

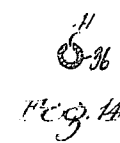
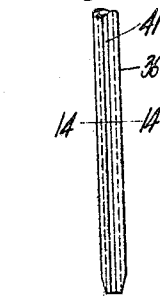
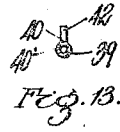
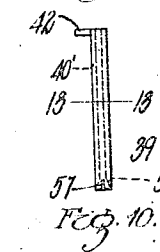
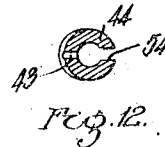
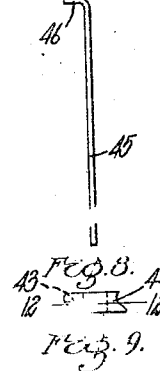
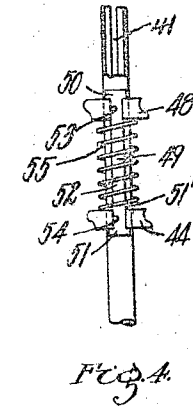
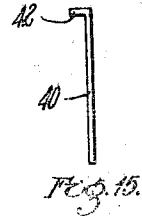
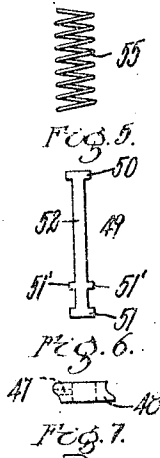
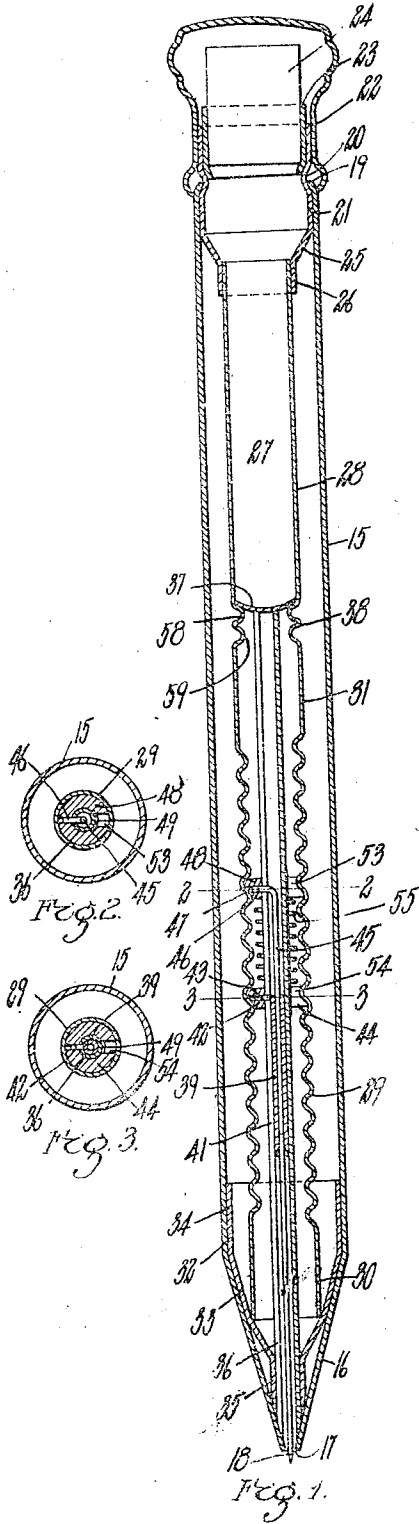
Nov. 6, 1923.

1,472,962

W. P. DE WITT

PENCIL

Filed April 19, 1920



Inventor:
 William P. De Witt,
 By his attorney
 Charles S. Gooding

UNITED STATES PATENT OFFICE.

WILLIAM P. DE WITT, OF SOMERVILLE, MASSACHUSETTS, ASSIGNOR TO DE WITT-LA FRANCE CO., OF CAMBRIDGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

PENCIL.

