Oct. 7, 1958 C. N. JOHNSON 2,854,950

WRITING INSTRUMENT

Filed May 24, 1956 2 Sheets-Sheet 1

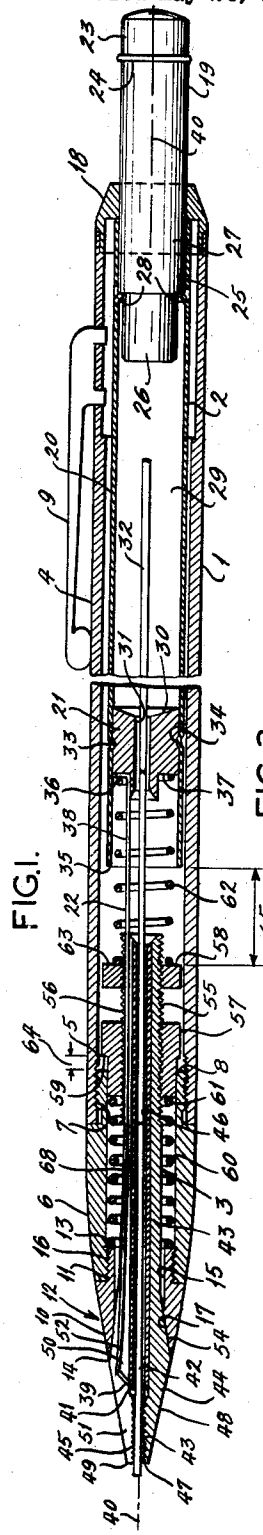


FIG. 1.

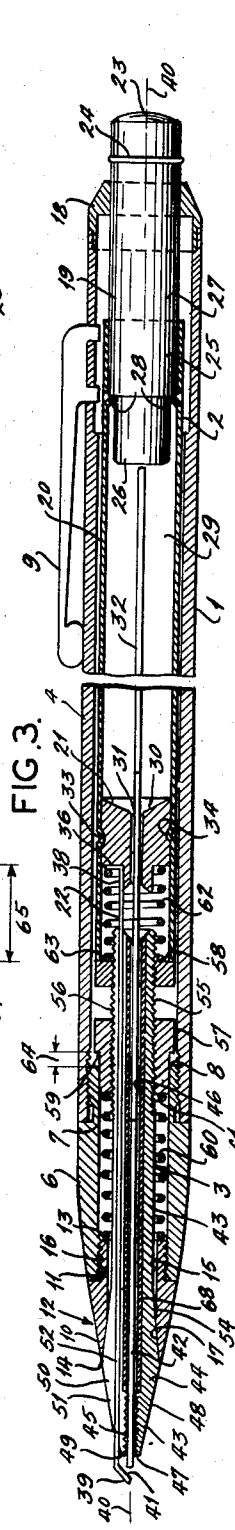


FIG. 3.

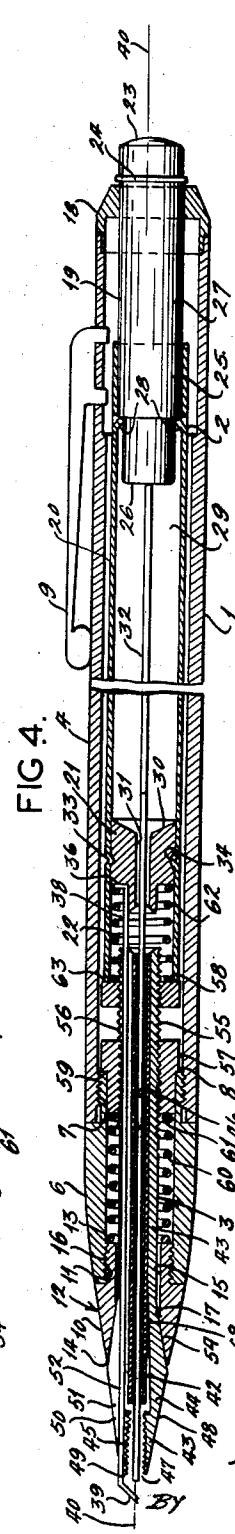


FIG. 4.

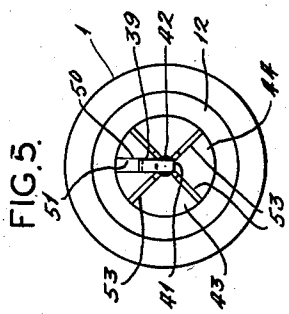


FIG. 5.

