March 27, 1928. 1,664,071

F. FUREDY

WRITING IMPLEMENT

Original Filed April 28, 1925 2 Sheets-Sheet 1

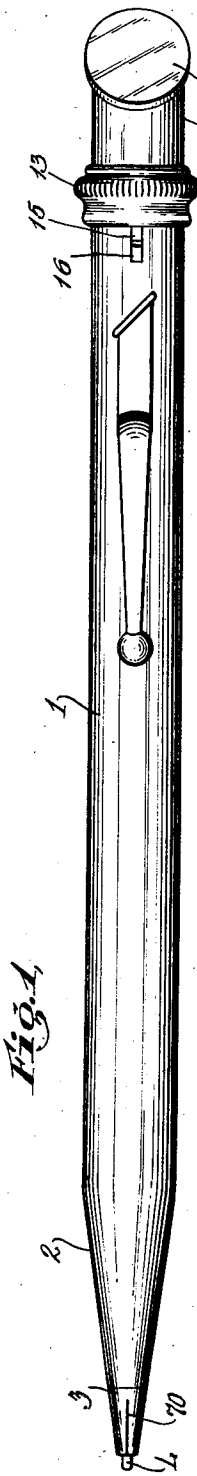

Fig. 1.

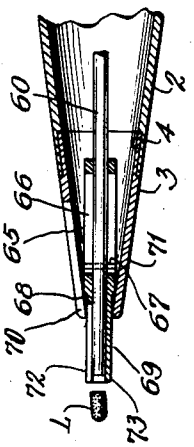

Fig. 7.

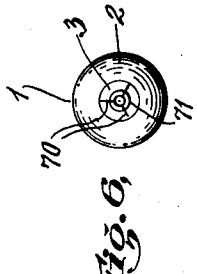

Fig. 6.

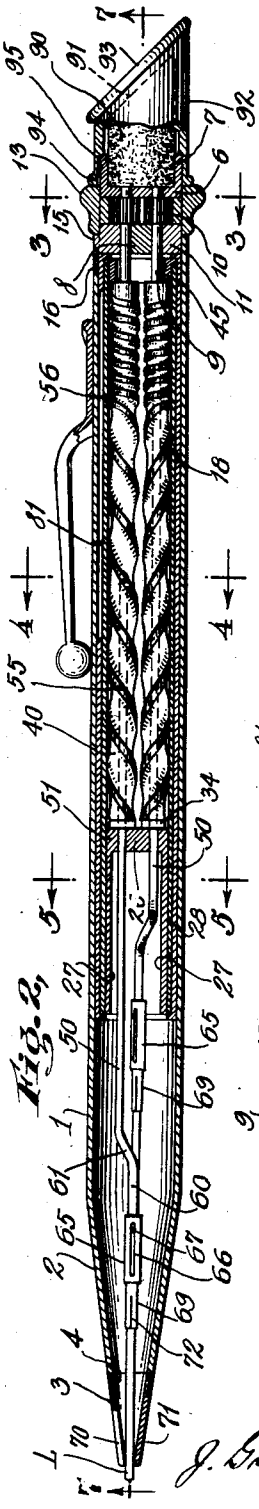

Fig. 2.

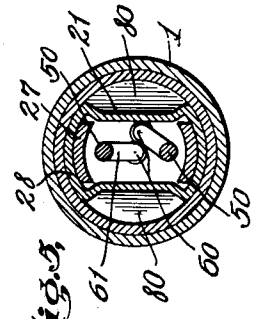

Fig. 5.

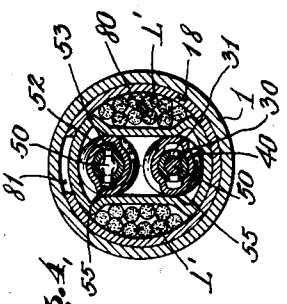

Fig. 4.

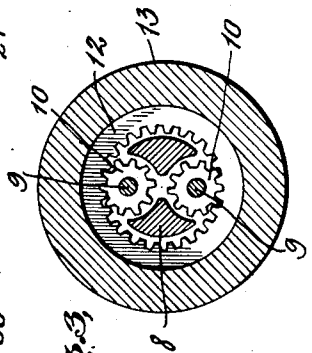

Fig. 3.

