July 23, 1957 W. GERMANN 2,800,109

MECHANICAL PENCIL

Filed Oct. 7, 1953 3 Sheets-Sheet 1

Fig. 1

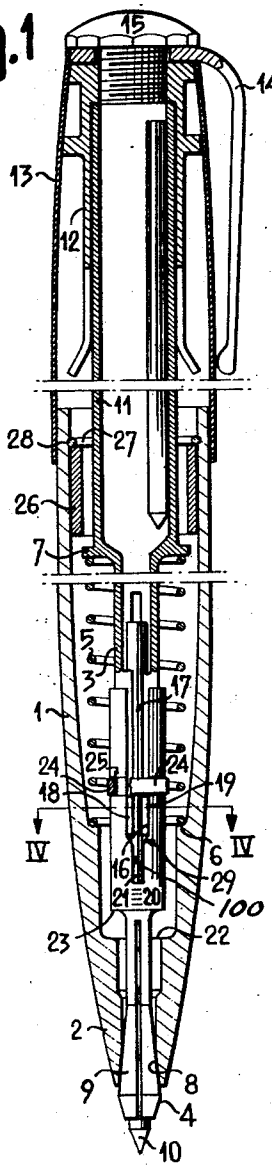


Fig. 2

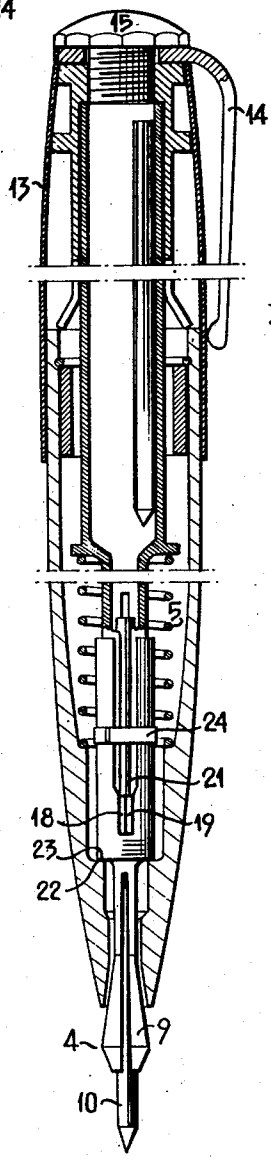


Fig. 4

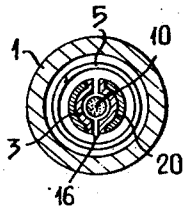
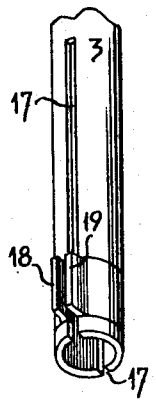


