Dec. 30, 1958 K. F. SCHISCHKOW 2,866,438

SELF-FEEDING AUTOMATIC PENCIL

Filed May 23, 1957

Fig. 1.

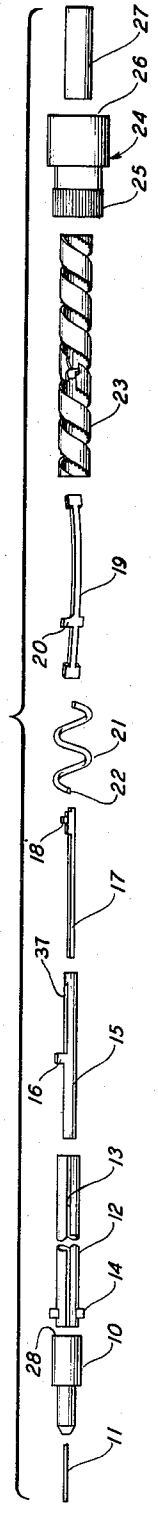


Fig. 4.

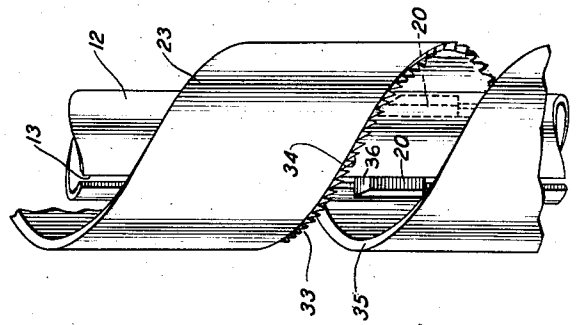


Fig. 2.

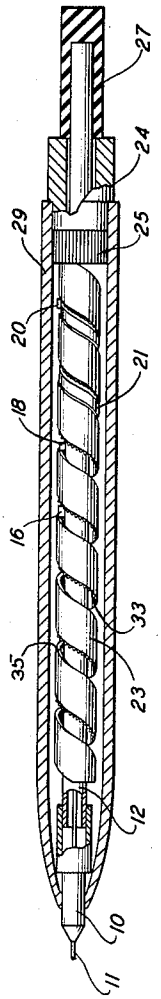
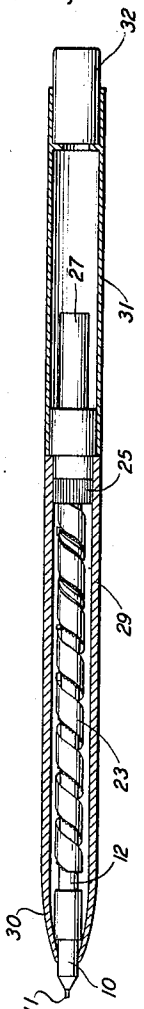


Fig. 3.



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SELF-FEEDING AUTOMATIC PENCIL

Konstantin F. Schischkow, Whitestone, N. Y.

Application May 23, 1957, Serial No. 661,240

7 Claims. (Cl. 120—18)

This invention relates to automatic pencils and particularly such as are capable for self-feeding in response to the writer's requirements, and is a continuation-in-part of my co-pending applications Serial No. 586,010, filed May 21, 1956; Serial No. 597,677, filed July 13, 1956, which are now abandoned.

Automatic pencils, heretofore known, which profess to feed themselves in response to writing requirements, have been either not totally automatic or deficient in that they allowed the lead to feed out of the pencil in excess of writing demands. Still other previously known devices have employed highly complicated structures which made them delicate and subject to operational failure.

Accordingly, it is an object of the present invention to provide a self-feeding automatic pencil which will advance only so much lead as is necessary to continue the writing operation.

Another object is to provide a self-feeding automatic pencil which will not advance the lead despite conditions of vibration and handling except in response to the wearing-away of the lead at the tip of the pencil.

A further object is to provide a simplified self-feeding mechanical pencil having a minimum number of parts.

Another object is to provide a self-feeding pencil which will be durable and provide trouble-free operation for a long period of time.

A further object is to provide a self-feeding mechanical pencil in which the motion of the lead in adjusting itself to the writing operation will not be annoying to the user.

A feature of the present invention is its use of a spirally-wound band having a continuous passage between the convolutions, one wall of said passage being provided with serrations in the form of teeth.

Another feature is the use of friction means to promote the smooth operation of the pencil.