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F. FUREDY

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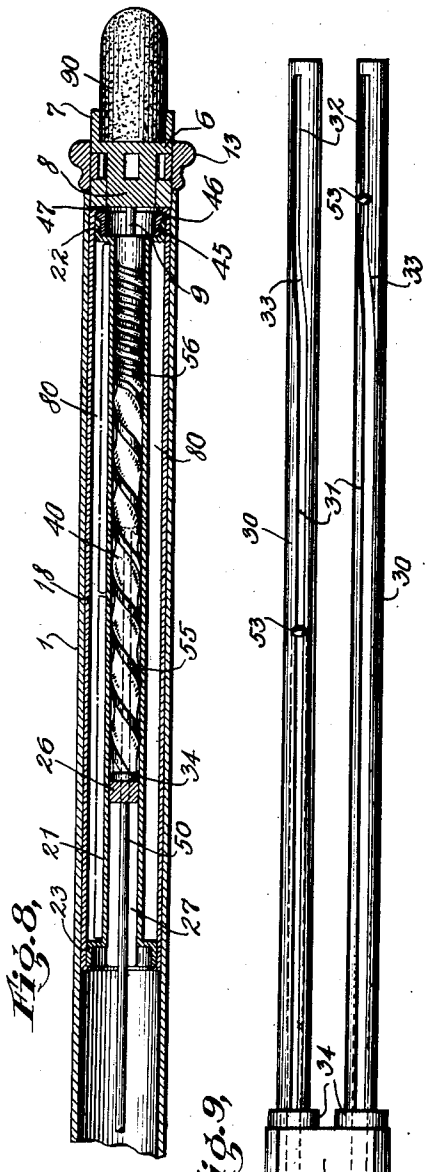

Fig. 8.

Fig. 9.

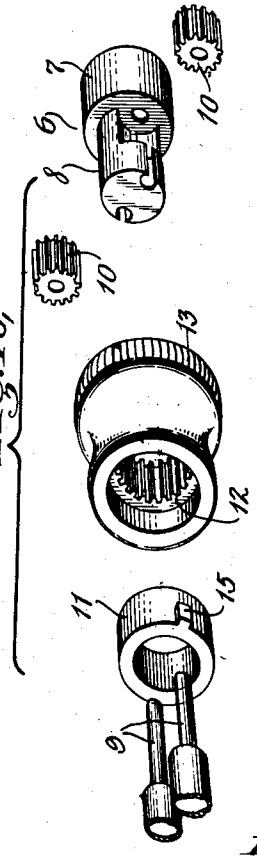

Fig. 10.

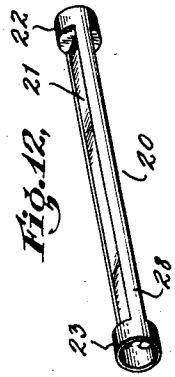

Fig. 12.

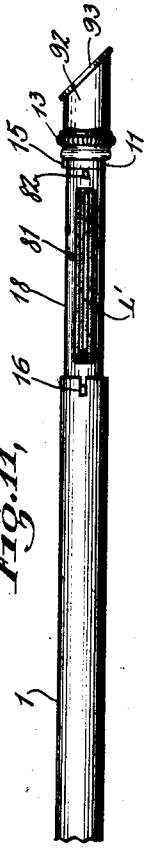

Fig. 11.

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Patented Mar. 27, 1928. 1,664,071

UNITED STATES PATENT OFFICE.

FRANK FUREDY, OF BROOKLYN, NEW YORK, ASSIGNOR TO BUSHWICK NATIONAL BANK.

WRITING IMPLEMENT.

Application filed April 28, 1925, Serial No. 26,378. Renewed July 16, 1927.

My invention relates to writing implements, conveniently designated as pencils, of the class commonly called adjustable pencils.