Fig. 3



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Fig.5

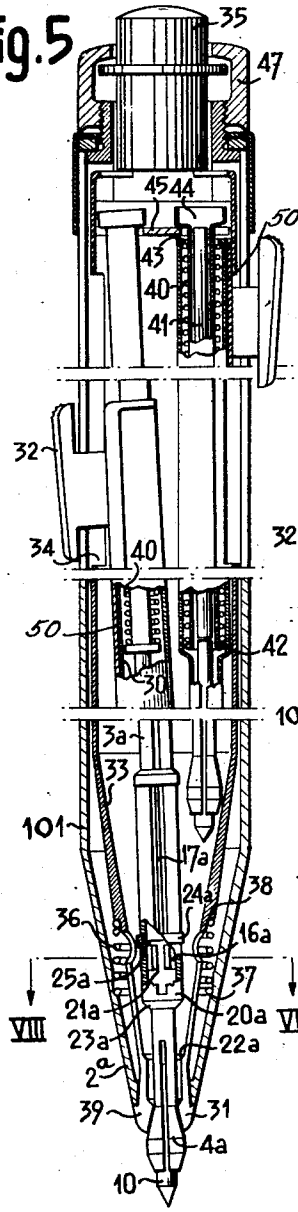


Fig.6

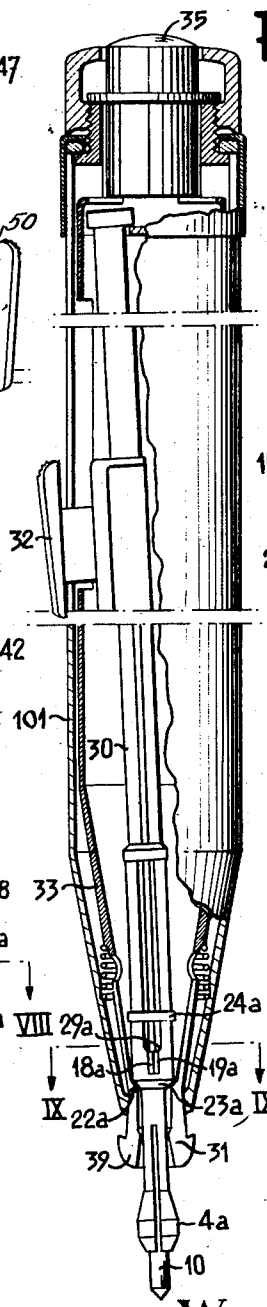


Fig.9

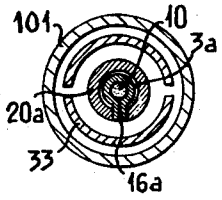


Fig.8

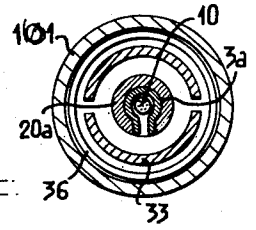
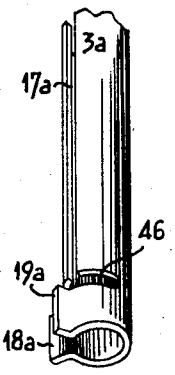


Fig.7



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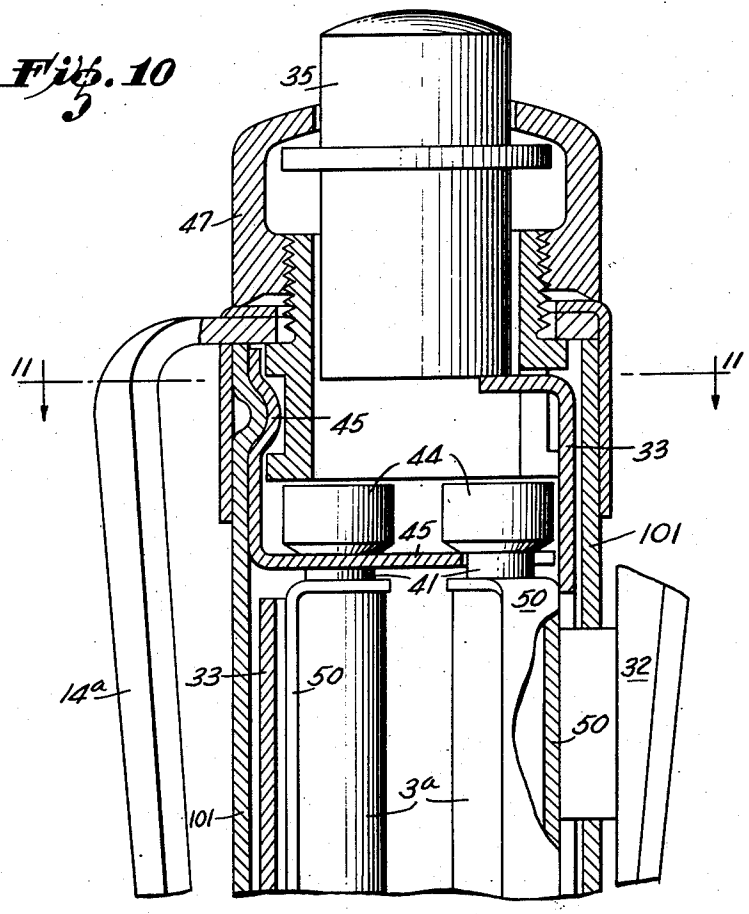
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MECHANICAL PENCIL

