Aug. 18, 1959 H. BROSS 2,899,931

WRITING DEVICE HAVING AN EXTENSIBLE AND RETRACTABLE WRITING ELEMENT

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Fig. 1

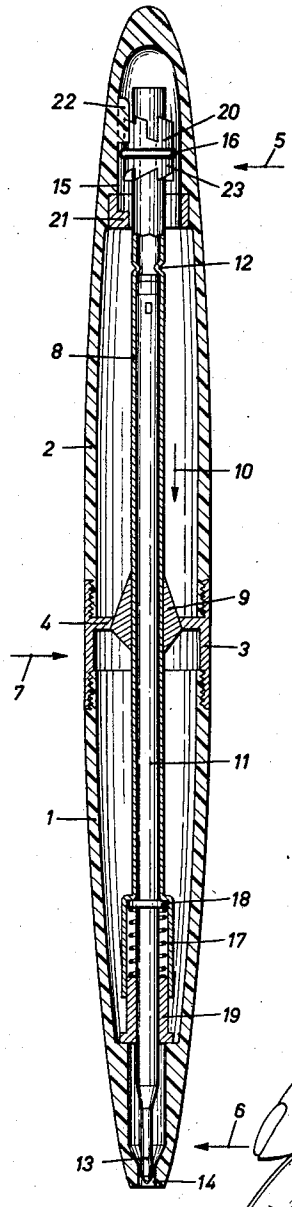


Fig. 2

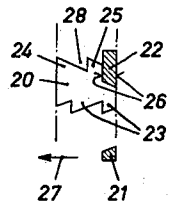
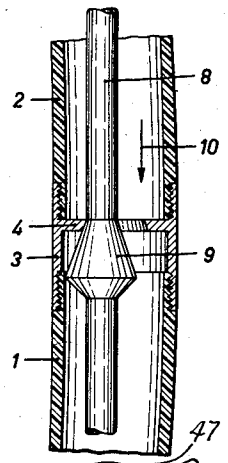