An important object is to provide an improved multi-lead pencil in which a plurality of leads or writing points are so arranged that either of them may be quickly positioned for writing while the other is withdrawn or inactive, and many of the novel features or organization or arrangement are especially devised for this purpose; but other features of structure or arrangement are also adapted or adaptable to a writing implement in which only one lead or point is arranged for active use. Certain of the appended claims will apply to such single lead devices as well as to multi-lead pencils or analogous implements, and in the following description it will not be attempted, except in certain instances, to point out how the individual parts or subcombinations may be adapted for single lead devices, since such availability or adaptability will be evident to skilled persons without detailed explanation.

In the broader aspects of the invention I contemplate the substitution of stylus points or even pen points for the leads, but for the sake of brevity will usually refer to leads as the actual marking devices.

One object of the invention is to properly arrange or mount a plurality of leads, at least two, in active position for selective use, in a small and compact case of attractive form; that is, the case may be made as small in diameter and length as is desirable for pocket or other use; although, of course, in some cases, for instance where unusually large leads are to be used for particular purposes, the outer and other dimensions of the pencil may be increased to any reasonable extent.

Another object is to provide improved lead holding and operating mechanism which gives a very smooth and precise movement of the active leads to and from operative position, and for length adjustment of either lead in operative position.

Another important object is to provide improved lead ejecting means, or to arrange the lead grips and their carriers for lead ejection.

Another general object is to very materially reduce the cost of production by suitable design and arrangement of the various parts.

The characteristics and advantages of the invention are sufficiently set forth in the following detail description of the accompanying drawings, which show one exemplifying embodiment of the invention. After considering this example, persons skilled in the art will understand that many variations may be made within the principles of the invention, and I contemplate the employment of any structures that are properly within the scope of the appended claims.

Fig. 1 is a side elevation of a writing instrument, specifically a pencil, embodying the invention in one form.

Fig. 2 is a longitudinal section.

Fig. 3 is a transverse section at 3—3, Fig. 2.

Fig. 4 is a section at 4—4, Fig. 2.

Fig. 5 is a section at 5—5, Fig. 2.

Fig. 6 is a left end elevation of Fig. 1.

Fig. 7 is an enlarged detail in section at 7—7, Fig. 2.

Fig. 8 is a partial longitudinal section in a plane perpendicular to that of Fig. 2.

Fig. 9 is an enlarged detail of the guide tubes and associated parts.

Fig. 10 is a detail in perspective of various parts of the operating mechanism.

Fig. 11 is a partial side elevation showing the operating mechanism partly withdrawn from the case to give access to spare leads.

Fig. 12 is a detail of the inner sleeve or housing.

Almost all of the operative parts are housed in a main sheath or casing 1, which is generally of cylindrical form except the lower end portion 2, which has a conical taper. This portion terminates in a tip 3 which is usually a separate piece, being preferably formed of spring steel with its upper end 4 of reduced thickness to fit within the suitably formed end of the conical case portion 2, and these parts are secured by

pressing, and also brazed or soldered if necessary. The tip construction is further described below.

A head 6 is located at and partly within the upper end of the case. This includes an upper cupped portion 7 and an inner portion 8 of reduced diameter. The head is bored longitudinally to receive and provide bearings for two pinion shafts 9, which preferably go all the way through the head, as shown in Fig. 2, and the portion 8 is also cut away to accommodate two pinions 10, which are fixed on the shafts. The pinions, shafts and parts connected to the shafts are secured against end motion by a ring 11 which is slipped over the lower end of member 8 and secured by brazing or in any other suitable way. Before the ring 11 is positioned, an internal gear 12 is placed with its teeth in engagement with outer teeth of the two pinions. This gear is secured to a ring 13 which is the exposed lead-operating member and in some cases, the gear may be integral with this ring. A portion of the cylindrical inner surface of the operating ring engages a part of the outer cylindrical surface of the upper head portion 7, and after the retaining ring 11 is positioned the lower portion of the inner surface of the operating ring engages a part of the cylindrical outer surface of the retaining ring, so that the operating ring turns on the stated members, which serve as bearings and also locate the internal gear in its proper rotative relation to the pinions 10 and prevents longitudinal displacement of the gear or operating ring. A portion of the periphery of ring 11 fits within the upper end of case 1. To insure that ring 11 with its connected parts, above and later mentioned, is inserted in a definite position (with respect to relative rotation) in the case, the ring is provided with a lug 15 fitting a slot 16 in the upper end of the case wall.