A further feature is its use of positive locking structures whereby the lead will not be forced back into the pencil during use once it has been advanced.

Another feature is its simplified construction which provides a highly efficient operation without requiring expensive close-machining tolerances.

The invention consists of the construction, combination and arrangement of parts, as herein illustrated, described and claimed.

In the accompanying drawing, forming a part hereof is illustrated one form of embodiment of the invention and in which:

Figure 1 is a somewhat exploded view of a complete embodiment of the operating mechanism in accordance with the present invention.

Figure 2 is a view in side elevation of the assembled operating mechanism of the pencil shown in Figure 1, partly cut away to show the interior structure thereof.

Figure 3 is a view in side elevation, partially in section, of the assembled pencil made in accordance with the present invention.

Figure 4 is a view in side elevation on an enlarged scale, illustrating a fragment of the feed spiral and its associated structure.

Referring to the drawing, and specifically Figures 1 and 2, 10 indicates the pencil tip which is centrally bored to receive therethrough a length of lead 11. A feed tube 12 is inserted in the upper end of the tip 10 and is rigidly secured thereto. The feed guide tube 12 is longitudinally slit as indicated at 13 and provided with laterally extending ears 14, which act as a stop at the bottom of the said guide tube. A lead clutch member 15 is slidably received within the guide tube 12. The clutch member 15 is longitudinally slit and provided with a central bore to receive therein the upper end of the lead 11. A small detent 16 is provided on the clutch 15 and extends laterally therefrom as shown in Figures 1 and 2. The clutch member 15 is adapted to receive an ejector pin 17 which slides freely within the bore of the clutch member 15. The ejector pin 17 is also formed with a laterally extending detent 18 for a hereinafter described purpose, which detent extends through a window 37 cut in the wall of the clutch 15.

After the clutch 15 and its associated ejector member 17 are assembled and slipped within the slotted feed guide tube 12, a friction strip 19 is slipped into the guide tube behind them. The friction strip 19 is bow shaped as indicated in Figure 1, and is also provided with a laterally extending ear 20. The detents 16, 18, and the ear 20, all project through the slotted portion 13 of the guide strip 12, as illustrated in Figures 2 and 3.

A short length of spirally wound wire or the like 21, is next slipped around the guide tube 12 and threaded therearound until its lower-most end 22 bears against the side of the detent 18, projecting through the slot 13 from the ejector member 17. The spirally wound wire 21 acts as a guide member as hereinafter set forth. The feed spiral member 23 is next slipped over the guide feed tube 12 and threaded over the spiral wire member 21, the ear 20, and the detents 16, 18, all of which project through the slot 13 of the guide tube 12.

The feed spiral member 23 is formed of a single flat strip, wound to provide a continuous helical path 33 between the convolutions. The upper wall of the path 33 is serrated to provide a series of teeth 34 which are buttressed in the manner shown in Figure 4. The buttressed teeth 34 allow the pencil detent members 16, 18, and the ear 20, to slide downwardly in the spiral path 33, but resist any upward motion of the said detent 16 and the ear 20. The spiral path 33 is of a width somewhat greater than that of the detents 16, 18, or the ear 20. The wall of the spiral path 33 opposite the serrated edge is smooth, as shown at 35 in Figures 2 and 4. The detents 16, 18 and the ear 20 are therefore free to slide downwardly when in contact with the smooth wall 35. Any upward displacement of the clutch 15 or the friction strip 19 will bring the detent 16 and the ear 20 into locking contact with the teeth 34. The edges of the detent 16 and the ear 20, may be beveled as shown at 36 to more sharply engage the teeth 34.

The upper end of the feed spiral member 23 has a cap member 24 secured thereto. The cap member 24 is provided with a reduced knurled portion 25 at the bottom thereof and an enlarged portion 26 at the top. The cap member 24 is also centrally bored to receive therethrough the end of the guide tube 12. With the parts assembled, as shown in Figure 2, the extended end of the guide tube is fitted with a stop member 27.

The stop 27 limits the downward movement of the guide tube within the feed spiral member 23. Upward movement of the guide tube 12 is limited by the shoulder 28 on the tip member 10 coming into contact with the end of the feed spiral member 23. As will hereinafter be more fully disclosed, the longitudinal travel of the guide tube member 12 limits the maximum amount of lead advance of the automatic pencil mechanism at any single raising and lowering of the tip 10.