Application filed April 19, 1920. Serial No. 374,848.

To all whom it may concern:

Be it known that I, WILLIAM P. DE WITT, a citizen of the United States, residing at Somerville, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Pencils, of which the following is a specification.

This invention relates to pencils with adjustable and removable leads and especially the invention relates to that class of pencils in which the lead is of very small diameter so that the same may be used without sharpening.

The object of this invention is to provide a pencil of the class set forth in which the lead can be fed forward for use until it is almost entirely used up and the small remaining butt is finally ejected from the pencil.

The object of the invention is further to provide a pencil of the class set forth in which the mechanism for advancing or feeding forward the lead and also for ejecting the lead from the pencil when used up is so constructed and arranged that the head of the pencil, by the rotation of which the lead is fed forward and ejected, can be rotated continuously even after the lead is ejected from the pencil without injury to the mechanism, and furthermore, the object of the invention is to provide a pencil of the class described in which by reversing the rotatory movement of the head the feeding and ejecting members of the pencil will be caused to retreat toward the rear end of the pencil in order that a new lead may be inserted, and after said members have retreated to the extreme rear end of their path of movement a continued rotation of the head of the pencil will cause no damage to the operating parts.

The object of the invention is further to simplify and cheapen the construction of the pencil by entirely eliminating any soldered or brazed parts.

The invention consists in the combination and arrangement of parts whereby the foregoing objects are attained as hereinafter set forth in the specification and particularly pointed out in the claims.

Referring to the drawings:

Figure 1 is an enlarged sectional elevation of my improved pencil.

Fig. 2 is a sectional plan taken on the line 2—2 of Figure 1.

Fig. 3 is a sectional plan taken on the line 3—3 of Figure 1.

Fig. 4 is a side elevation as viewed from the right of Figure 1, illustrating a portion of the lead feeding mechanism.

Fig. 5 is a detail elevation of a spring.

Fig. 6 is a side elevation of a connecting member.

Fig. 7 is a side elevation of a screw-threaded collar.

Fig. 8 is a side elevation of a push-rod.

Fig. 9 is a side elevation of another screw-threaded collar.

Fig. 10 is a side elevation of the lead carrier tube.

Fig. 11 is a side elevation of the guide tube.

Fig. 12 is a detail section taken on the line 12—12 of Fig. 9.

Fig. 13 is a detail section taken on the line 13—13 of Fig. 10.

Fig. 14 is a detail section taken on the line 14—14 of Figure 11.

Fig. 15 is a detail view of a spline with a lateral projection.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 15 is the outer casing of the pencil which terminates at its front end in a conical end portion 16, through an opening 17 in the front end of which the lead 18 is fed. At the rear end of the outer casing 15 an annular flange 19 projects into an annular groove 20 provided in a tube 21 which is rotatably mounted in the casing 15 and projects rearwardly outside thereof to receive upon its outside a head 22 and upon its inside at its rear end a tube 23 is provided which contains an eraser 24. At its forward end the tube 21 is reduced in diameter at 25 forming a frustro-conical portion and terminates in a cylindrical portion 26 which is a tight fit upon the propeller tube 27, said propeller tube for a portion of its length as at 28 is cylindrical and for the remainder of its length, except as hereinafter set forth, is provided with an interior screw thread 29, while at its front end and at its rear end at 30 and 31 respectively said propeller tube has a smooth bore.

The front end of the propeller tube 27 bears against the inner wall of an alignment tube 32; said alignment tube consists of a frustro-conical portion 33 against which the front end of the propeller tube bears and which forms a bearing therefor, a cylindrical portion 34 at the rear end thereof, and a

cylindrical portion 35 at the front end thereof. The frusto-conical portion 33 fits against the inner wall of the conical forward end 16 of the casing 15 and thus positions the alignment tube 32 longitudinally of the casing. The cylindrical portion 35 terminates adjacent to the inner wall of the conical portion 16 of said casing and forms a holder for a guide tube 36 which fits tightly into said cylindrical portion 35 and extends rearwardly therefrom in the interior of the propeller tube 27 until at its rear end it bears against a disc 37 which is a close fit in the portion 28 of the propeller tube and bears against an inwardly projecting annular flange 58 on said propeller tube.