A tube 18, conveniently identified as a magazine-case (without necessary limiting significance since this tube also serves other purposes) is dimensioned to have a close sliding fit within case 1. Within this tube is another tubular structure 20, Fig. 12, which may be identified as an inner sleeve. This inner sleeve has long flattened portions 21 and its ends 22 and 23 are cylindrical. The cylindrical portions of the inner sleeve have a rotating fit in tube 18. A member, conveniently identified as a guide base 25, is located with a tight or press fit in the lower portion of inner sleeve 20. This base includes a head 26 contoured to fit within the flattened section of sleeve 20, and arms 27 also contoured externally to fit the inner cylindrical formations 28 of the sleeve. The guide base may be retained merely by its tight fit or may be soldered or brazed in position. Rigidly secured to the head 26 are guide tubes 30, each provided with two opposite guide-slots, each of which includes a relatively long lower portion 32, and an intermediate curved or angular portion 33 connecting the straight portions, which are therefore offset in relation to each other, as clearly shown in Fig. 9. A cylindrical boss 34 may be formed on each guide tube or on the base 26 where the tube is connected with it.

An impeller sleeve 40 is placed over each guide tube 30 and is held rotatively thereon, with its lower end resting on base 26 or one of the bosses 34. At its upper end each of the impeller sleeves has a head connected to one of the pinion shafts 9. A ring 45 is inserted in the upper end of the inner sleeve 20, that is, in its cylindrical portion 22 and this ring has a flange 46 overlying the sleeve end and located within the magazine case 18. The upper end of this case or sleeve is pressed or spun inward, forming a flange 47 overlapping flange 46 to retain ring 45 in the inner sleeve. Portions of the inner end of ring 45, as best understood in Fig. 2, overlap segments of the upper ends of the impeller tubes 40 and retain these tubes in proper position within the inner sleeve; and the described arrangement also connects all of the internal mechanism so that when it is desired to partly or entirely remove it, as, and for the reasons later explained, a pull on the operating ring 13 causes all of this mechanism to move out of the case 1 as a unit.

A suitable plurality, in the present example two, lead carriers are provided to correspond with the number of operating devices including the pinions, guide sleeves and impeller tubes. Specifically, in the present example, the lead carriers are in the form of wire stems 50 having relatively long upper portions passing through bearing holes 51 in head 26 in line with the guide tubes 30, and also passing up into the guide tubes. At the upper end of each stem it is provided with one or preferably two opposite projections 52, conveniently identified as guide pinions to co-operate with the slots in the guide tubes through which the pins project. Preferably, the outer end of each pin is formed into a ball or knob 53. To co-operate with these knobs or screw followers, each impeller tube is made substantially in screw form. In cases where it is convenient to make the metal of the tube thick enough, it may be internally threaded by cutting operations; but for the sake of compactness and manufacturing convenience and economy, it is preferred to make the impeller tubes with a relatively thin wall, and helical threads are formed in this wall by pressing or swaging operations. Thus each tube is provided with a lower, relatively long double threaded or helix 55, merging into a relatively shorter

double thread or helix 56, these two threaded portions occupying substantially the entire tube length. The threads have a substantially smooth or rounded inner contour to correspond with the knobs 53 formed on the ends of the guide pins.

The upper lead carrying stem portions 50 are located at opposite sides of the central axis of the case, and each stem has a lower portion offset sufficiently to bring it in line with the case axis when the stem is properly rotated. Specifically, each stem has a straight lower portion 60 connected to its upper portion by a cranked or bent portion 61. For the purpose of securely and removably holding a lead and preferably also for the purpose of readily ejecting the lead when desired, each carrier is provided with means identified as a lead holder. Specifically, in the present example a sleeve 65 is slidably mounted on the lower straight portion 60 of each carrier stem. The upper portion of the sleeve is provided with slots 66 to receive a retaining pin 67 which passes through stem portion 60. An inward part of the sleeve, that is, from a point toward its inward end to the point 68, Fig. 7, is of relatively large diameter or at least a shoulder is formed at 68, and from there outward the sleeve portion 69 is of smaller diameter. To cooperate with the sleeve formation, the outer portion of the tip member 3 above referred to, is provided with a suitable plurality of slots 70 producing spring fingers 71 which normally converge and engage with a sliding fit the small outward sleeve portion 69. The outward portion 69 of the sleeve 65 is provided with one or more longitudinal slots 72 producing flexible, part-cylindrical lead gripping fingers 73 which form the lead grip or clutch proper.