With the mechanical portion of the pencil assembled as shown in Figure 2, the said feed mechanism is inserted within the pencil casing 29. The pencil casing 29 consists of an elongated hollow shell tapered at its forward end, as indicated at 30 in Figure 3, and having a bore to receive therethrough the tip 10. The knurled portion 25 of the cap member 24 is pressed firmly within the central bore of the casing 29, thereby preventing the feed spiral member 23 from rotating independently of the said casing 29. The feed spiral member 23 for all intents and purposes becomes a fixed member within the pencil.

The remainder of the self-feeding mechanical pencil consists of an upper casing 31 which is slidably received on the enlarged portion 26 of the cap member 24.

An eraser 32 may be held in the upper end of the casing 31, as shown in Figure 3. The operation of the self-feeding automatic pencil in accordance with the present invention will be apparent from an examination of the foregoing structure, as follows:

When the pencil is loaded with lead, the mechanical portion of the pencil may be caused to feed the said lead outwardly so as to bring a portion of the lead into position for writing purposes by bringing the tip 10 to bear against the writing surface. Pressure on the tip 10 forces it inwardly of the casing 29, thereby causing the feed tube 12 to slide upwardly through the feed spiral 23 and the cap 24. Thus as the feed tube 12 slides upward it slips past the clutch member 15 and the friction strip 19. Because of the frictional engagement of the strip 19 within the tube 12, the ear 20 of said strip is raised by the tube into contact with the teeth 34. Thereafter further upward motion of the tube 12 will cause it to slip past the strip 19.

When the tip 10 is lifted from the writing surface the feed guide tube 12 slides downwardly as the extended detents 16, 18, and the ear 20 ride along the smooth face 35 of the strip 23, through the action of gravity. The guide tube thus descends with the clutch 15, the ejector member 17 within the clutch, and the friction strip 19. The downward spiral travel of the guide tube 12 and its associated clutch member 15 advances the lead 11, carried by the clutch 15. If the distance traveled by one raising and releasing of the tip member 10 is not sufficient to expose the lead, this action may be repeated to further advance the lead until it arrives at the end of the tip member 10. Once the lead 11 appears at the end of the pencil the user may write with the said pencil. In writing, pressure is applied to the lead 11. Pressure upon the lead is transmitted through the lead to the clutch member 15 which causes the detent 16 of the clutch to come into contact with one or more of the teeth 34 in the spiral path 33. The buttressed shape of the teeth 34 prevents the detent 16, and consequently the clutch member 15 from moving upwardly in the spiral path 33, thereby locking the lead in place.

As the clutch member 15 and the friction strip 19 move downwardly within the spiral feed strip 23 they are followed by the follower strip 21. The follower strip 21 slides within the spiral path 33 through the action of gravity and the lower end thereof presents a guiding and supporting surface for the detent 18 of the ejector. Since the ejector is coupled to the clutch 15 the said detent 18 will cause the clutch detent 16 to be guided into positive contact with the teeth 34 when pressure is applied to the lead. The spiral strip functions to make the operation of the pencil smoother in its feed without the need for expensive close machining tolerances.

As the writer continues to write he will automatically raise and lower the pencil from the surface of the paper. If the lead 11 is projecting from the end of the pencil, such raising and lowering of the pencil will not affect the feed of said pencil. However, in the event that the lead 11 breaks or becomes worn down, so that it no longer extends from the pencil 10, the pressure of the writing action will force the tip 10 of the pencil to begin the feeding operation hereinabove described. As a consequence of the operation of the pencil, the lead 11 will constantly be fed forward for use in writing in accordance with the requirements of the writer's wearing away of said lead. The lead will not feed forward unless the demand for said lead is present, or in other words unless the tip 10 comes into contact with the paper due to the absence of lead projecting from the pencil.

After all of the lead has been used the clutch member 15 and its associated ejector 17 will be at the bottom of the feed spiral 23. The detent 18 of the ejector 17 will move downwardly until the last bit of lead 11 is pushed out of the pencil. The stop member 14 will lie in the path of the clutch detent 16 and prevent it from being bent as it comes down to the final feed stages.

In reloading the pencil it is merely necessary to retract the clutch 15 and the ejector 17 therein by removing the upper casing 31 and rotating the feed tube 12 by means of the stop member 27, thereby causing the detents 16, 18, and the ear 20 to slide up the spiral path 33, by-passing the teeth 34. The lead 11 can then be slipped into the tip 10 and pressed into the opening in the clutch member 15. The pencil is then in condition to begin writing.