Fig. 3



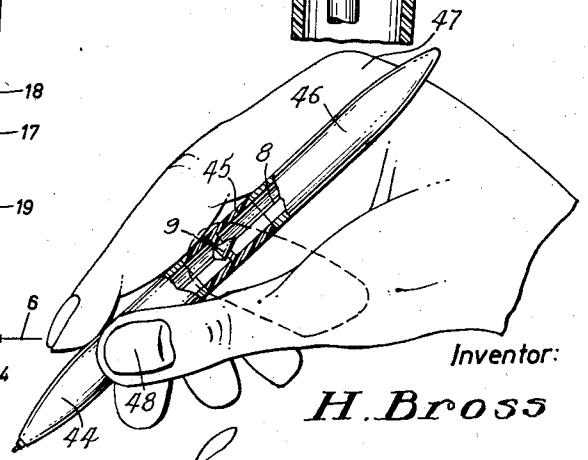


Fig. 5

Inventor:
H. Bross

By Glascock Downing & Seebold
Attorneys

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Fig. 4

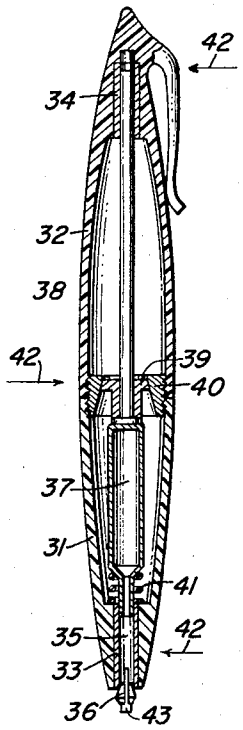


Fig. 6

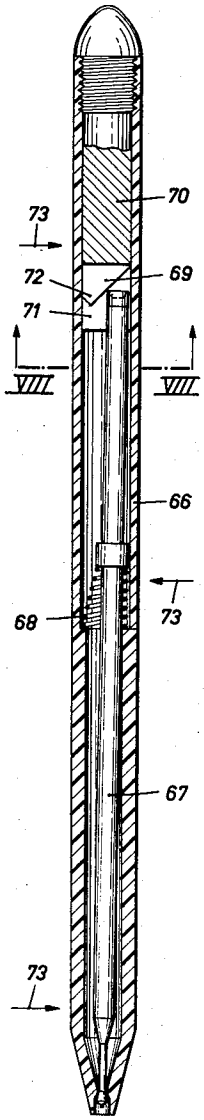


Fig. 7

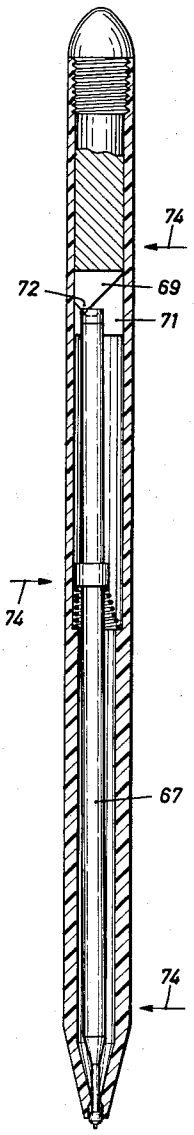
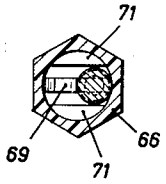


Fig. 8



Inventor:

H. Bross

by Glascock Downing & Seebold

Attorneys

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Fig. 10

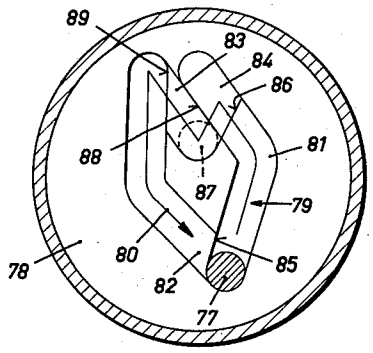


Fig. 9

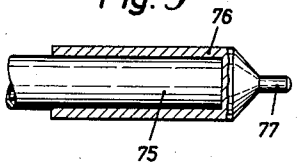


Fig. 11

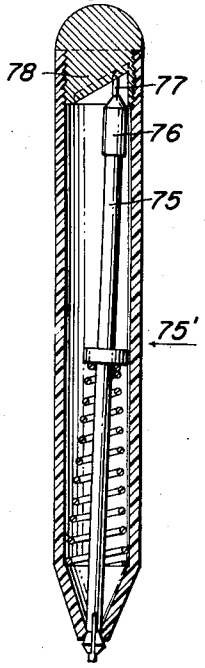
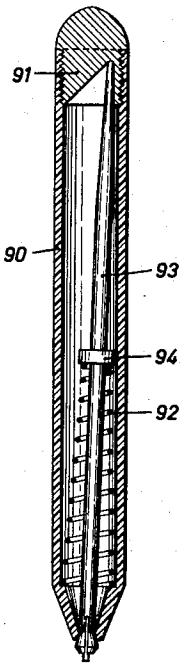


Fig. 12



Inventor:
H. BROSS

by Glascock Downing & Seebold
Attorneys

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2,899,931

WRITING DEVICE HAVING AN EXTENSIBLE AND RETRACTABLE WRITING ELEMENT

Helmut Bross, Braunschweig, Germany, assignor to Guenther Wagner, Hannover, Germany

Application May 2, 1955, Serial No. 505,401

12 Claims. (Cl. 120—22)

This invention relates to hand appliances, particularly writing appliances, each with a hollow barrel, in some cases assembled from several parts, and unalterable in length, which has sufficient stiffness for its use, and wherein is mounted a tubular organ, particularly a carrier of a writing medium, which is longitudinally displaceable by finger pressure through a reversing mechanism.

The object of the invention is to simplify the construction and operation of such appliances.

An essential feature of the invention consists in the barrel being made wholly or partially elastically yielding and provided on the inside, within the range of the elastic portion, with at least one actuating element, preferably effective from all sides, which, on deformation of the barrel by transversely directed finger pressure, longitudinally displaces the tubular organ.

According to a preferred constructional form of the invention, the barrel is made capable of being bent out of shape or distorted.

The invention is directed moreover to the particular construction of the reversing mechanism, which effects, on deformation of the barrel, longitudinal displacement of the tubular organ, particularly a carrier of a writing medium, mounted in the barrel.

The invention is directed also to a constructional form wherein the rigid tubular organ receiving the writing medium, especially a ball-point reservoir unit, bears with its rear end against an inclined interior end wall of the barrel, so that the tubular organ is displaced by bending the barrel.