Two magazines 80, each capable of holding a plurality of spare leads L^1, are formed between the flat sides 21 of the inner sleeve and the adjacent wall of the magazine case 18, and to give access to the magazines the tube or case 18 is provided with a slot 81 of convenient width. Ordinarily this slot is located as shown in Fig. 4 opposite one of the part cylindrical surfaces of the inner tube 21, so that both magazines are closed. This is important so that when the mechanism is partly withdrawn as in Fig. 11 to obtain a spare lead, the magazines will at that time be closed in order to prevent accidental spilling of the leads. For this purpose lug 15 on ring 11, above referred to, may be located in line with one of the cylindrical faces of the inner sleeve, and another lug 82 is provided at the upper end of the magazine case 18 in line with the slot 81. When the case 18 is turned to bring the lugs 15 and 82 in line, therefore, the magazine slot or opening 18 is in closed position, and will be in this position when the mechanism is partly withdrawn, as shown in Fig. 11. Access may then be had to either magazine by rotating the magazine housing, or case, one-quarter turn in relation to ring 11 in either direction, to give access to the appropriate magazine, and after a lead has been removed, the parts must be returned to normal position with the lugs in line and with the magazines closed, in order to move the mechanism back to normal position in the casing with both of the lugs 82 and 15 located in casing slot 16. When so reinserted in the outer casing, the mechanism is securely retained against accidental displacement by the tight sliding fit of tube 18.

The sockets or cupped outer end 7 of head 6 above referred to, provides for the convenient insertion of a rubber eraser 90 which may have a beveled end 91, and the eraser may be protected by a cap 92 which may have a beveled end 93. The cap has a tight sliding fit over the outer cylindrical portion of head portion 7, and to insure placing it in proper position it may be provided at one point with an internal longitudinal channel 94 to co-operate with a small stud 95 formed on the head member 7.

With the parts in one position, as shown in Fig. 2, and with leads inserted in the lead grips, one of the leads L, is projected for writing. This lead is guided by the approximately tight fit between the lead and the tip aperture formed by the flexible fingers 71, which, however, need not actually bear on the lead with any pressure. The lead and its same portion 60 are in line with the tip aperture and the central axis of the pencil. The other lead grip with its lead, is out of line with the pencil axis, due to the different angular position of the lead carrier, as sufficiently shown in Figs. 2 and 5. The length of the projecting portion of the active lead may be regulated to suit the user by turning the operating ring 13, whereupon the internal gear 12 revolves both of the pinions 10 in the same direction, and the screw threads or helices formed therein of opposite leads or pitch, move one of the lead carriers outward and the other one inward. The carrier which is in the inward or inactive position is moved more slowly than the other, which is in active position, because the pins 52 and knobs 53 of the inactive lead carrying stem are located in the fine-pitch portions of their impeller threads or helices, while corresponding parts of the active lead carrier are located in the steep pitch portions of the screw. Adjustment of the active lead may therefore be made within a wide range (to compensate also for the changing length of the lead as it is used up or accidentally broken in use), while the idle motion of the inactive carrier is relatively small and only a moderate part of the total pencil length is required to permit this idle movement.

During the described adjustment and at all other times the lead carriers are prevented from rotating while they travel in the straight portions of their guide-slots 31 and 32, and the screw action of the impellers imparts to them true longitudinal movement.

By turning the operating ring 13 a substantial distance in one direction, the active lead may be withdrawn into the casing and by continuing this rotation of the ring, the lead carriers will come nearly opposite each other, and at this time their pins 52, moving in opposite directions, encounter opposite ends of the curved guide slot portions 33 and the carrier stems are simultaneously rotated a small part of a revolution in opposite directions, so that any conflict between the lead grips is avoided as they pass each other, and the holder which is now moving downward is brought with its lead in the axial line of the pencil, while the other one which is retreating is turned toward one side. Continued movement brings the fresh or other lead to projected active position and it may then be adjusted in the manner previously described. These manipulations of the leads are effected very quickly and almost automatically, since the user will appreciate by turning the operating ring one way or the other what effect this operation has upon the leads, and will then almost instinctively manipulate the pencil for the desired result.