At the end of each forward motion of the feed tube 12 the said feed tube has a tendency to continue rotating within the spiral feed member 23. However, said rotation can not be in a downward direction because of the stop member 27, but will merely be in a circular direction. The circular rotation of the feed tube 12 at this point causes the ear 20 to describe the path shown in dashed lines in Figure 4. This path of travel brings the ear member 20 into contact with the teeth 34 on the upper surface of the spiral path 33. The downward motion and the feed of the lead 11 in the feed tube 12 is thereby quickly stopped. The above operation of the teeth 34 and ear 20 thus prevents unwanted and unnecessary feed, and also overcomes the danger of self-feed, caused by mere vibration of the pencil. It will be seen that the lead will not move downwardly due to vibration, because of the action of the teeth 34 in stopping any tendency of the feed tube 12 to rotate during conditions of vibration.

If it is desired to eject the lead 11 from the pencil the user may remove the upper casing 31 and rotate the guide tube 12 by means of the stop member 27, until the clutch and ejector have been worked down to the bottom of the spiral feed strip 23. At this juncture, the ejector will be caused to move downwardly through the clutch 16 by the passage of the detent 18 through the spiral path 33. As the ejector 17 approaches the bottom of its travel the forward end of the ejector 17 will force the lead 11 out of the clutch bore.

From the foregoing, it will be seen that there has been provided a practical, self-feeding pencil which will advance the lead therein only upon actual writing demand, but which will not advance the lead during conditions of vibration. There also has been provided a self-feeding pencil which is extremely simple in construction, which requires a limited number of parts, and which will quickly present a writing point for use when the normal writing motions are made by the user.

Having thus fully described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States, is:

1. A self-feeding lead pencil comprising, a hollow casing tapered at its lower end, a centrally bored tip member slidably received within the tapered portion of the casing, a feed guide tube within the casing adjacent the tip member, a longitudinal slit in the wall of said tube, a hollow clutch member slidable within the tube and adapted to receive the end of a length of lead therein, a first detent attached to the clutch member and extending laterally therefrom through the tube slit and beyond the said tube, an elongated opening in the wall of the clutch, a lead ejector slidably carried within the clutch member, a second detent attached to the ejector and extending laterally therefrom, through the clutch opening, the tube slit, and beyond the said tube, a friction strip slidably received within the feed guide tube above the clutch in frictional engagement with the walls of said tube, an ear on the friction strip extending laterally therefrom, through the tube slit and beyond said tube, a feed spiral overlying the feed tube consisting of a continuous band spirally wound to form a somewhat tubular structure having a helical path between adjacent convolutions thereof, said helical path of the feed spiral being threaded around the first and second detents and the friction strip ear, friction means on the portion of the feed spiral band forming the upper wall of the helical path to engage the projecting detents and friction strip ear, and a cap member secured to the upper end of the feed spiral and the casing to prevent the said spiral from rotating within the said casing.

2. A self-feeding lead pencil comprising, a hollow casing tapered at its lower end, a centrally bored tip member slidably received within the tapered portion of the casing, a feed guide tube within the casing adjacent the tip member, a longitudinal slit in the wall of said tube, a hollow clutch member slidable within the tube and adapted to receive the end of a length of lead therein, a first detent attached to the clutch member and extending laterally therefrom through the tube slit and beyond the said tube, an elongated opening in the wall of the clutch, a lead ejector slidably carried within the clutch member, a second detent attached to the ejector and extending laterally therefrom, through the clutch opening, the tube slit, and beyond the said tube, a friction strip slidably received within the feed guide tube above the clutch in frictional engagement with the walls of said tube, an ear on the friction strip extending laterally therefrom, through the tube slit and beyond said tube, a feed spiral overlying the feed tube consisting of a continuous band spirally wound to form a somewhat tubular structure having a helical path between adjacent convolutions thereof, said helical path of the feed spiral being threaded around the first and second detents and the friction strip ear, friction means in the form of a serrate margin on the portion of the feed spiral band forming the upper wall of the helical path to engage the projecting detents and friction strip ear, and a cap member secured to the upper end of the feed spiral and the casing to prevent the said spiral from rotating within the said casing.