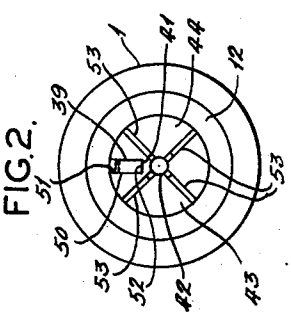


FIG. 2.

INVENTOR:
CLIFFORD N. JOHNSON
Gravely, Lieder, Woodruff & Willer
ATTORNEYS.

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FIG.6.

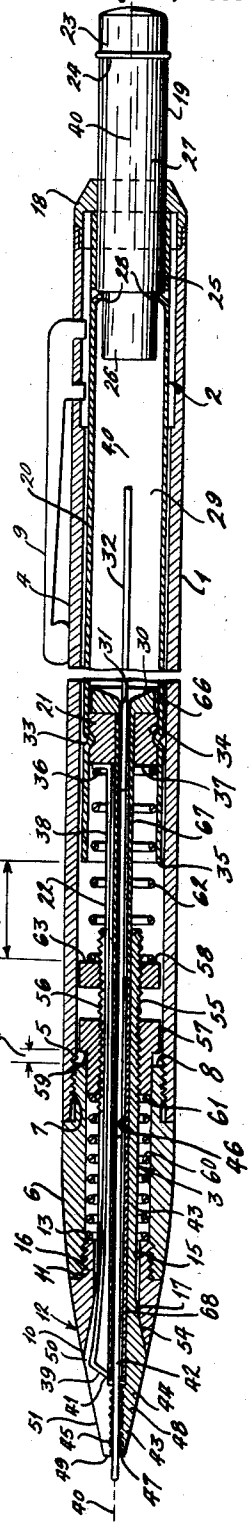


FIG.8.

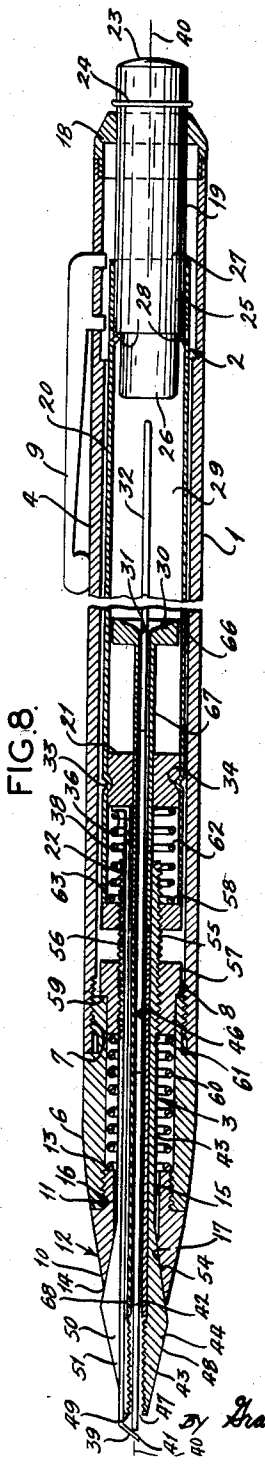


FIG.9.

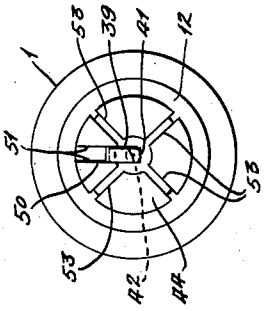
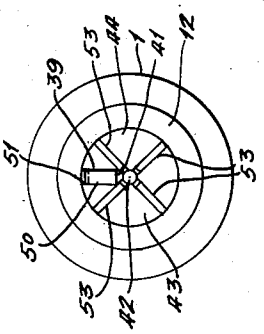


FIG.7.



INVENTOR:
CLIFFORD N. JOHNSON

By Gravely, Lieder, Woodruff & Wille
ATTORNEYS.

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2,854,950

WRITING INSTRUMENT

Clifford N. Johnson, St. Louis, Mo.