The tube 36 bears at its forward end against the inner wall of the conical portion 16 of the casing and forms a guide for a lead carrier tube 39 in which the lead 18 is placed and by which it is fed longitudinally of the pencil. This carrier tube 39 is provided with a spline 40 which is fast in a slot 40' provided in the tube 39. Said spline 40 has a laterally extending projection 42 which when the several parts are assembled, as illustrated in Figure 1, extends into a hole 43 in the collar 44. A push-rod 45 slides in the tube 39 and terminates at its upper end in a lateral arm 46 which when the parts are assembled extends into a hole 47 in a collar 48.

The collars 44 and 48 are each provided with a screw thread upon their peripheries and are joined together by a connecting member 49 which is provided at its rear end with a T-shaped head 50 and at its front end with a T-shaped head 51, said T-shaped heads being connected by a shank portion 52 with ears 51' thereon and this shank portion is located in slots 54 and 53 provided in the screw-threaded collars 44 and 48 respectively.

A spiral spring 55 encircles the guide tube 36 and is slidable thereon, said spring serving to hold the guide member 49 in position in the slots 53 and 54.

It will be understood that the collars 44 and 48 are slidably mounted upon the guide tube 36, that they are connected together by the connecting member 49 and that they are forced apart until they strike the heads 51 and 50 respectively, by the spiral spring 55.

The diameter of the bore of the carrier tube 39 is slightly smaller than the diameter of the lead intended to be used therewith. The tube 39 is countersunk at 56 and is slit a slight distance at 57 so as to allow the lead to enter the tube 39 and wedge itself into the tube.

While the alignment tube 32 has been described in its preferred form in the foregoing specification as consisting of two cylindrical portions 34 and 35 joined together by a frusto-conical portion 33, it will be un-

derstood that I do not confine myself to this specific construction or form, but this invention contemplates an alignment tube consisting of two tubes of different diameters joined together, the larger of the tubes engaging the casing of the pencil and stationary relatively thereto and with a guide tube fitting the tube of smaller diameter and stationary relatively thereto and having a member slidable longitudinally within the guide tube.

The general operation of the device hereinbefore specifically described is as follows: Assuming the parts to be in the relative positions illustrated in Figures 1 and 4 and that the head 22 is given a rotary clockwise movement then the tube 21 will be rotated, thereby causing the propeller tube 27 to rotate. The rotation of said propeller tube will cause the collars 44 and 48 to be fed forwardly in said tube and this forward movement of the collars will carry forward the carrier tube 39 with the lead 18 and the push rod 45. When the carrier tube 39 has been moved forwardly in this manner until the collar 44 is moved out of the screw-threaded portion 29 of the propeller tube 27 into the smooth bore portion 30 thereof, the collar 48 will continue to be fed forward by the screw-threaded portion of the propeller tube 27 and the spring 55 will push the collar 44 and the tube 39 forwardly until the end of the carrier tube 39 abuts against the forward portion of the conical end 16, and during this forward movement the collar 48 and the push-rod 45 will continue their forward movement until the spring 55 is sufficiently compressed to allow the collar 48 to enter the smooth bore portion 30. During this last part of the movement of the collar 48 the spring 55 will be still more compressed and the connecting member 49 will slide in the collar 48.