Further essential features of the invention are disclosed in the following description.

Various constructional examples of the invention are shown in the accompanying drawings, in which:

Fig. 1 is a longitudinal section of a ball-point writing appliance made according to the invention, having a barrel bendable about a rigid mid-portion thereof.

Fig. 2 is a development of the locking mechanism used in the appliance of Fig. 1.

Fig. 3 is a longitudinal section of the middle portion of the appliance of Fig. 1 in the operative position.

Fig. 4 is a longitudinal section of a propelling pencil provided with clamping jaws with a barrel bendable merely at the midlength, constructed according to the invention.

Fig. 5 is a perspective view of a writing instrument, partly in section.

Fig. 6 is a longitudinal section of a particularly suitable constructional form of the invention.

Fig. 7 is a longitudinal section of the constructional form of Fig. 6 in the operative condition.

Fig. 8 is a section on the line VIII—VIII of Fig. 6.

Fig. 9 is a longitudinal section of the end of the lead tube of a modified constructional form like the constructional form of Fig. 6.

Fig. 10 is an internal view, on a larger scale, of the inclined wall surface with a guide groove for the constructional form of Fig. 9.

Fig. 11 is a longitudinal sectional view of the form illustrated in Figs. 9 and 10.

Fig. 12 is a longitudinal section of a press propelling pencil like the ball-point pen of Fig. 6 but somewhat otherwise constructed.

The ball-point writing appliance shown in Figs. 1 and 2, has a three-part hollow barrel, the front and rear portions 1 and 2 of which are formed elastically bendable, and are for example composed of a polyamide with low modulus of elasticity. The barrel has sufficient stiffness to be usable as a writing appliance. The front portion 1 and the rear portion 2 are united by an interposed metal screwthreaded sleeve 3, which is formed with an annular internal flange 4. If the hollow barrel is for instance in the writing position supported by hand and stressed in the directions of the arrows 5, 6 and 7 the barrel can then be bent to a certain extent. On the pressure ceasing the barrel reassumes its original shape.

Inside the hollow barrel is a stiff centrally located tube 8, which is mounted by its end in the ends of the barrel. The tube 8 is provided, at the region of the internal flange 4, with an external cone 9. Inside the tube 8 a ball-point reservoir unit 11 is mounted, which bears by its rear end against a crimping 12 of the tube 8. The point of the ball-point reservoir unit 11 is located with play in the nose 14 of the front portion 1 of the barrel. The rear end of the barrel is formed with an inner bore 15, in which the rear end of the tube 8 engages, likewise with play, by means of an interposed external flange 16. By this mounting of the ends of the tube 8 and of the ball-point reservoir unit 11, the bending of the barrel is hindered neither by the tube 8 nor by the unit 11.

The ball-point reservoir unit 11 is subject to the influence of a retracting spring 17, which bears on the one hand against a flange 18 of the unit and on the other hand, through a sleeve 19 longitudinally displaceable along the unit, against the front barrel portion 1. The tube 8 engages over the flange 18 and is guided on the sleeve 19.

On bending the barrel towards the essentially stiff tube 8 as shown in Fig. 3, the internal flange 4 acts on the inclined surface of the cone 9 to effect thereby a displacement of the tube 8 and therewith the ball-point reservoir unit in the direction of the arrow 10. In order, on resumption by the barrel of its original shape, to hold the ball-point reservoir unit in the writing position, a locking arrangement is required.

This locking device is arranged in the bore 15 of the rear barrel end. It consists of a toothed sleeve 20, fast with the tube 8 and bearing the shallow external flange 16, which is displaceable, together with the tube 8, between two projections 21 and 22 provided on the inside of the barrel. The ring sleeve has at the lower end saw teeth 23 with a vertical and slanting flank and at the top pairs of teeth 24 and 25. The teeth 23 are inclined oppositely to the slanting flank and offset with respect to the teeth 24 and 25 by a half tooth width. Tooth 25 has a slot 26 alongside the vertical flank of tooth 24 of a width corresponding to the half tooth width. The longitudinal slot 26 serves to receive the longitudinal projection 22.

