April 23, 1940. A. HAMMER-PURGSTALL 2,198,384

PROPELLING PENCIL WITH LEAD SHARPENING MEANS

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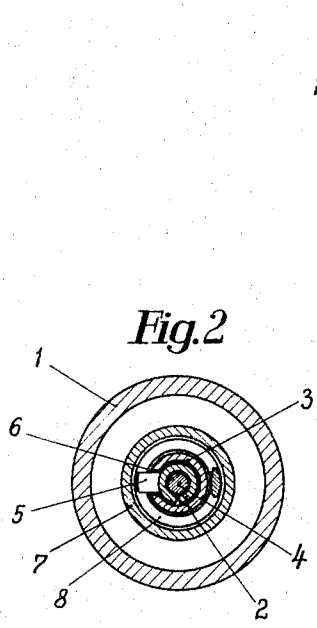


Fig.2

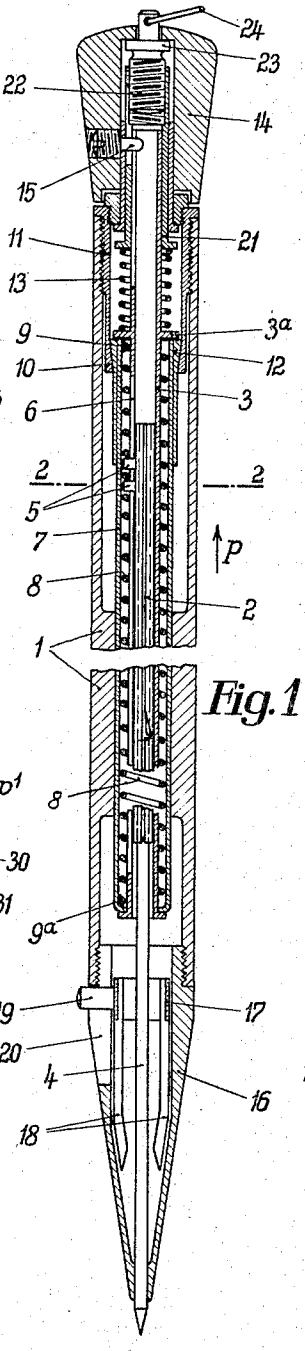


Fig.1

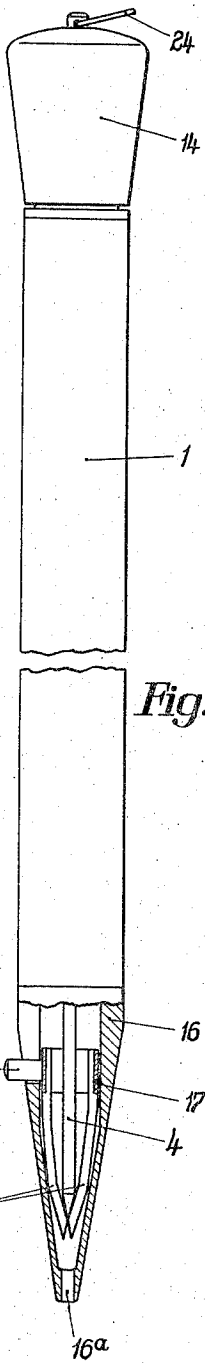


Fig.3

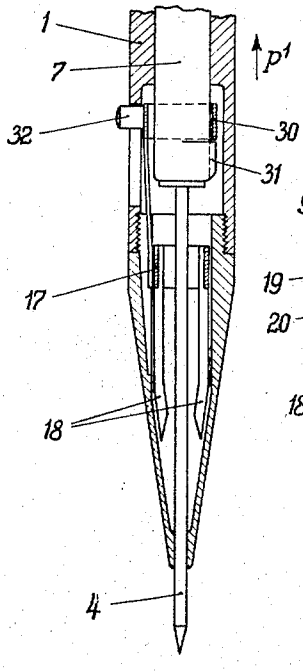


Fig.4

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PROPELLING PENCIL WITH LEAD SHARPENING MEANS

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13 Claims. (Cl. 120—15)

This invention relates to a propelling pencil which is provided in a known manner with a lead sharpening device which is capable of being brought into the operative position. This sharpening device which is suitably arranged in the tip of the propelling pencil enables the lead to be resharpened with the aid of the propelling device provided for feeding the lead forward, which propelling device is actuated, as usual, by means of a rotatable knob at the rear end of the pencil.