It is evident that after the carrier tube has been moved to its extreme forward position and the push-rod has been also moved to its extreme forward position thus expelling the lead from the carrier tube that a continued rotation of the propeller tube 27 by the head 22 will have no further effect upon the movement of the collars and consequently the carrier tube and push-rod will remain practically stationary until the head 22 is rotated in the opposite direction or in a counter-clockwise direction, whereupon the collar 48 being pressed against the forward end of the screw thread 29 by the spring 55 will enter said screw-threaded portion and commence to be fed toward the rear end of the pencil carrying with it the push-rod 45. As soon as the collar 48 has been moved rearwardly until the head 50 on the connecting member abuts against the rear face of the collar 48 and the head 51 abuts against the front face of the collar 44 then the collar 44 will be drawn backwardly by the con-

tinued rotation of the propeller tube until it enters the screw-threaded portion of said propeller tube, whereupon both the collars will be moved rearwardly together with the push-rod and the carrier tube.

A new lead may be inserted in the carrier tube at any time after the push-rod has been drawn backwardly therein. The collars 44 and 48 and the lead carrier 39 and push-rod 45 together with the spring 55 and the connecting member 49 will be now moved backwardly in the pencil until the collar 48 enters the smooth bore portion 31 of the propeller tube, and then a continued rotation of the head 22 will cause the collar 44 to be moved toward the rear and the spring 55 will push the collar 48 along the smooth bore 31 until said collar 48 engages an inwardly extending flange 59 on said propeller tube, whereupon further rearward movement of the collar 44 will compress the spring 55 and the shank 52 will slide in the collar 48 until said collar 44 enters the smooth bore portion 31, whereupon further rotation of the head 22 in a counter-clockwise direction will have practically no effect upon the collars 44 and 48 and none of the parts of the pencil will be broken by a continued counter-clockwise rotation of said head.

Now upon rotating the head 22 clockwise the collars will be caused to enter the screw-threaded portion of the propeller tube in a manner similar to that hereinbefore described in relation to the movement of the collars from the smooth bore portion 30 into the screw-threaded portion of the propeller tube.

It will be understood that it is not necessary to cause the collars 44 and 48 to move backwardly into the smooth bore portion 31, the distance to which said collars should be moved back being regulated by the length of the new lead, but in case that anyone using the pencil did continue rotating the head, either clockwise or counterclockwise beyond the time necessary for the parts of the pencil to perform their different functions, then the smooth bore portions 30 and 31 will prevent injury to the different parts of the pencil.

The different parts of the pencil hereinbefore described are assembled as follows: The carrier tube 39 is placed in the guide tube 36 with the collar 44 placed in position on said guide tube and with the lateral projection 42 extending into the hole 43. Next, the connecting member 49 is placed in position on the collar 44 with the head 51 bearing against the forward face of said collar and the lateral prongs 51' thereon bearing against the rear face of said collar. The spiral spring 55 is then placed in position upon the guide tube 36 over the connecting member and bearing against the collar 44,

then the collar 48 is placed on the push-rod 45 with the arm 46 projecting in the hole 47, and the push-rod is inserted in the hole in the carrier tube 39, then the spring 55 is compressed and the head 50 on the connecting member 49 is slipped over the rear end of the collar 48, while at the same time the shank portion 52 enters the slot 53 in said collar 48.

The several parts hereinbefore described are now in the relative positions illustrated in Figure 4. The guide tube 36 is then forced into the cylindrical portion 35 of the alignment tube 32 and the alignment tube, with the guide tube in position therein, is then forced into the casing 15 until the frusto-conical portion 33 is seated against the conical portion 16 of the casing, as illustrated in Figure 1. The disc 37 is then forced into the propeller tube 27 and down against the annular rib 58. The cylindrical portion 26 of the tube 21 is then forced on to the rear end of the propeller tube. The propeller tube with the tube 21 attached thereto is now inserted in the casing 15 and is rotated in a counter-clockwise direction until the collars 48 and 44 enter the screw-threaded portion of said propeller tube and the propeller tube is then advanced to the position shown in Figure 1, and the rear end of the casing is spun into the annular groove 20 in the tube 21. The leads are then placed in the propeller tube in the chamber at the rear of the disc 37. The eraser 24 is then forced into the tube 23 and the tube 23 is placed in the rear end 21 with which it has a snug friction fit. The head 22 is then pushed upon the rear end of the casing with which it has a tapered fit until it assumes the position illustrated in Figure 1 with its forward edge contacting with the rear end of the casing and just in advance of the flange 19.