Application May 24, 1956, Serial No. 587,094

5 Claims. (Cl. 120—14.9)

This invention relates to a writing instrument wherein the writing unit is allowed to fall by gravity a limited predetermined distance beyond the forward end or tip of said writing instrument when the projecting mechanism is actuated. In particular, this invention relates to a mechanical pencil wherein the lead is allowed to fall by gravity a limited predetermined distance, which can be adjusted as desired, beyond the tip of the pencil when the lead stop is actuated.

The use of extra thin lead in mechanical pencils has become increasingly popular. This lead is approximately 0.036 inch in diameter and is frequently broken due to the over extension thereof from the forward tip of a pencil. It is estimated that over fifty percent of such lead is wasted since it is broken off so frequently in use. Present mechanical pencils feed the lead from the forward end of the pencil in many different ways, such as by spiral means actuated by rotation, by button means which when pushed positively moves the lead forwardly step by step, or by clutch means actuated by rotation as normally found in mechanical drafting pencils. With all of the present feed arrangements, the amount of lead which extends beyond the forward end of the pencil is not positively measured by means projecting externally from the pencil, but is visually estimated or moved by means within the pencil itself. Either way, there is no assurance that the desired amount of lead will extend forwardly from the end of the pencil.

One of the principal objects of the present invention is to positively measure by externally projecting means the amount of lead which extends externally downwardly from the forward end of a mechanical pencil.

Another object of the present invention is to provide retractable stop means which is projected beyond the writing end of a writing instrument for preventing the writing unit from falling by gravity beyond a predetermned distance from the tip of the instrument. Another object is to provide in a writing instrument means normally positioned within said instrument which can be projected externally thereof to limit the distance which the writing unit is allowed to project from the tip of the writing instrument. Another object is to provide actuating means which when operated does not positively act upon or move the writing unit but simply allows the writing unit to move by gravity to its predetermined writing position. This eliminates the necessity of providing means for pushing the writing unit or lead to its new or projected position.

Another object of the present invention is to provide a mechanical pencil wherein lead is allowed to move by gravity to its writing position upon actuation of the projecting mechanism. Another object is to provide a mechanical pencil wherein an additional supply of leads from the lead magazine will by virtue of being located one above the other in the lead tube and resting upon one another cause the service lead to drop to its new position quickly because of the additional weight thereon when the projecting mechanism is actuated.

Another object is to provide a lead clutch or collet which is located outside of the pencil barrel or casing which will firmly grip the service lead at only one point, said point being located adjacent to the writing tip. Another object is to provide a lead gripping clutch or collet with means thereon for varying or limiting the travel of said clutch when the projecting mechanism is actuated thereby varying the amount which the clutch will open. Another object is to provide lead adjusting means operatively connected to said lead gripping clutch for varying the amount which the externally projecting lead stop will allow the writing unit to fall or project beyond the writing tip. A still further object is to provide a central opening in a collet which is always larger in diameter than the lead except at the writing tip. Another object is to provide a thin walled tube in said collet of slightly larger diameter than the lead to prevent the lead from sticking to one or more of the collet jaws.

A still further object is to provide a new method of projecting a writing unit from a writing instrument and retracting same.

These and other objects and advantages will become apparent hereinafter.

The invention also consists in the parts and in the arrangements and combination of parts hereinafter described and claimed. In the accompanying drawings which form part of this specification and wherein like numerals and letters refer to like parts wherever they occur:

Fig. 1 is a longitudinal cross-sectional view of a writing instrument embodying the present invention showing the lead or writing unit in its writing position after it has been worn to some extent,

Fig. 2 is an end view of the writing tip of the instrument shown in Fig. 1,

Figs. 3 and 4 are longitudinal cross-sectional views of the writing instrument shown in Fig. 1 showing the projecting mechanism in its partially and fully extended or projected positions respectively when the push button is partially and fully depressed,

Fig. 5 is an end view of the writing tip of the writing instrument shown in Fig. 3,

Fig. 6 is a longitudinal cross-sectional view of a writing instrument embodying a modification of the present invention,

Fig. 7 is an end view of the writing tip of the instrument shown in Fig. 6,

Fig. 8 is a longitudinal cross-sectional view of the modification shown in Fig. 6 showing the push button fully depressed and the projecting mechanism in its fully extended position, and

Fig. 9 is an end view of the writing tip of the writing instrument shown in Fig. 8.

Referring now to the drawings in detail, it will be seen that the principal embodiment of the invention which has been lilustrated in Figs. 1–5 comprises a casing 1 having a projecting mechanism 2 and clutch mechanism 3 therein.

