as a cylindrical ball point pen unit having an upper tubular ink reservoir portion 12 and a lower writing tip 13 of reduced diameter. The cartridge 11 is slidably positioned in a longitudinally extending bore or chamber of a lower case 14 and an upper or rear case element 15, the latter being permanently encased in a shell 16. At its lower end the case 14 is provided with an opening or bore 8 to slidably receive the writing tip 13 of the cartridge 11. The cartridge is normally biased toward a retracted position and into operating engagement with a cam follower or "wobbler" 17 by a retracting spring 18. As shown, the spring bears against a retaining shoulder 19 provided in the lower portion of the case 14 and a shoulder or projection 14a on the cartridge. As best seen in Fig. 2, the wobbler or latch 17 is permanently retained within the upper or rear case element 15 by the body 20 of the retracting mechanism, which in turn is held within the case by interned flanges 22 forming the upper terminus of the case element 15. Preferably the body 20 is press set into the element 15 for rigid positioning therein. The latch 17 receives upward thrust of the cartridge or writing unit 11 and can move longitudinally and tilt or rock but is restrained from rotation. The latch or wobbler is forwardly of a depressible plunger 24 arranged and formed to be moved into contact with the latch in alternative relative positions to cause longitudinal movement and rocking or tilting of the latch into engagement of oppositely disposed separate surfaces carried by the latch into oppositely disposed and longitudinally displaced stationary stop shoulders of the barrel or pen. Such combined longitudinal movement and rocking of the latch and engagement with stop shoulders in succession, produced by successive depressions of the plunger, causes the writing unit to be successively held in retracted and in projected positions, as will appear from the further description.

Mounted within the shell 16 above the body 20 is an operating plunger 24 which includes an operating button 25 extending axially of the pen through a port in the shell and an axial shank portion 26 terminating at its lower end in an adjacent pair of downwardly directed cam faces, herein referred to as a retracting cam face 27 and a projecting cam face 28. These cam faces are oppositely inclined and each is displaced from the longitudinal axis of the plunger. The shank portion 26 is adapted for sliding movement within an axial passage 29 formed in the body. The plunger is biased upwardly by a spring 30 resting on the body 20 and is retained within the shell 16 by a stop shoulder 31 carried by the plunger and bearing against the inner surface of the shell.

In the illustrated apparatus the various operations involved in projecting and retracting the writing tip 13 are brought about by sequential operation of the plunger 24. For this purpose it is necessary that the shank portion 26 of the plunger be slidably and nonrotatably received in the axial passage 29 of the body 20. Accordingly, the plunger and axial passage should have corresponding configuration in cross section adapted to permit free sliding movement but to prevent relative rotation of the parts. While a square configuration has been found to be particularly advantageous, providing both desirable strength and ease of manufacture, other regular or irregular configurations such as polygonal or rectangular, also are suitable.

Below the axial passage 29 the body 20 is suitably formed with an enlarged chamber or enclosure 32, pro-

viding room for free oscillation or pivotal movement of the wobbler or latch 17 about the upper end 12 of the ink cartridge 11. The chamber 32 is conveniently provided by a pair of recesses 34, 36 formed in opposite sides of the axial passage 29 and terminating at their upper ends in a pair of oppositely inclined stop shoulders 38 and 40. These stop shoulders are preferably planar in configuration with each of the shoulders being inclined to the axis of the writing instrument at an angle between about 10° and 40°. The opposing stop shoulders are longitudinally displaced with respect to each other; as shown, the stop shoulder 38 is at a substantially greater distance from the writing tip aperture 8 of the writing instrument than is the stop shoulder 40.