While I have illustrated as the improved embodiment of my invention in respect to the alignment tube, a construction wherein a cylindrical portion 34 at the rear end thereof and a cylindrical portion 35 at the front end thereof are of different diameters and these two different diameter tubes are joined together by a frusto-conical portion 33 integral therewith, it is evident that without departing from the spirit of my invention an alignment tube, in all respects the mechanical equivalent of the alignment tube hereinbefore described and illustrated, may be substituted therefor without departing from the spirit of my invention in this respect, so long as two tubes one of larger diameter than the other are rigidly joined together.

I claim:

1. A pencil having, in combination, an outer casing, a head rotatably mounted on the rear end of said casing, a stationary

guide tube within said casing, a carrier tube for leads slidable in said guide tube, a push rod slidable in said carrier tube, a rotary propeller tube extending longitudinally within said casing and provided with an interior screw thread, a collar fast to said carrier tube and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread, another collar fastened to said push-rod and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread and a spring interposed between said collars.

2. A pencil having, in combination, an outer casing, a head rotatably mounted on the rear end of said casing, a stationary guide tube within said casing, a carrier tube for leads slidable in said guide tube, a push-rod slidable in said carrier tube, a rotary propeller tube extending longitudinally within said casing and provided with an interior screw thread, a collar fast to said carrier tube and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread, another collar fastened to said push-rod and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread, a spring interposed between said collars, and a connecting member connecting said collars together and limiting the distance to which they can be moved apart while allowing them to be moved toward each other.

3. A pencil having, in combination, an outer casing, a head rotatably mounted on the rear end of said casing, a stationary guide tube within said casing, a carrier tube for leads slidable in said guide tube, a push-rod slidable in said carrier tube, a rotary propeller tube extending longitudinally within said casing and provided with an interior screw thread, a collar fast to said carrier tube and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread, another collar fastened to said push-rod and slidably and non-rotatably mounted upon said guide tube and having screw-threaded engagement with said interior screw thread, a spring interposed between said collars, and a connecting member extending through said collars and longitudinally of said guide tube with a head at each end thereof adapted to engage the front face of one of said collars and the rear face of the other of said collars respectively and limiting the distance to which said collars can be moved apart while allowing them to be moved toward each other.

4. A pencil having, in combination, an outer casing, a head rotatably mounted on

the rear end of said casing, a reciprocatory carrier tube for leads, a guide for said carrier tube, a push rod adapted to slide in said carrier tube, a non-rotatable screw-threaded member connected to said carrier tube, a non-rotatable screw-threaded member connected to said push-rod, both of said screw-threaded members being slidable upon said guide, a spring interposed between said non-rotatable screw-threaded members, an interiorly screw-threaded propeller tube adapted to engage both of said screw-threaded members, the interior screw thread of said tube terminating at a point removed from the forward end thereof and from the rearward end thereof, means operated by the rotation of said head to impart a rotary motion to said propeller tube, and means to prevent the rotation of said carrier tube and of said push-rod whereby a reciprocatory motion may be imparted to said carrier tube, and an independent reciprocatory motion imparted to said push-rod and whereby when said screw-threaded members have entered said smooth bore portion further reciprocatory motion of said carrier tube and of said push-rod will cease.

5. A pencil having, in combination, a casing, a carrier tube for leads, a guide therefor, a push-rod slidable in said carrier tube, a spring interposed between said carrier tube and push-rod, a member connected to said carrier tube and push-rod and adapted to limit the distance to which they may be moved apart, means to impart a reciprocatory motion to said carrier tube and means to impart a reciprocatory motion to said push rod.