The casing 1 comprises a cylindrical barrel 4 with internal threads 5 therein at its forward end for receiving a tapered intermediate section 6 having cooperating threads 7 thereon and a rear abutment surface 8. The barrel 4 is provided with a pocket clip 9 and is preferably cylindrical for ease in manufacturing and printing names or advertisements thereon. A clutch closing tube 10 is secured to said intermediate section 6 by means of threads 11 or the like and has an outer surface 12 which forms a continuation of the taper of the intermediate section 6. The clutch closing tube 10 has a rear abutment surface 13 thereon and a forward tip 14. The closing tube 10 has an axial opening 15 therethrough which is cylindrical at its upper end 16 and flared out-

wardly at its forward end 17 terminating in the forward tip 14. The barrel 4 has an end plug 18 suitably secured to its upper or rearward end. The individual members of the casing 1 are provided with axially aligned openings for receiving the projecting mechanism 2 and clutch mechanism 3, the forward portion of which forms part of the casing 1.

The projecting mechanism 2 comprises a push button 19 which extends through the top opening of the casing 1 and fits into a magazine 20 having a magazine bushing 21 therein which abuts against the upper part of a lead stop 22. The push button 19 comprises an outer section 23 with a bead 24 therearound and an eraser holder 25 for holding an eraser 26. The inner end 27 of the push button 19 fits within the magazine 20 and abuts against inwardly bent tabs 28 struck from the upper end of said magazine 20. The magazine 20 forms a cylindrical lead chamber 29 which is closed on the top by the removable button 19 and which is closed on its bottom by the magazine bushing 21 having a conical face 30 and a flared central opening 31 for receiving lead 32 therethrough. The magazine bushing 21 is secured to the magazine 20 by suitable means, preferably a crimp or inner bead 33 formed in said magazine 20 which fits into a recess or groove 34 in said magazine bushing 21. The magazine 20 is provided with a lower end 35 which extends beyond or forwardly of said magazine bushing 21 for reasons which will be explained later. The lead stop 22 extends longitudinally and is provided with a bent portion or upper flange 36 which abuts against the bottom surface 37 of the magazine bushing 21, a longitudinal body portion 38, and a tip 39 which is bent angularly inwardly toward the geometric axis 40 of said writing instrument and which terminates in a sliding edge 41. The angle between the tip 39 and the geometric axis 40 is preferably 45° or less. The lead stop 22 is made from resilient metal and is adapted to spring automatically into axial alignment with the lowermost or service lead 42.

The clutch mechanism 3 comprises a clutch 43 having a plurality of jaws 44 with lead gripping teeth 45 therein and a tube 46 therethrough, said jaws 44 being preferably three or four in number and forming a bottom or discharge opening 47 therebetween. The jaws 44 are tapered as at 48 almost to a point or tip 49 to form a continuation of the clutch mechanism and the forward portion of the casing 1. One of said jaws 44 is provided with a longitudinal slot 50 having wall 51 and a slot bottom 52 for receiving said lead stop 22. If desired, the slot 50 may extend into the clutch closing tube 10. The jaws 44 are formed from the cylindrical clutch 43 which is slotted as at 53 to form the several jaws 44, each of which has a tapered or cam surface 54 which cooperates with the flared end 17 of the closing tube 10 for moving the jaws 44 radially inwardly and outwardly. The rear portion 55 of said clutch 43 is provided with threads 56 having a clutch adjusting nut 57 and a lead adjusting nut 58 threaded thereto in spaced relationship. The nuts 57 and 58 move with the clutch 43 and form part of the clutch mechanism 3. The clutch adjusting nut 57 has a forwardly extending shoulder 59 thereon. A coil spring 60 for returning the clutch mechanism 3 is mounted between th bottom surface 61 of said clutch adjusting nut 57 and the opposing upper surface of the clutch closing tube 10 of the casing 1. A second coil spring 62 for returning the projecting mechanism 2 is mounted between the upper surface 63 of the lead adjusting nut 58 and the bottom surface 37 of the magazine bushing 21. The spring 62 also maintains the lead stop 22 in contacting relation with the magazine bushing 21.