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Fig. 10



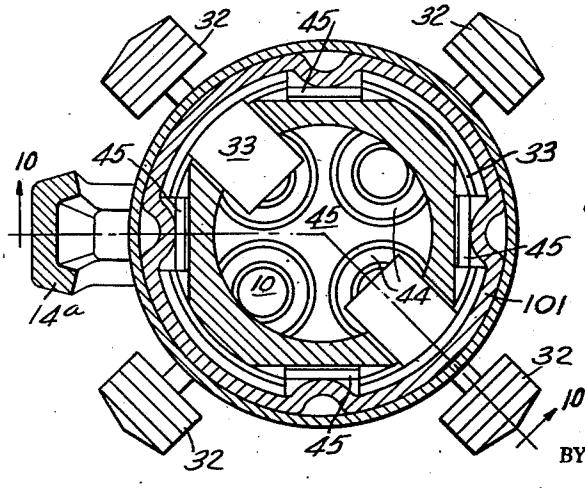


Fig. 11

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MECHANICAL PENCIL

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Application October 7, 1953, Serial No. 384,561

Claims priority, application Switzerland January 19, 1953

2 Claims. (Cl. 120—14.5)

The present invention relates to mechanical pencils and more particularly to the type having a mechanical lead feeding system.

This mechanical pencil is of the type comprising a tubular body tapered at one of its ends and at least one lead holder or guide, one end of which is integral with a clamping clasp emerging from the tapered end of said body, the said lead-guide tube being subjected to the action of a return spring tending to apply the primary clasp on a seat provided in the said tapered end so as to cause the clasp to firmly grip a lead engaged between its jaws. In such a pencil, an actuating member, integral with the lead-guide, makes it possible to displace the said tube against the action of the return spring, a secondary clasp being provided to cause the step-by-step feeding of the lead with respect to the first, or primary, clasp.

The pencil of the present invention differs from known pencils by the fact that its primary clasp is adapted to slide axially outwardly for a certain length with respect to the end of the lead-guide tube, means being provided to bring about the clamping of the secondary clasp onto the lead by a relative axial displacement of the secondary clasp with respect to the primary clasp.

The accompanying drawing shows, diagrammatically and by way of example, two embodiments of the invention.

Figure 1 is an axial cross section of a first form of construction, in this instance a pencil with lead of one color.

Figure 2 shows a section of the said pencil with the lead in the projected position prior to the release of the actuating element.

Figure 3 is a perspective fragmentary detail view of the lead guide tube and

Figure 4 is a section along IV—IV of Figure 1.

Figure 5 is an axial sectional view of a second form of construction, in this particular case a pencil with several colors.

Figure 6 is a view similar to the preceding one, showing the pencil with one of its leads in the projected position prior to the release of the actuating element.

Figure 7 is a perspective fragmentary view of a detail.

Figure 8 is a section along VIII—VIII of Figure 5, and

Figure 9 is a section similar to the preceding one along IX—IX of Figure 6.

Figure 10 is an enlarged axial sectional view on line 10—10 of Figure 11, corresponding to the top portion of the pencil as shown in Figure 5.

Figure 11 is a section along line 11—11 of Figure 10.

Similar reference characters designate similar parts in the several views.

With reference to Figures 1 to 4, the mechanical pencil shown in these figures comprises a tubular body 1 with a tapered end 2. In this tubular body is engaged a lead-guide sleeve or tube 3. One of the ends of this sleeve, for example, the inner end, is slidably inter-connected, as will later appear, with a primary lead gripping clasp 4 which emerges from the tapered end 2 of body 1. The sleeve 3 is subjected to the action of a return spring 5,

which, at one end, bears against a shoulder 6 provided in body 1, and at the other end, against a flange 7 on the sleeve adjacent the outlet of the lead magazine. This spring 5 thus tends to apply the clasp 4 to the seat 8 of less pronounced conicity than that of jaws 9 forming clasp 4. Consequently, the application of clasp 4 on the said seat 8 causes the closing or tightening of the said clasp on the lead 10 in use and engaged between its jaws 9.