If, as already described, the tube 8 and therewith the toothed sleeve 20 are moved by transverse pressure on the barrel in the direction of the arrow 10, the tooth sleeve 20 then comes out of the range of the projection 22 and encounters, with a tooth 23, the projection 21. An inclined surface of the projection 21 effects, in conjunction with the inclined surface of the tooth 23, rotation of the toothed sleeve 20 and therewith also of the tube 8, of half the tooth pitch in the direction of the arrow 27 of Fig. 2. If the barrel goes back to its normal posi-

tion, the spring 17 then presses the tube 8 again rearwards until the tooth 24 of the toothed sleeve 20 encounters the projection 22. As a result of the inclined flanks of the tooth 24 and of the projection 22 the toothed sleeve carries out a further rotation of a half tooth pitch. The projection 22 now holds the sleeve 20 in the space 28 between teeth. This position corresponds to the writing position in which the unit 11 projects from the nose 14. On a further bending of the barrel the displacing operations proceed in like manner, wherewith however the toothed sleeve 20 arrives again with the slot 26 in the range of the projection 22. This position corresponds to the position of rest, in which the parts again assume the position shown in Figs. 1 and 2.

Instead of the locking arrangement shown, other arrangements are conceivable with which the tube 8 moves into the writing position or into the position of rest or can be held therein. The deformability of the barrel can also be brought about, by simply the intermediate piece 45 being elastic, while the front portion 44 and rear portion 46 of the barrel are rigid (see Fig. 5). The writing medium carrier has the displacing and stop devices as represented in Fig. 1. If the hollow shaft is bent by the pressure of the root joint 47 of the forefinger on the rear part 46 and by the pressure of the thumb 48 on the middle part 45 as shown in dotted lines, the writing medium carrier as illustrated in Fig. 1 is displaced.

In Fig. 4 a propelling pencil according to the invention is provided with an elastically bendable barrel as shown, which consists of a front half 31 and a rear half 32. The nose of the front half 31 is lined with a metal sleeve 33. In the end of the rear half 32 a bore is provided, which likewise is lined with a metal sleeve 34. In the sleeve 33 a lead-guide tube 35 is guided, which at the front end is formed into clamping jaws 36, known per se, and the rear end of which is enlarged into a lead-magazine 37 and finally is prolonged by a rigid rod 38, the end of which is guided in the sleeve 34. On the rod 38 is mounted a flanged sleeve 39, which is located in the range of a hollow cone 40. The hollow cone is secured frontally to the rear half 32 and serves also by a screwthreading as a connecting member for interconnection of the two halves of the barrel. The propelling mechanism is moreover provided with the usual returning spring 41.

On bending the barrel in the directions of the three arrows 42, the hollow cone exerts a thrust on the flange of the sleeve 39 of the propelling mechanism, which results in a forward displacement of the lead-guiding tube. Thereby in the known manner the clamping jaws 36 are relaxed, which permits a displacement of the lead 43 issuing from the clamping jaws. On the barrel resuming its normal position, the spring 41 pushes the lead-guide tube 25 back into the barrel again. The clamping jaws 36 are closed. Obviously with this construction other kinds of propelling mechanism can be used.

In the ball-point pen shown in Figs. 6 to 8 the ball-point reservoir unit 67 is tiltably mounted about the point of the unit, in the barrel 66, formed elastic at least in its rear half. The rear end of the unit 67 bears, with the aid of the retracting spring 68, known per se, on an inclined ridge 69, which is provided on a plug 70, screwed from the rear into the barrel. For the purpose of guiding the end of the unit on the ridge 69, the plug 70 has two cheeks 71 extending parallel to the ridge. The ridge 69 is reverted to form a rest 72, on which the usually somewhat concave rear end of the unit can seat itself.

If the barrel in the position of Fig. 6 is stressed in the directions of the arrows 73 and thereby somewhat bent, the substantially rigid unit 67 then becomes rocked into the operative position shown in Fig. 7; during which the rear end of the unit slides on the ridge 69, so that the unit is thrust forward. The unit in the operative position then springs on to the rest 72. In order to bring the unit into the position of rest, the barrel must be stressed in the opposite direction, namely in the direction of the arrows 74. The unit is thereby un-stressed. The unit then slides back again on the ridge 69 into the position shown in Fig. 4. As the bending of the barrel has to take place in an absolutely determined plane going through the longitudinal axis, the barrel can be provided on the outside with appropriate marking. Also it can be of advantage, precisely with this constructional form, to give the barrel a non-round external configuration, for example the hexagonal shape shown in Fig. 8.