It has already been proposed in such arrangements to reduce the rate of forward feed of the lead during the sharpening operation to the amount which will enable a uniform removal of material during sharpening. The invention also relates to such an arrangement for regulating the forward feed during sharpening and applies to the type of propelling pencils having a lead carrier (insertion sleeve for the lead) which, when turned, is propelled forward by engaging in a feed member having a screw-like action (for instance a helical spring).

The essential feature characterizing the invention consists in this, that the feed member is held during writing by a friction coupling, the closing force of which is produced by a spring which during sharpening allows the coupling to be eased by the axial resistance of the sharpening blades (sharpening pressure) acting against the lead and consequently the lead to be turned without or with a greatly reduced forward feed, the spring at the same time itself determining the sharpening pressure.

Now, although through the spring which effects the frictional engagement of the coupling an automatic regulation of the forward feed of the lead during sharpening is provided, the regulating arrangement does not allow of any change (preadjustment) of the initial stressing of the spring, such as is of great advantage for compensating the fatigue of the spring, for adapting the sharpening pressure to the hardness of the leads used at any time and for altering if necessary the sharpening pressure to allow for the considerable increase in the sharpening resistance towards the end of the sharpening operation.

The invention also provides a remedy here, a further feature being that the spring which regulates the application pressure of the friction coupling is held between the movable part of the coupling and an adjustable member which allows of the length of the spring and consequently the initial stressing of the spring being altered.

The arrangement according to the invention permits of an extremely fine automatic regulation of the forward feed of the lead during sharpening, the pressure regulating spring which controls the frictional engagement and determines the magnitude of the closing force of the coupling enabling the sharpening pressure to be accurately adjusted.

Further features of the invention relate to constructional details of the aforesaid coupling or of individual members thereof, to the construction of an arrangement for adjusting the initial stressing of the spring and to an arrangement for securing the lead when the pencil is in normal use.

A constructional example of the propelling pencil according to the invention is illustrated in the accompanying drawing, in which

Fig. 1 shows a longitudinal section through the propelling pencil,

Fig. 2 a cross-section on line 2—2 of Fig. 1,

Fig. 3 the forward part of the propelling pencil (the tip) with the sharpening device in the operative position and

Fig. 4 a constructional example of an arrangement for holding the lead, while the propelling pencil is in normal use.

In the drawing 1 is the case of the propelling pencil, preferably made of an artificial pressed material or the like, which is provided with a central bore for the lead propelling arrangement of the usual construction. This arrangement consists substantially of the actual lead carrier 2 which is slidable in a long sleeve 3. The lead carrier 2 which is also sleeve-shaped and receives one end of the lead has near its rear end two pins 5 which extend through a longitudinal slot 6 of the sleeve 3 into the space between the sleeve 3 and the outer sleeve 7. In this space is disposed an element which acts in the manner of a thread, for instance a fairly strong helical spring 8, and is fixed at its ends to the outer sleeve, as indicated in the drawing at 9 and 9a and between the convolutions of which the pins provided on the lead carrier 2 engage. The sleeve 7 is held by frictional engagement with respect to the case 1. This frictional engagement is produced according to the invention by a cone coupling, one part, 10, of which is arranged on a bush 11 screwed into the casing and the other part, 12, of which is arranged on the sleeve 7. The application pressure between the parts 10 and 12 required for securing the sleeve 7, when the propelling pencil is in normal use, is produced by a helical spring 13 which, in the ex-

ample shown, embraces the long sleeve 3 and is gripped between a part of the rotatable knob 14 and a collar 3a on the sleeve 3. The collar 3a transmits the pressure of the spring 13 to the sleeve 7 and thereby to the coupling part 12.

The forward feed of the lead is effected in the usual manner by actuating the rotatable knob 14 provided at the rear end of the propelling pencil. The rotary motion of the knob 14 is transmitted by the pin 15 to the long sleeve 3, by the latter through the intermediary of the longitudinal slot 6 to the pins 5 of the lead carrier 2 and thereby to the lead carrier itself. During the rotary motion of the lead carrier 2 the pins 5 are moved along the convolutions of the helical spring 8, resulting in the lead carrier being displaced forwards and backwards in accordance with the sense of rotation of the knob 14.

In the forward, preferably unscrewable part 16 a sharpening device is contained, which in the illustrated example is formed by a plurality of sharpening blades 18 fixed to a ring 17. For enabling the sharpening device to be moved out of the inoperative position shown in Fig. 1 into the sharpening position shown in Fig. 3, the ring 17 is provided with a push knob 19 which is guided in a slot 20 of the part 16.