At its end opposite the point of the pencil, for example the outer end, the compressible split sleeve 3 is provided with an enlargement 11, forming the magazine or container for replacement leads, and the end of this magazine carries a thimble 12, on which is secured an outer case or shell 13 forming a relatively slidable extension of the body 1 on the side opposite the point of the pencil. A clip 14 is secured to sleeve 12 by a screw 15 which also provides a cap for the replacement lead magazine.

This mechanical pencil has a secondary clasp adapted to cause the step by step feeding of the new lead relative to the primary clasp 4. In this particular case the secondary clasp 16 is formed as a part of the inner end of the split sleeve 3. To that end, said inner end is rendered expandable and contractable at its end nearest the point of the pencil, by two oppositely arranged longitudinal slots 17, each edge of said slots 17 being provided with an integral fin 18 and 19, respectively. The primary clasp 4 is integrally provided at its end within body 1, with a hollow cup 20 and in which the split end of sleeve 3 is adapted to slide. This hollow cup 20 has two oppositely arranged slots 21, each having a lower narrow portion 100 for the passage of fins 18 and 19. These slots 21 are narrower toward the pencil point, so that the said fins 18 and 19 may be brought together to close clasp 16 when shell 13 and cap 15 are depressed with the result that said fins are moved toward the point of the pencil and thereby into said slot 100. The axial displacement of the primary clasp toward the pencil point is limited by a stop arrangement comprising an inner abutment 22 provided in body 1 which cooperates with a shoulder 23 provided on the outside of said hollow cup 20. Moreover, a band or ring 24 is engaged in a groove 25 of the said hollow part 20 so as to cover slots 17 over a medial portion of their length, thus limiting the relative axial displacement of the two clasps 4 and 16. Fins 18 and 19 come to bear against ring 24 when the actuating member 15 and shell 13 is released so as to cause the closing of the primary clasp 4 on lead 10 under the action of spring 5 as seen in Figure 1.

In this form of construction, it will be seen that the fins 18 and 19 are attached to the end of lead-guide tube 3.

The lead-guide tube 3 may be mounted in the body 1 by a sleeve 26 which is held in place by a stop spring 27 engaged in an annular groove 28 of said body 1.

The functioning of the pencil according to the first form of construction is as follows:

By depressing cap 15 of the said pencil, sleeve 3 is displaced downward relative to body 1. If the initial pressure exerted on cap 15 does not exceed a certain value, fins 18 and 19 come to bear against the converging ramps or edges 29 of slot 21, thus pushing primary clasp 4 beyond point 2. This displacement of the clasp 4 beyond the seat 8 causes the clasp to open thereby making it possible, in this position, either to receive a new lead in clasp 4 from the outside of the pencil, or, if the leads are available in the magazine, a lead may pass from the magazine into clasp 4 because the jaws of the clasp 16 happen to be open. This can be done by shaking the pencil slightly while holding it in the vertical position, the point downward.

Continued pressure on cap 15 will bring abutment 22 and shoulder 23 into contact. Fins 18 and 19 are then moved relative thereto into the narrow portion of slots

21 to thus compress them to clamp them about a lead (see Figure 2), simultaneously moving the lead toward the point of the pencil. When cap 15 is released, tube 3 and clasp 4 begin to move at first jointly, under the action of spring 5, in the direction of cap 15. As soon as jaws 9 of clasp 4 come to bear against the conical seat 8, clasp 4 firmly grips the lead and retains the latter, whereas tube 3 continues to move to the end of the pencil opposite point 2. Fins 18 and 19 become disengaged from the narrow portion 100 of slots 21 and move into the wider part thereof, thus releasing clasp 16. After reaching that position, fins 18 and 19 bear against ring 24 and tend to draw clasp 4 toward the interior of the pencil, still under the action of spring 5.

If, after a feeding movement the lead has not yet been pushed far enough toward the point of the pencil, other successive feeding movements may be effected in the course of which the lead 10 will further advance to writing position.