When any lead is almost used up or if for any other reason it is desired to eject a lead, it is only necessary to continue the rotation of the operating ring 13 in one direction until the shoulder 68 in lead grip sleeve 65 encounters the spring fingers 71 of the tip, as shown in Fig. 7. Outward movement of the lead grip is then stopped and further movement of the operating ring causes stem 60 to advance through the lead grip sleeve and eject the lead in a manner which is obvious in Fig. 7. Outward movement of the stem 60 is limited by engagement of its pin 67 with the outer ends of slots 66. The lead grip or sleeve 65 is now held with considerable frictional force between the spring tip fingers 71, so that the grip will remain in the position shown while stem 60 is withdrawn inward by reverse rotation of the operating ring. When it reaches its inward position, a check is felt as the pin 67 encounters the ends of slots 66. The sleeve or aperture in the outer portion of the lead grip is then ready to receive a fresh lead, which is pushed into the projecting end of the grip until its inner end seats against the outer end of stem 60, and the lead is securely retained by the resilient pressure of the fingers 69. During this operation accidental inward movement of the grip is prevented by its firm frictional contact with the fingers 71. The operating ring is now turned in the appropriate direction to withdraw the fresh lead sufficiently for writing purposes or entirely within the case, or to project the other lead for use or the other lead grip for reloading, as may be desired.

The ejection of a nearly spent lead is practically automatic, since when there is only a short piece of lead in a holder, the holder will naturally be projected farther in the attempt to bring this lead into position for use, and evidently from the preceding description and the drawing, especially Fig. 7, when the operating ring is turned sufficiently in either direction, the lead grip is checked and the stem is projected through it, and the short length of lead will then be ejected, and this obviously gives notice to the user that a fresh lead should be inserted.

The invention is well adapted for the use of a plurality of leads of different colors, which may be mounted in the different lead grips ready for immediate use by manipulation of the operating member, or evidently leads of the same color and different qualities or degrees of hardness may be used, or if it is desired to use leads of one quality, the provision of a plurality of holders for leads in condition for active use provides an immediately available reverse, so that if any lead is exhausted or ejected when it is worn down to a small butt, another one may be immediately projected for use without delay or annoyance of reinserting a lead in a lead holder.

I claim:

1. A pencil or analogous writing implement comprising an outer case and operating mechanism normally contained within the case and slidable outward, said operating mechanism including a spare-lead magazine and a magazine case rotatable thereon and apertured to give access to the magazine when placed in a certain rotative position, the outer case having at its upper end a notch and the magazine and magazine case having lugs so positioned that the magazine case must be turned to closed position to align the lugs which will then enter the slot in the outer case as the operating mechanism is slid inward to operative position.

2. A pencil or analogous writing implement comprising an outer case, an inner sleeve, a plurality of guide tubes in fixed position within the inner sleeve, each tube having a longitudinal guide slot including an angular portion, an impeller tube rotatably mounted about each guide tube and provided with a helical groove, a head located substantially at the upper end of the inner sleeve, shafts connected to the impeller tubes and carrying pinions located substantially in said head, an exposed operating ring mounted for rotation on said head, an internal gear carried by the operating ring in engagement with the pinions, and lead car-

riers in the guide tubes and provided with followers engaging the slots and the helical grooves.

3. A pencil or analogous writing implement comprising an outer case, an inner sleeve, a plurality of guide tubes in fixed position within the inner sleeve, each tube having a longitudinal guide slot including an angular portion, an impeller tube rotatably mounted about each guide tube and provided with a helical groove, a head located substantially at the upper end of the inner sleeve, shafts connected to the impeller tubes and carrying pinions located substantially in said head, a retaining ring connected to said head and projecting within the outer case, a lug on the retaining ring engaging a slot in the upper end of the outer case wall, an exposed operating ring mounted for rotation on said head, an internal gear carried by the operating ring in engagement with the pinions, and lead carriers in the guide tubes and provided with followers engaging the slots and the helical grooves.