It is a feature of the invention that the cam follower, latch or wobbler 17 is at all times in engagement with the upper end 12 of the ink cartridge and receives upward thrust therefrom but free to pivot, rock or oscillate thereabout for operative coaction, in sequence, with the stop shoulders 38 and 40 of the body and the cam faces 27 and 28 of the plunger. In the illustrative apparatus, these rocking movements are facilitated by a rounded base or pivot surface 46 provided on an enlarged base portion 44 of the wobbler. Preferably the surface 46 is concaved to slidably receive and retain the upper end 12 of the cartridge. Extending vertically of the base portion 44 of the wobbler is an axial stem or supporter bar 48 terminating in an upwardly directed distal end 50. The end 50 preferably is rounded to facilitate tilting or rocking movements of the wobbler on contact with the cam faces 27 and 28 of the plunger. Adjacent the end 50 is a pair of oppositely directed, separate cam surfaces 54 and 52 having portions adapted for operative engagement with the retracting and projecting shoulders of the body chamber 32. Desirably the cam surfaces 54 and 52 are provided with portions corresponding in inclination (when the wobbler stem 48 is in a vertical position) with the inclines 38 and 40 respectively. As best seen in Fig. 3, air ducts or passages 43 formed in the base 44 provide for free access of air to the ink supply in the cartridge 11 upon which the latch is seated.

The operating means for sequentially moving the ink cartridge between projected and retracted positions comprise the cam faces 27 and 28 of the operating plunger, which contact in alternation opposite sides of the rounded end 50 of the movable or floating latch upon depression of the plunger into contact therewith, and the cam surfaces 54, 52 on the latch and the stop shoulders 38, 40 of the body with which the latch surfaces are successively and alternatively engaged upon rocking motion of the latch. By the above-mentioned combination of elements the ink cartridge 12 may be moved by successive vertical movements of the plunger 24 between a projected position shown in Figs. 1 to 4 and a retracted position shown in Figs. 7 to 10.

The operation of my retractable writing instrument in providing for vertical projection and retraction of a writing cartridge without appreciable lateral movement thereof is as follows:

When the writing cartridge is in a projected position, as shown in Figs. 1 to 4, the wobbler or latch 17 is tilted in one direction and held by engagement of surface 52 with the stop shoulder 40 of the body or barrel; in this position, the writing tip is in projected position. When the operating button 25 is depressed to retract the writing unit 11, the plunger shank portion 26 moves downward to cause the retracting cam face 27 to contact a laterally displaced portion of the rounded end 50 of the wobbler or latch device 17 and thereby urge the latch to rock or pivot to the right in Fig. 2 and also move the latch and writing unit axially downward. The oscillation or pivotal movement of the wobbler or latch, indicated in Fig. 5, is substantially in the plane of the rear face 55 of the axial passage 29, as is more clearly shown in Fig. 6. Pivotal movement continues until the distal end 50 of the wobbler bears against the side of the recess 34. On releasing the

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pressure on the operating button 25, the spring 18 urges the writing unit 11 and latch 17 axially upward until the cam surface 54 contacts the stop shoulder 38. In the retracted position shown in Fig. 7, the wobbler or latch is tilted on its pivot surface 46 so that its distal end assumes the position in the lower right-hand quadrant of the device as indicated in Fig. 9. In other words, movement of the distal end 50 of the wobbler during oscillation from a projected position to a retracted position of the writing unit is substantially in the directions indicated by the lines 57 and 59 of Fig. 4.

When the operating button 25 is depressed to project the writing unit 11 (the parts being in the positions shown in Figs. 7 to 9), the plunger shank 26 moves downward to cause the projecting cam face 28 to contact the rounded end 50 of the wobbler and to urge the wobbler or latch to rock or pivot in the opposite direction and to move axially downward. The rocking or pivotal motion causes surface 54 of the latch to clear and disengage from stop shoulder 38 and to move downwardly into a position illustrated in Fig. 10 which shows the parts at an instant just before the cam surface 52 of the latch is forced into engagement with the stop shoulder 40. A moment later coaction and engagement between the cam surface 52 and the stop shoulder 40 will return the parts to the projected position shown in Figs. 1 to 4. Movement of the upper or distal end of the wobbler during this sequence of operations is in the direction of lines 61 and 63 in Fig. 4. In other words, by successive depressions and axial movements of the plunger into contact with laterally spaced surface portion areas of the end of the movable or floating latch, the latch is oscillated or rocked in such a way that its upper end 50 moves in opposite directions in succession, these rocking movements causing successive contacts and engagements of the various separate surfaces carried by the latch or wobbler and the oppositely disposed longitudinally displaced stop shoulders.