From the foregoing it will be seen that the present invention contemplates the provision of a body 1 having a conical seat 8 at one end thereof and a cap 13, 14, 15, slidable on the other end of the body. A combination lead holding and feeding unit is arranged to be axially slidable with the body and its upper end is connected with the cap so that when the cap is depressed the entire unit will slide to produce two movements, the first to open the jaws 9 of the primary clasp 4 and the second to feed a new lead toward the primary clasp by the gripping and feeding action of the secondary clasp primarily constituted by the split sleeve 3, in conjunction of course with the fins 18 and 19 operating within the slots 21 of cup 20. The initial movement of the unit permits the fins 18 and 19 to move far enough to engage the ramps 29 leading to the constricted portions of the slots 21 to thus push the primary clasp 4 out of its seat 8. Continued movement of the entire unit will cause the split yieldable sleeve 3 to move the new lead toward the primary clasp.

The second form of construction of the pencil shown in Figures 5 to 11, relates to a so-called "multi-color" pencil, whose tubular body 101 contains several lead holder units 30 of the lead feeding type described in Figures 1–4 and which are adapted to be brought successively and selectively to the point 2*a* of the body 101.

In this form a clasp 31 is arranged at point 2*a* of the tubular body 101 to grip the clasp 4*a* of each selected lead holding and feeding unit 30 in active writing position. The selection of the said lead holder units is first effected by exerting finger pressure on cap 35 as will later appear more in detail, and then moving a finger-operated actuating member 32 with which each of the said lead holder units is provided to effect the dual function of bringing the selected unit into writing position and also feeding the lead.

A step-by-step pencil of the type for use with any form of lead holder unit comprising a retaining clasp 31 has been described in applicant's companion application Serial No. 384,677 filed on October 7, 1953.

As shown in Figure 5, clasp 31 is secured to the end of an inner casing 33 having slots 34 for exposing push tabs 32. This casing 33 is adapted to be moved toward the point of the pencil by means of a push button 35, slidably mounted in the end of the pencil opposite its point 2*a*. Displacement of casing 33 is effected against the action of a spring 36, which, at one end, bears against a shoulder 37 of body 101, and, at the other end, against a shoulder 38 of the said casing 33. This displacement of casing 33 and clasp 31 toward the pencil point causes jaws 39 of clasp 31 to spread apart, thus disengaging the lead holder which had been previously selected. Each lead holder unit 30 has a clasp 4*a* of the same type as clasp 4 of the first form of construction. As soon as clasp 31 is opened, a spring 40, provided between the rear part of sleeve 3*a* and tube 41 of smaller cross-section draws the lead holder released by clasp 31 back toward the

interior of the pencil. This spring 40 bears at one end against the flanged edge 42 of tube 41, and, at the other end, against a flanged edge 43 of the rear end of sleeve 3*a*. Each tube 41 has an enlarged head portion 44, by which the said tube is secured to a spider 45 which is fixed to the body 1.

In this multi-color pencil, each lead holder unit is constructed in a manner similar to the internal part of the pencil shown in Figures 1 and 2. The sleeve 3*a* of each unit 30 has at its end a secondary clasp 16*a* which, as shown in Fig. 7, is formed by a longitudinal slot 17*a* provided in sleeve 3*a*, and by fins 18*a* and 19*a* formed directly on the end of sleeve 3*a*. An arcuate slot 46 is provided in sleeve 3*a* (Figure 7) at the point where the fins 18*a* and 19*a* join the said tube, for the purpose of increasing the elasticity of the said fins relative to the tube. Primary clasp 4*a* is integral with a hollow cylindrical part or cup 20*a*, provided with a slot 21*a*, and in which the end of lead-guide tube 3*a* can slide axially. A ring 24*a*, engaged in a groove 25*a*, is provided to limit the relative axial displacement of part 20*a* and tube 3*a*.

In this second form of construction, the arrangement for limiting the axial displacement of the primary clasp 4*a* toward point 2 is formed by a shoulder 22*a* provided in clasp 31. This shoulder cooperates with a shoulder 23*a* provided on part 20*a*.