The clutch 43 is provided with a thin walled tube 68 with a hole or bore slightly larger in diameter than the lead 42, which it circumscribes, so that there will be a space between said tube 68 and said lead 42. The lead 42 sometimes has a tendency to stick to the gripping teeth 45 when the jaws 44 are opened thereby preventing the lead from moving by gravity. The tube 68 prevents this by preventing the lead from following the jaw to which it is temporarily stuck beyond a predetermined distance. Whether the tube 68 is necessary or desirable depends upon the size and shape of the gripping teeth 45 and the characteristics of the lead itself. The tube 68 is preferable since it insures that the lead 42 will be free to slide whenever the jaws are opened.

It is believed that the operation of the writing instrument is apparent from the foregoing. The writing instrument is normally carried in the pocket of the user with the writing unit or lead 42 and 32 in its fully retracted position (not shown) or in its partially used or partially retracted position shown in Fig. 1. In either position, with the push button 19 in its normal or upper position, the jaws 44 are in their innermost position toward each other and toward the geometric axis 40 to firmly contact any piece of service lead 42 which might be therebetween. The clutch jaws 44 are in their innermost or gripping position when said jaws are rearwardly within the clutch closing tube 10. If no lead is between the teeth 45 of the jaws 44 in their innermost position, the discharge opening 47 is so small that no lead can fall or pass therethrough.

In order to allow the lead to project from the forward end of the writing instrument, the push button 19 is depressed, usually by the thumb, thereby moving the magazine 20 and magazine bushing 21 downwardly, compressing the upper spring 62 until the bottom edge 35 of the magazine 20 abuts against the lead adjusting nut 58 as shown in Fig. 3. In so doing, the edge 41 of the tip 39 of the lead stop 22 slides forwardly along the bottom 52 of the slot 50 until it passes beyond the end 49 of the clutch mechanism 3 where it automatically springs toward the geometric axis 40 due to the inherent resilience of the lead stop 22. In this position, the angularly positioned tip 39 forms an abutment which is spaced forwardly from the discharge opening 47 and makes it impossible for anything to fall completely out of the discharge opening 47 since said tip 39 intersects the geometric axis 40 or is in spaced axial alignment with the discharge opening 47.

Continued downward movement of the push button 19 causes the projecting mechanism 2 and the clutch mechanism 3 to move together as a unit, and causes the clutch adjusting nut 57 to move forwardly until the shoulder 59 thereof abuts against the rear surface 8 of the intermediate section 6 thereby compressing the forward spring 60 and causing the jaws 44 to spread to their outermost position to enlarge the discharge opening 47 as best shown in Fig. 4. The cooperating slanting surfaces 54 and 17 on the jaws 44 and clutch closing tube 10 respectively allow the jaws 44 to spread due to the natural or inherent resilience of the clutch material. In this position, as best shown in Fig. 4, the lead 42 is free to move forwardly or rearwardly within the discharge opening 47 as desired simply by tilting the forward end downwardly or upwardly so that the service lead 42 can move by gravity.

After the lead 42 is allowed to fall by gravity into contacting or abutting relation with the tip 39 of the lead stop 22, the push button 19 is released. In so doing, the lower spring 60 returns the clutch mechanism 3 to its upper position to close the jaws 44 as shown in Fig. 3, thereby firmly gripping and fixing the lead 42 in the discharge opening 47. Continued upward movement causes angularly positioned tip 39 to slide rearwardly over the lead 42 and into the slot 50 where it is automatically cocked for the next projection and automatically covers the slot opening. Continued rearward movement of the projecting mechanism 2 is caused by the force of the upper spring 62 which moves the parts upwardly until they assume the position shown in Fig. 1.

It will be seen that the distance 64 between the shoul-

ders 59 and 8 of the clutch adjusting nut 57 and intermediate section 6 can be varied by rotating the nut 57. This increases and decreases the radial and longitudinal movement of the jaws 44 to adjust the tightness with which the lead 42 in the tube 46 or other writing means is gripped by the teeth 45. It will also be seen that the distance 65 between the lower end 35 of the magazine 20 and upper surface 63 of the lead adjusting nut 58 determines the distance beyond which the lead stop 22 both initially and finally projects when the push button 19 is depressed. Thus, more lead can be projected by moving the nut 58 forwardly to increase the distance 65 and less lead can be projected by decreasing said distance 65.