4. A pencil or analogous writing implement comprising an outer case, an inner sleeve, a plurality of guide tubes in fixed position within the inner sleeve, each tube having a longitudinal guide slot including an angular portion, an impeller tube rotatably mounted about each guide tube and provided with a helical groove, a head located substantially at the upper end of the inner sleeve, shafts connected to the impeller tubes and carrying pinions located substantially in said head, a retaining ring connected to said head and projecting within the outer case, a lug on the retaining ring engaging a slot in the upper end of the outer case wall, a ring located in the upper end of the inner sleeve and secured by a flanged portion of the inner case, said ring overlying segments of the upper ends of the impeller tubes to secure the operating mechanism together, an exposed operating ring mounted for rotation on said head, an external gear carried by the operating ring in engagement with the pinions, and lead carriers in the guide tubes and provided with followers engaging the slots and the helical grooves.

5. A pencil or analogous writing implement comprising an outer case, an inner sleeve, a plurality of guide tubes in fixed position within the inner sleeve, each tube having a longitudinal guide slot including an angular portion, an impeller tube rotatably mounted about each guide tube and provided with a helical groove, a head located substantially at the upper end of the inner sleeve, shafts connected to the impeller tubes and carrying pinions located substantially in said head, an exposed operating ring mounted for rotation on said head, an internal gear carried by the operating ring in engagement with the pinions, and lead carriers in the guide tubes and provided with followers engaging the slots and the helical grooves, the lead carriers also having offset lower portions provided with lead grips.

6. A pencil or analogous writing implement comprising an outer case, an inner case slidably located therein, an inner sleeve, a plurality of guide tubes in fixed position within the inner sleeve, each tube having a longitudinal guide slot including an angular portion, an impeller tube rotatably mounted about each guide tube and provided with a helical groove, a head located substantially at the upper end of the inner sleeve, shafts connected to the impeller tubes and carrying pinions located substantially in said head, an exposed operating ring mounted for rotation on said head, an internal gear carried by the operating ring in engagement with the pinions, and lead carriers in the guide tubes and provided with followers engaging the slots and the helical grooves.

7. Operating mechanism for an adjustable pencil or like structure, comprising an outer case, an inner case rotatable and slidable therein, an inner sleeve within the inner casing having cylindrical end portions providing lead magazines in co-operation with the inner case, a guide base substantially conforming to the inner contour of the inner sleeve and located in the lower portion thereof, guide tubes fixed on the guide base, impeller tubes rotatably located about the guide tubes, the guide tubes having longitudinal guide slots provided with offset portions and the impeller tubes being provided with helical thread formations, lead-carrier stems projecting through bearing holes in the guide base and into the respective guide tubes, the stems being provided with guide pins projecting through the guide slots and having rounded heads engaging the impeller tube screw formations, the carrier stems also having offset lower portions provided with lead grips, and means for simultaneously rotating the impeller tubes.

8. In a pencil or like implement, lead holding and ejecting means comprising a case having a lead aperture at the tip defined by resilient fingers, a lead carrier reciprocable within the casing, a lead grip slidably and revolubly mounted on the carrier and having a lead clutch, the carrier being arranged to slide within the grip to eject a lead by longitudinal movement and the grip having a formation to co-operate with the tip fingers to control relative movement of the carrier and grip.

9. In a pencil or like implement, lead holding and ejecting means comprising a case having a lead aperture at the tip defined by resilient fingers, a stem arranged to reciprocate within the case in line with the lead aperture, a sleeve slidably and revolubly mounted on the stem, means to limit relative

movement of the sleeve and stem so that in one position the stem end is projected through the grip nearly to its outer end and in another position is withdrawn to provide a lead socket of substantial length, the outer end of the sleeve being provided with resilient fingers forming said socket, and the sleeve also having an enlargement to cooperate with the tip fingers and control relative straight reciprocating movement of the sleeve and stem.

Signed at New York city, in the county of New York and State of New York, this 27th day of April, A. D. 1925.

FRANK FUREDY.