3. A self-feeding lead pencil comprising, a hollow casing tapered at its lower end, a centrally bored tip member slidably received within the tapered portion of the casing, an enlarged shoulder on the upper end of the tip member, a feed guide tube within the casing adjacent the tip member, a longitudinal slit in the wall of said tube, a hollow clutch member slidable within the tube and adapted to receive the end of a length of lead therein, a first detent attached to the clutch member and extending laterally therefrom through the tube slit and beyond the said tube, an elongated opening in the wall of the clutch, a lead ejector slidably carried within the clutch member, a second detent attached to the ejector and extending laterally therefrom, through the clutch opening, the tube slit, and beyond the said tube, a friction strip slidably received within the feed guide tube above the clutch in frictional engagement with the walls of said tube, an ear on the friction strip extending laterally therefrom, through the

tube slit and beyond said tube, a feed spiral overlying the feed tube consisting of a continuous band spirally wound to form a somewhat tubular structure having a helical path of the feed spiral being threaded around the first and second detents and the friction strip ear, friction means in the form of a serrate margin on the portion of the feed spiral band forming the upper wall of the helical path to engage the projecting detents and friction strip ear, and a cap member centrally bored to slidably receive the feed tube therethrough secured to the upper end of the feed spiral and the casing to prevent the said spiral from rotating within the said casing, and a stop member secured to the extending end of the feed tube above the cap member.

4. A self-feeding lead pencil comprising, a hollow casing tapered at its lower end, a centrally bored tip member slidably received within the tapered portion of the casing, a feed guide tube within the casing adjacent the tip member, a longitudinal slit in the wall of said tube, a hollow clutch member slidable within the tube and adapted to receive the end of a length of lead therein, a first detent attached to the clutch member and extending laterally therefrom through the tube slit and beyond the said tube, an elongated opening in the wall of the clutch, a lead ejector slidably carried within the clutch member, a second detent attached to the ejector and extending laterally therefrom, through the clutch opening, the tube slit and beyond the said tube, a friction strip slidably received within the feed guide tube above the clutch in frictional engagement with the walls of said tube, an ear on the friction strip extending laterally therefrom, through the tube slit, and beyond said tube, a feed spiral overlying the feed tube consisting of a continuous band spirally wound to form a somewhat tubular structure having a helical path between adjacent convolutions thereof, said helical path of the feed spiral being threaded around the first and second detents and the friction strip ear, friction means in the form of a serrate margin on the portion of the feed spiral band forming the upper wall of the helical path to engage the projecting detents and friction strip ear, a spirally formed guide slidably received within the helical path above the clutch and around the feed tube, and a cap member secured to the upper end of the feed spiral and the casing to prevent the said spiral from rotating within the said casing.

5. A self-feeding pencil according to claim 1, in which the friction strip consists of a flat strip of metal having a bow therein and said ear member being integral with said strip.

6. A self-feeding pencil according to claim 2, in which the individual teeth of the serrate margin are buttressed to resist upward movement of the first detent.

7. A self-feeding lead pencil comprising, a hollow casing tapered at its lower end, a centrally bored tip member slidably received within the tapered portion of the casing, an enlarged shoulder on the upper end of the tip member, a feed guide tube within the casing adjacent the tip member, a longitudinal slit in the wall of said tube, a hollow clutch member slidable within the tube and adapted to receive the end of a length of lead therein, a first detent attached to the clutch member and extending laterally therefrom through the tube slit and beyond the said tube, an elongated opening in the wall of the clutch, a lead ejector slidably carried within the clutch member, a second detent attached to the ejector and extending laterally therefrom, through the clutch opening, the tube slit, and beyond the said tube, a friction strip slidably received within the feed guide tube above the clutch in frictional engagement with the walls of said tube, an ear on the friction strip extending laterally therefrom, through the tube slit, and beyond said tube, a feed spiral overlying the feed tube consisting of a continuous band spirally wound to form a somewhat tubular structure having a helical path of the feed spiral being threaded around the first and second detents and the

friction strip ear, friction means in the form of a serrate margin on the portion of the feed spiral band forming the upper wall of the helical path to engage the projecting detents and friction strip ear, a spirally formed guide slidably received within the helical path above the clutch and around the feed tube, and a cap member centrally bored to slidably receive the feed tube therethrough secured to the upper end of the feed spiral and the casing to prevent the said spiral from rotating within the said casing and a stop member secured to the extending end of the feed tube above the cap member.

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