A modified form of the invention is shown in Figs. 6–9. The modified form is substantially the same as the principal embodiment shown in Figs. 1–5 except that a separate lead selector 66 having a tube 67 thereon slidably extends through the magazine bushing 21 and into the clutch 43. The construction and operation of the modified form is substantially the same as the principal form with this one exception. It will be noted in the modified form that the lead selector 66 moves only the short distance 64 when the clutch mechanism 3 is actuated, whereas in Figs. 1–5 the contents of the lead chamber 29 move the same distance as the magazine bushing 21 which is the distance 65 plus the shorter distance 64. The tube 67 also prevents foreign particles or tiny broken pieces of lead from the lead chamber 29 from entering the space between the magazine bushing 21 and the lead adjusting nut 58.

From the foregoing, it is apparent that a plurality of relatively short pieces of lead need not necessarily be used in connection with the projecting mechanism of this invention. If desired, one four inch piece of lead could be used or a ball or pen unit could be used. Regardless of the particular type or nature of the writing unit, the lead stop 22, which can be adjusted as desired, moves externally of the instrument and positively determines the distance which the writing unit can move by gravity beyond the forward end thereof. The projecting mechanism 2 does not positively move or feed the writing unit 42, but when actuated simply allows or permits the writing unit 42 to move freely within the writing instrument to a position determined by the slant or tilt thereof, that is, to its projected or retracted position.

By positively measuring the distance which the lead projects externally from the forward end of the pencil, great savings will be effected in lead, especially in the extra thin size which is still gaining in popularity. Also, writing will be made easier since the desired length of the lead is always assured.

The service lead of conventional mechanical pencil becomes rounded at the writing end due to the pencil being held and rotated in various positions while in use. If the service lead is broken off instead of being worn down, the writing end of the lead will have a sharp jagged edge which is more likely to catch in the paper than if the lead had been worn down with rounded corners. Because of this, a pencil lead is often broken a second time immediately after having been broken once.

The present construction grips the service lead 42 at one point only, namely, at the forward tip 49 of the pencil to further reduce breakage and hold the lead 42 securely against movement or rotation. Holding the lead at one point reduces breakage since no perfect alignment of the lead within the tube to the other parts is required. Breakage is also reduced since the lead is not pushed into a new position but is freely allowed to assume a new position when the pencil is tilted after the mechanism has been actuated. This arrangement eliminates the necessity of a positive feeding mechanism thereby reducing the cost of manufacture and breakage of the service lead. The cylindrical barrel allows advertising matter to be printed easily thereon. The stacking of two or three leads 32 above the service lead 42 in the tube 46 increases the weight and causes the service lead 42 to quickly move into abutting relation with the lead stop 22 of the projecting mechanism 2 when the clutch jaws 44 are opened. The entire mechanism can be assembled from the forward or writing end of the pencil. If desired, a thin walled metal tube may be used in place of a plastic barrel 4 when a slender pencil is desired. The combination push button and eraser holder 19 can be withdrawn and reinserted to cause either the eraser 26 or the metallic outer section 23 to project upwardly. The magazine 20 provides a reserve supply of pencil leads which will automatically drop into the service tube 46 when the pencil is held in an upright position even though the tube may be partially filled with other lead.

This invention is intended to cover all changes and modifications of the examples of the invention herein chosen for purposes of the disclosure, which do not constitute departures from the spirit and scope of the invention.

What I claim is:

1. A writing instrument having a hollow casing with openings in the bottom and top thereof, a writing unit movably positioned within said casing and adapted to extend through said bottom opening, full length projecting means slidably mounted within said casing and having a push button thereon extending upwardly through said top opening at all times, said projecting means adapted to project downwardly from said casing into spaced axial alignment with said bottom opening upon depression of said push button, clutch means mounted in said casing for controlling the size of said bottom opening, clutch adjusting means adjustably and rotatably mounted on said clutch means within said casing, a tube within said clutch means for preventing lead from adhering to said clutch means when the latter is opened, writing unit adjustment means for adjusting the length of writing unit which projects beyond the tip of the writing instrument, a clutch spring normally biasing said clutch means to its closed position, and a projecting means spring normally biasing said projecting means to its retracted or upper position.