Figs. 9 and 10 show a modification of the constructional form of Figs. 6 to 8, in which on the rear end of the unit 75 a cap 76 is set, which ends in a pin 77. In this embodiment, a wall 78 is provided at the rear end of the barrel instead of the bevel part 69 shown in Figs. 6 to 8 and the wall is formed with an endless groove 79.

Pin 77 is pressed by retracting spring 68 on the base face of the groove and is guided in such groove. A writing unit 75 is mounted at the front end of the barrel for pivotal and translatory movement. For the purpose of displacing unit 75 on movement of the pin in the groove 79, the groove is provided with a varying depth. The groove is subdivided into four sections 81, 84, 83, 82 and has a resting spot or zone 87 for the end of the pin corresponding to the writing position of unit 75. In Fig. 10, the inoperative position of the unit 75, retracted into the barrel, is indicated by the cross-hatched circle denoting the pin 77 of the unit. The pin travels through groove 79 in the direction indicated by the arrow 80, upon the barrel being bent twice. For this purpose, at the boundary between sections 81 and 82, the former is deeper than the latter section. The term "deeper" indicates the direction towards the retracted position of the unit. Similarly, at the boundary between sections 82 and 83, the former section is deeper than the latter section and at the boundary between sections 83 and 84, the former is deeper than the latter. Also, at the boundary between the sections 84 and 81, the former section is deeper than the latter section and each such boundary is formed by a step.

Upon bending the barrel by forces acting in the direction of the arrows 73 (Fig. 6), the pin 77 is forced to move in section 81 of the groove 79 towards the section 84. This is the only direction the same can move along from its position shown in Fig. 10 as the way to the section 82 is barred due to step 85 between the sections 81 and 82. In the direction of the movement of the pin 77, groove section 81 is inclined towards the operating position and, thus, as the pin moves along, the unit is gradually pushed towards the operating position and the tip of the unit protrudes out of the barrel. When the pressure on the barrel decreases, the barrel straightens and the pin 77 slides along step 86 into notch 87. The writing point or tip of the unit is now in the position for use. Upon again bending the barrel, the pin will leave the notch 87 and slide along section 83 of the groove and drop over step 89 into section 82 of the groove. The section 82 is sloped towards the retracted position of the writing unit, when progressing in the direction of arrow 80. Hence, after the force on the barrel ceases and the latter straightens, the pin 77 will slide in section 82 in the direction of arrow 80 and, by the slope of and under the pressure of the spring, the pin, together with the writing unit, will be forced in the direction towards the retracted position. Finally, at the end portion of section 82, the pin 77 drops down at the step 85 into its initial position in section 81, corresponding to the full retracted position of the writing unit 75.

With this constructional form, it suffices to indicate as the pressing position only a single position on the outer surface of the barrel, for example by a wart or a depression.

The constructional forms of Figs. 6 to 8 have the merit of exceptional simplicity of arrangement and therewith cheapness of construction.

In Fig. 12 a propelling pencil is shown the basic construction corresponds substantially to the ball-point pen of Figs. 6 to 8. The bendable barrel **90** is closed by a plug **91** with eccentric internal conicity, against which bears the rear end of the lead-tube **93** under the influence of a clamping spring **92**. To avoid a large idle bending stroke, the lead-tube **93** can be provided with a flange **94**, which is somewhat larger than is necessary for providing an abutment for the spring **92**. At each bending and recovery of the barrel the lead-tube **93** carries out one forward and backward movement, which, in the manner known per se, can be utilised for advancing and clamping the pencil lead.

The plug **91** of Fig. 12 with the eccentric inner cone requires a bending of the shaft **90** in a definite plane. If it is desired that the lead tube **93** on bending shaft **90** be displaced in any direction, the hollow cone of the plug **91** is constructed as a concentric cone of Figs. 6, 8.

The constructional examples shown are only to illustrate the invention, so that in case of need possibly for manufacturing reasons desirable alterations may be made, without altering the essence of the invention.