As shown by the drawing, the only difference existing between the step-by-step feed control mechanism of the pencil according to the first form of construction and that of the pencil of the second embodiment resides in the fact that fins 18*a* and 19*a*, instead of being added to the end of split sleeve 3*a*, as shown in Figure 3, are in one piece with the tube and that, moreover, a single pair of fins is provided in the second form of construction for each lead holder unit 30, whereas the mechanism of the pencil according to Figures 1 and 2 comprises two opposite pairs of fins 18 and 19. Each push tab or actuating element 32 is attached to its respective sleeve member 3*a* by riveting the extension thereof up against an intermediate piece 50 which is fixed onto each sleeve member 3*a*, as clearly shown in Figures 10 and 11. In Figure 10 is also shown clip member 14*a*.

The functioning of the pencil of the second form of construction is similar to that of Figures 1 and 2 as regards the feeding of the lead. The selection of any desired lead holder unit is effected by pushing its actuating member or tab 32 at the side of the body toward the point. While member 32 moves toward the point, sleeve 3*a* pushes clasp 4*a* forward by means of fins 18*a* and 19*a* which bear against a ramp 29*a* of slot 21*a*. While moving forward, clasp 4*a* engages shoulder 22*a* of clasp 31 removing clasp 31 from its seat at tip 2, against pressure from spring 36, causing clasp 31 to open. As soon as the enlarged part of clasp 4*a* emerges from clasp 31, member 32 can be released. When that happens, clasp 31 closes again under the action of its spring 36 and holds the selected lead holder in the active writing position. If a lead is in the proper position in the pencil, the closing of clasp 31 against clasp 4*a* causes the latter to firmly grip lead 10 by a gripping action which now holds the lead rigidly at the end of the pencil. However, if lead 10 does not project far enough from the pencil point, it will be sufficient to exert continued pressure on finger tab 32 in the direction of the pencil point. In that event, shoulder 23*a* will come in contact with shoulder 22*a* of the clasp; fins 18*a* and 19*a* will be brought together by their descent into the narrow portion of slot 21*a*, whereupon the lead which is engaged in clasp 16*a* is firmly gripped by the latter and moved by a certain length in the direction of the pencil point. When member 32 is released, spring 40 pulls the unit spring holder back toward the interior of body 101 and when the widest part of clasp 4*a* comes to bear against the jaws of clasp 31, clasp 4*a* retains the lead 10 in the advanced position, while fins 18*a* and 19*a* slide into the

wide portion of slot **21***a*, causing the secondary clasp **16***a* to open. Such an advancing movement of the lead may be repeated at will.

As in the first form of construction, in this second embodiment also, the enlarged inner portion of the split sleeve **3***a* forms the magazine for replacement leads, accessible by removing a cap **47** fastened on body **101** and intended to hold push button **35** in place. Removal of cap **47** thus permits withdrawal of push button **35** and to make visible the enlarged portions **44** of tubes **41**. In this second embodiment, the replacement leads can also pass directly from the magazine into the secondary clasp **16***a* of the corresponding lead guide tube **3***a* without necessity of inserting into clasp **4***a* a fresh lead from the outside.

By way of modification, it is obvious that fins **18***a* and **19***a* of the second form of construction could also be designed in the same manner as in the first form of construction, that is, they could be constituted by separate pieces fastened to tubes 3a. Conversely, fins **18** and **19** of the first form of construction could also be integral, in a single piece, with their corresponding lead-guide tube **3**.

I claim:

1. A mechanical pencil, comprising, in combination, a tubular body conically shaped at its inner surface at one end thereof to constitute a seat, at least one hollow tubular lead guiding sleeve member disposed in said body, said sleeve member having at least one longitudinal slot at one end thereof, said sleeve member having a lead storage unit, outwardly projecting fins operatively connected to said sleeve member at the edges of said one slot, a clasp member slidably connected to said sleeve, said clasp member including at one end thereof a hollow cylindrical cup, lead gripping jaws extending forwardly from said clasp member and engaging said body at said conically shaped seat, said hollow cup being positioned about said sleeve member at said portion having said one slot and fins, said cup having at least one open-ended longitudinal slot in the walls thereof in alignment with said one slot of said sleeve and the fins connected thereto, said cup slot being constricted at its closed end and having ramps between the upper portion and the constricted portion thereof, a shank portion integrally joining said cup and said clasp member, said shank portion being of smaller cross-section than said cup and said clasp and said jaws thereby forming shoulder means between said cup and said shank, abutment means on the inner surface of said tubular body for receiving said shoulder means, whereby the downward movement of said cup, and thus said clasp member, is stopped, said sleeve member having a flange at the top portion thereof, a spring means positioned adjacent a surface wall of said sleeve and against said flange of said sleeve member for urging said sleeve member away from said hollow cup, control means connected to said sleeve member at the upper portion thereof for moving the slotted portion of said sleeve member and the fins connected thereto at said one slot downwardly, and an annular band positioned about the slotted portion of said hollow cup, whereby, when the control means is urged downwardly, the sleeve member will move downwardly in said hollow cup and the said fins will engage the said ramps to move the clasp from said seat and, when the control means is further moved downwardly, the fins will enter the restricted portion of the slot in the hollow cup and the sleeve member will be compressed to grip the lead so that the continued movement of the sleeve member will move the lead along the clasp member and whereby, when the control means is allowed to return upwardly by releasing pressure thereon to allow said spring means to act thereupon, said band will limit the upward movement of the fins and the clasp will return to said seat and

will grip the lead and hold said lead in writing position.

2. A mechanical pencil, comprising, in combination, a body having side slots and a conical seat at its lower end, a conically tapered casing having at least one side slot and disposed within said body, a first spring means between said body and said casing normally moving the said casing outwardly, cap means connected to said body at its upper end for depressing the casing, a plurality of lead holder units disposed within said casing, each of said units including a hollow tubular lead guiding sleeve member, said sleeve member having at least one longitudinal slot at one end thereof, outwardly projecting fins connected to said sleeve member at the edges of said one slot, said longitudinal slot forming a secondary clasp, a member having at one end thereof a hollow cylindrical cup and at the other end thereof a primary lead gripping clasp, said gripping clasp having adjacent thereto a retaining clasp including gripping jaws, said retaining clasp being connected with said casing, said retaining clasp being adapted to seat in the conical seat of said body, said hollow cup being positioned about said sleeve portion having said one slot and fins, said cup having at least one open-ended longitudinal slot in the walls thereof in alignment with said one slot of said sleeve member and the fins connected thereto, said cup slot being constricted at its open end and having ramps between the upper portion and the constricted portion thereof, a shank portion integrally forming said cup and said lead gripping clasp, said shank portion being of smaller cross-section than said cup, said gripping clasp and said retaining clasp, said cup forming a shoulder means between said cup and said shank for engaging said retaining clasp, abutment means in said clasp connected to said casing for receiving said shoulder means of said cup, whereby the downward movement of said cup, and thus said gripping clasp, is stopped, a tubular lead storage member positioned within the upper portion of said guiding sleeve member, said tubular member having an outwardly turned flange at its lower end, said guiding sleeve member having an inwardly turned flange at its upper end, a second spring means positioned about said tubular member and adjacent to the inner wall surface of said guiding sleeve member for moving said sleeve member away from said hollow cup, said second spring means being positioned between said guiding sleeve flange and said tubular member flange, said conically tapered casing having a shoulder portion in the outer wall surface of the tapered portion thereof, said body having a shoulder portion in the inner wall surface of the tapered portion thereof, said first spring means bearing against said respective shoulder portions, control means passing through a body slot and through a casing slot operatively connected to a lead holder unit at the upper portion of the lead guiding sleeve member portion thereof for moving the slotted portion of said guiding sleeve member and the fins connected thereto at said slotted portion downwardly towards said retaining clasp including the gripping jaws, and an annular band positioned about the slotted portion of said hollow cup, whereby said control means will advance the clasp of one of the said units toward the conical clasp seat of said casing to feed the lead downwardly and whereby said cap, when depressed, will cause said casing to move downwardly against the first spring means to allow the lead holder unit to be retracted.

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