It will be observed that a correct positioning of parts throughout the successive operations of retracting and projecting the writing unit 11 depends upon the nonrotatability of the plunger, wobbler and body of the retracting mechanism about the axis of the pen. Whereas the body 20 and plunger 24 are rigidly positioned with respect to the body and each other, the wobbler or latch 17 is free to rock and slide about the upper end 12 of the writing cartridge. Accordingly some means must be provided to prevent relative rotation of the wobbler. One suitable means is illustrated in Fig. 11 where the latch is shown keyed against rotation by a notch 70 provided in its base 44 to receive the key or spline 72 which is rigidly secured to the case element 15. It will be apparent of course that other suitable means might be provided for this purpose.

From the above description, it will be apparent that the present invention makes possible projection and retraction of a writing unit by means of a device occupying a minimum of axial and radial space within the pen body. Since all lateral movements necessary to the operation of the device may be transmitted into oscillatory or tilting movement of a single unit of the retracting mechanism, little, if any lateral movement need be imparted to the writing cartridge itself. As a result, it is possible to provide writing instruments of unusual slimness; the retracting mechanisms of such instruments employing simply formed, inexpensive plastic parts, all of which may be readily cast or molded from thermoplastic or other resinous materials. In particular, the wobbler or latch 17 may be readily molded in a rugged, durable shape. Moreover, the resulting mechanism is easy to operate, positive and dependable in operation and consequently capable of a large number of operations without failure.

To those skilled in the art to which this invention relates, many changes in construction and widely differing embodiments and application of the invention will suggest themselves without departing from the spirit and scope of the invention. For example, instead of the preferred concave pivot surface 46 illustrated, such pivot

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surface could be convex without detracting from the essential oscillatory or tilting movements of the wobbler or the minimal lateral movements of the ink cartridge. Moreover, the inner radial dimensions of the case element 15, which have been illustrated as spaced from the writing unit, could be dimensioned so as to closely encompass the unit and thereby insure an essential vertical movement of the cartridge within the pen. Accordingly, it should be understood that the disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

I claim:

1. A project-retract mechanism for a writing instrument having a barrel and a writing unit longitudinally movable therein between projected and retracted positions and spring means normally biasing the writing unit toward retracted position, said writing unit having an upper end and a writing tip at the other end, including: a depressible plunger carried by the rear end of the barrel; a floating latch member contained within said barrel forwardly of said plunger, said latch member being rockably seated on the upper end of said writing unit and adapted to receive upward thrust of said writing unit, said latch member and barrel being cooperatively shaped to permit longitudinal sliding and rocking of the latch in opposite directions and to restrain axial rotation of the latch, said latch having a pair of separate, upwardly directed, laterally spaced surfaces and an upper end, said plunger being depressible into contact with laterally spaced portions of the upper end of the latch in alternative rocked positions thereof so that each successive depression of the plunger causes rocking of the latch in a direction opposite to that of the preceding depression and rocking of the latch; and oppositely disposed, longitudinally displaced stop shoulders in the barrel for engaging and holding the laterally spaced surfaces of the latch in alternately rocked positions thereof to hold the writing unit in projected and in retracted position.

2. A mechanism as stated in claim 1, wherein the end of the plunger adapted to contact said latch is provided with oppositely inclined faces and is restrained from rotation during depression.

3. A mechanism as stated in claim 1, wherein an upwardly directed, laterally spaced surface of the latch and a respectively cooperating stop shoulder in the barrel is located each side of the axis of said mechanism and such surfaces and shoulders are inclined, the direction of inclination of said surface and shoulder on one side of such axis being opposed to the direction of inclination of the surface and shoulder on the other side of such axis.

4. A mechanism as stated in claim 1, wherein the separate laterally spaced surfaces of the latch lie in a plane between the upper end of the latch and the plane of the rockable seat of the latch on the upper end of the writing unit.

5. A mechanism as stated in claim 1, wherein the mechanism includes a stationary body member having aperture means for slidably receiving and guiding the lower end of the plunger into contact with said latch and for restraining said plunger from rotation, and said stop shoulders are formed in said body member, said body member being held by the barrel.

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