I claim:

1. In a writing device of the type having an extensible and retractable rigid writing element provided with a point, a hollow barrel surrounding said writing element blocked at one end and having an opening at the other end through which the point of said writing element may extend, means to normally bias said writing element away from said opening, said barrel being at least in part of flexible material so that it may be bent for curving the barrel transversely of its axis, coacting surfaces on the barrel and the rigid writing element, one of said surfaces being inclined to the axis of the barrel so that upon curving the barrel, said surfaces cooperate to force the writing element point through said opening, and means adjacent said blocked end and acting under the influence of the bias means to retain the writing element in position with its point through said opening, said writing element being released, upon subsequent curving of the barrel, to return under the influence of said biasing means to its original position.

2. A writing device as per claim 1 wherein at least at one end, a tube is mounted in the barrel so that the same has a stiffening effect on the barrel, the said tube serving as guide means for a sliding movement of the writing element.

3. A writing device as per claim 1 wherein the barrel comprises a front part and a rear part of rigid material and a flanged nipple connecting said parts, the flanged nipple being composed of elastic bendable material.

4. Writing device as per claim 1, wherein stops are provided in the barrel and on the writing element, said stops being adapted to hold the writing element in the position to which it is moved by displacement upon cessation of bending the barrel and defining the holding device.

5. Writing device as per claim 4 wherein said stops combine with driving elements in one ring sleeve with saw teeth on the upper and lower edge of an even number of teeth each with vertical and slanting flanks, the inclination of the teeth of the slanting flanks on the upper end of said ring being opposite to those on the lower edge, said teeth having equal tooth widths, the teeth on the upper edge being offset to the teeth on the lower edge by half a tooth width, the teeth on the upper edge each alternately including a slot at their bottoms alongside the vertical flank of the adjacent tooth, the slot having a width corresponding to one half of the width of the tooth gap, and two stops in the barrel receiving between them the ring sleeve in spaced relation to one another permitting a displacement of the sleeve with the writing element.

6. Writing device as per claim 1, wherein the barrel is composed of a front part and a rear part, said parts being connected by a flanged nipple of rigid material, the front and rear parts being elastically bendable transversely of their axes.

7. Writing device as per claim 1, wherein the rear end of the barrel is shaped as a hollow cone, while a clamping device is provided for holding the writing element in its position upon cessation of bending the barrel.

8. Writing device as per claim 1, wherein the barrel is composed of a front and a rear part, the front part being of rigid material and the rear part of flexible material.

9. A writing device as claimed in claim 1 wherein the writing element is supported for slidable movement along and pivotal movement about a point at the front part of the barrel, said inclined surface being a bevel arranged at the rear end of the barrel, said writing element bearing at its free end against said bevel, with such free end defining the coacting surface on the writing element, and a holding device constitutes the means for retaining the writing element in its position upon cessation of bending the barrel.

10. Writing device as per claim 9, wherein a groove is formed in said bevel, in which groove the writing element is guided, at the forward end of said groove a rest into which the writing element fits.

11. Writing device as per claim 9, wherein the writing element is supported for slidable movement along and pivotal movement about a point at a front part of the barrel, a surface at the end of the barrel, an endless guide groove formed in said surface for guiding the end of the writing element, the guide groove being divided into four sections, the groove sections having different depths, the adjacent sections being separated by a step, declining corresponding to the direction of motion of the end of the writing element, the motion beginning from the deepest spot of the guide groove, said spot being a stop for holding the writing element in its retracted position, and another stop arranged two sections away from the first stop and serving to hold the writing element in its operating position.

12. A hand writing implement consisting of a barrel including a substantially tubular wall, a rigid carrier for the writing medium, a spring in the barrel mounted with one end on the barrel and engaging the carrier with the other end to hold the carrier retracted into the barrel, the walls of the barrel being of sufficient rigidity for the use of the implement in writing, said barrel being elastic so that it may be bent for curving the barrel transversely of its axis, driving surfaces on the inner side of the wall of said barrel and on the rigid writing medium carrier, respectively, at least one of said driving surfaces having an inclined guiding face engageable with said other driving surface whereby, on bending the barrel by transversely directed finger pressure to displace the rigid writing medium carrier in lengthwise direction in opposition to the spring, the driving surface on the carrier is forwardly cammed, and retaining means for holding the writing medium carrier in its position, said retaining means being effective under the bias of said spring after cessation of bending the barrel.

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