6. A pencil having, in combination, a casing, a carrier tube for leads, a guide therefor, a collar fast thereto, a push-rod slidable in said carrier tube, a collar fast to said push-rod, a spring interposed between said collars, and a member connected to said carrier tube and push-rod and adapted to limit the distance to which they may be moved apart only, and means to impart a reciprocatory motion to each of said collars, respectively, whereby a reciprocatory motion may be imparted to said carrier tube and to said push-rod.

7. A pencil having, in combination, a carrier tube for leads, a guide tube therefor, a collar fast to said carrier tube and provided with a slot extending longitudinally therethrough, a push-rod slidable in said carrier tube, a collar fast to said push-rod and having a slot extending longitudinally therethrough, a spring interposed between said collars, and a member slidable in said slots with a head at each end thereof engaging one of said collars respectively and adapted to limit the distance to which said collars may be moved apart, and means to impart a reciprocatory motion to said collars

whereby a reciprocatory motion will be imparted to said carrier tube and to said push-rod.

8. A pencil having, in combination, a casing, a carrier tube for leads, a guide tube in which said carrier tube is slidably mounted, a push-rod slidable in said carrier tube, a collar having a screw-threaded periphery fast to said carrier tube; another collar having a screw-threaded periphery fast to said push-rod, an interiorly screw-threaded propeller tube with which said collars have screw-threaded engagement, means adapted to rotate said propeller tube, a member connected to said collars and adapted to limit the distance to which they may be moved apart, a spring encircling said guide tube and connecting member, and a rotatable head connected to said propeller tube whereby upon the rotation of said head a reciprocatory motion may be imparted to said carrier tube and to said push-rod.

9. A pencil having, in combination, a carrier tube for leads, a guide tube in which said carrier tube is slidably mounted, a collar fast to said carrier tube and having a screw-threaded periphery, a push-rod slidable in said carrier tube, another collar having a screw-threaded periphery fast to said push-rod, a spring interposed between said collars, means to limit the distance to which said collars may be moved apart, an interiorly screw-threaded propeller tube rotatably mounted in said casing and having screw-threaded engagement with said collars, a head rotatably mounted on said casing and connected to said propeller tube, the opposite ends of said propeller tube each having a smooth bore whereby the distance to which said collars may be propelled by the rotation of said propeller tube is limited in opposite directions.

10. A pencil having, in combination, a

casing, a carrier tube for leads, a guide tube therefor, a projection extending laterally from said carrier tube, a collar provided with a hole into which said projection is adapted to extend, a push-rod slidable in said carrier tube, a lateral arm on said push-rod, a collar provided with a hole into which said arm is adapted to project, a spring interposed between said collars, a member connecting said collars and adapted to limit the distance to which they may be separated by said spring, and means to impart a reciprocatory motion to said collars.

11. A pencil having, in combination, a casing, a carrier tube for leads, a push-rod slidable in said carrier tube, a collar fast to said push-rod and having a screw-threaded periphery, a rotatable interiorly screw-threaded propeller tube having screw-threaded engagement with said collar and rotatable within said casing, and means to impart a rotary motion to said screw-threaded propeller tube.

12. A pencil having, in combination, a casing with a conical forward end portion and a cylindrical body portion, an alignment tube having a cylindrical portion tightly fitting the forward end of the cylindrical body portion of said casing and terminating at its forward end in another cylindrical portion of smaller diameter, and a frusto-conical portion connecting said cylindrical portions and fitting against the inner wall of the conical forward end of said casing, a guide tube tightly fitting said last-named cylindrical portion, a push-rod slidable in said guide tube and means to impart a reciprocatory motion to said push-rod.

In testimony whereof I have hereunto set my hand in presence of a witness.

WILLIAM P. DE WITT.

Witness:

FRANKLIN E. LOW.