2. A writing instrument having a hollow casing with aligned openings in the bottom and top thereof, a writing unit initially inserted through said top opening and movably positioned within said casing, said writing unit adapted to extend through said bottom opening, full length projecting means slidably mounted within said casing in spaced lateral relation with said writing unit and having a push button thereon extending upwardly through said top opening at all times, said projecting means adapted to project downwardly from said casing into spaced axial alignment with said bottom opening upon depression of said push button, clutch means mounted in said casing for controlling the size of said bottom opening and the tightness with which the clutch means grips the writing unit, clutch adjusting means adjustably and rotatably mounted on said clutch means within said casing and adapted to abut against a shoulder in said casing, a tube within said clutch means for preventing lead from adhering to said clutch means when the latter is opened, writing unit adjustment means adjustably and rotatably mounted on said clutch means within said casing for adjusting the length of writing unit which projects beyond the tip of the writing instrument, a clutch spring normally biasing said clutch means to its closed position, and a projecting means spring normally biasing said projecting means to its retracted or upper position.

3. A writing instrument having a hollow casing with aligned openings in the bottom and top thereof, a writing unit initially inserted through the top opening and positioned longitudinally within a magazine in said casing, said writing unit adapted to extend through said bottom opening, projecting means slidably mounted within said casing in spaced lateral relation with said writing

unit, said projecting means being actuated by a push button extending upwardly through said top opening, clutch means mounted in said casing for controlling the size of said bottom opening, said clutch means having a plurality of jaws thereon, a tube within said clutch means for preventing lead from adhering to said clutch means when the latter is opened, said projecting means adapted to project downwardly from said casing through a slot in said clutch means upon actuation of said push button, said projecting means adapted to extend a predetermined distance in axial alignment beyond said bottom opening, clutch adjustment means adjustably and rotatably mounted on said clutch means within said casing and adapted to abut against a shoulder in said casing, writing unit adjustment means within said casing rotatably mounted on said clutch means for adjusting the length of the writing unit which projects beyond the forward end of said writing instrument, said writing unit adjustment means being in spaced aligned relation with said magazine, a clutch spring normally biasing said clutch means to its closed position, and a projecting means spring normally biasing said projecting means to its retracted position within said casing, said projecting means spring positioned between said writing unit adjustment means and a bottom in said magazine.

4. A writing instrument having a hollow casing with aligned openings in the bottom and top thereof, a writing unit initially inserted through the top opening and positioned longitudinally within a magazine in said casing, said magazine having a bottom with an opening therein aligned with said bottom opening with a tube therebetween, said writing unit adapted to extend through said bottom opening, a lead stop slidably mounted within said casing in spaced lateral relation with said tube and in abutting relation with said magazine bottom, said lead stop being actuated by a push button closing the upper end of said magazine and extending upwardly through said top opening, clutch means mounted in said casing for controlling the size of said bottom opening, said clutch means having a plurality of jaws thereon, a tube within said clutch means for preventing lead from adhering to said clutch means when the latter is opened, said lead stop adapted to project downwardly from said casing through a slot in said clutch means upon actuation of said push button, clutch adjustment means adjustably and rotatably mounted on said clutch means within said

casing and adapted to abut against a shoulder in said casing, writing unit adjustment means within said casing rotatably mounted on said clutch means for adjusting the length of the writing unit which projects beyond the forward end of said writing instrument, said writing unit adjustment means being in spaced aligned relation with said magazine, a clutch spring normally biasing said clutch means to its closed position, and a projecting means spring normally biasing said lead stop and said magazine to their retracted position within said casing, said projecting means spring positioned between said writing unit adjustment means and said magazine bottom.

5. A writing instrument having a discharge opening in the forward end thereof, a writing unit adapted to project through said discharge opening, longitudinally extending projecting means normally positioned within said writing instrument in movable relation with said writing unit, movable means mounted rearwardly of said discharge opening adapted to move said projecting means forwardly and exteriorly beyond the forward end of said writing instrument a predetermined distance and in axial alignment with said discharge opening, clutch means mounted in the forward end for controlling the size of said discharge opening and normally gripping said writing unit, clutch adjusting means adjustably and rotatably mounted on said clutch means within said writing instrument, a tube within said clutch means for preventing lead from adhering to said clutch means when the latter is opened, said clutch means adapted to release said writing unit and control the size of the discharge opening in response to said movable means, writing unit adjustment means for adjusting the length of writing unit which projects beyond the tip of the writing instrument and resilient means mounted within said writing instrument normally biasing said clutch means to its gripping position and said projecting means to its interior or retracted position.

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