For sharpening the lead, the lead is first retracted from the writing position shown in Fig. 1 by suitably turning the knob 14, at least into the position shown in Fig. 3. Thereupon the sharpening device is brought into the operative position by actuating the push knob 19. The sharpening itself is effected by turning the knob 14 in the sense corresponding to the expulsion of the lead 4. The lead 4 will now find an axial resistance against the sharpening blades, which is transmitted by way of the lead or the pins 5 of the lead carrier 2 to the sleeve 7. When this axial resistance exceeds a certain amount which can be previously adjusted as hereinafter described, the continued rotation of the knob 14 will no longer cause the lead 4 to be advanced, but the sleeve 7 to be pushed back in the direction of the arrow *p*, stressing the helical spring 13 and at the same time easing the coupling 10, 12. The sleeve 7 and with it the lead carrier 2 and the lead 4 can then turn substantially in a stationary position, until, through a suitable amount of material being removed at the lead point, the axial resistance caused by the sharpening blades has again decreased to a corresponding amount. The strength of the spring 13 which in this case acts as a pressure regulating spring thus determines the amount of axial resistance allowed, that is to say the amount of the application pressure of the lead against the sharpening blades (the sharpening pressure).

After the sharpening operation has been completed, the sharpening device 17, 18 is returned into its position shown in Fig. 1 and the lead 4 is then pushed out through the opening 16a in the part 16.

In the constructional example shown in Fig. 1 the spring 13 is gripped, for the purpose to be explained later, between a collar 3a of the sleeve 3 and the flange of a bush 21 which is slidable on the sleeve 3. This bush which is provided with a longitudinal slot for the engagement of the coupling pin 15 is provided at its free end with an internal thread, in which a threaded spindle 22 engages, which is capable of turning freely in the rotatable knob 14. The threaded spindle which bears with the collar 23 against the rotatable knob carries outside the rotatable knob a member for the convenient actuation of the adjusting device formed by the bush 21 and the spindle, for instance a ring 24, a knurled head or the like. The screw engagement between the bush 21 and the spindle 22 may of course be arranged in the reverse way, namely in such a manner that an outer thread of the bush 21 coacts with the internal thread of a tubular extension of the spindle 22.

By turning the spindle 22 it is possible to adjust the distance between the seats of the spring 13 and thereby the initial stressing of the same. This makes it possible to compensate for the results of fatigue phenomena usually occurring in the case of springs and thus to ensure a proper action of the friction coupling, even after the propelling pencil has been in use for a long time. Furthermore, by a suitable alteration of the stressing of the spring it is possible to adapt the regulating arrangement to the hardness of the leads at any time in use. It has been found, that harder leads require a stronger application pressure of the coupling than softer leads. It is also possible by means of the adjusting arrangement according to the invention to make allowance for the varying sharpening resistance which occurs during the sharpening operation. Of particular importance is the circumstance that, owing to the possibility of the subsequent adjustment of the desired initial stressing of the spring, it becomes possible to use from the start shorter or harder springs, that is to say springs which have a considerably longer life.

In the propelling pencil according to the invention, as will be gathered from the preceding description, the guiding members for the lead carrier and consequently the latter itself together with the lead are supported resiliently in the propelling pencil in such a manner that, when too heavy a pressure is exerted during writing, the lead may be pushed back into the tip of the pencil. This may be inconvenient during writing Provision is therefore made, through a further modification of the propelling pencil for preventing the lead during the normal use of the propelling pencil, that is during writing, becoming displaced through too heavy pressure being exerted. According to the invention this is effected by locking means which are capable of being brought into operation and which act on the guiding members of the lead carrier, which are resiliently supported in the case, and fix the said guiding means with the lead carrier and the lead during writing. Such locking means are shown by way of example in Fig. 4. They consist of a ring 30 which is resiliently supported in the case and which acts against an abutment 31 on the forward end of the sleeve 7 and can be brought by a push knob 32 out of engagement with the abutment 31. When the locking ring 30 is in the position shown in Fig. 4, it secures the sleeve 7 in position, that is to say it prevents the sleeve which bears against the case through the intermediary of the pressure equalising spring 13 from becoming displaced in the sense of the arrow p^1 through the writing pressure on the lead.

While the lead is being sharpened, the locking means must be put out of operation, as the resilient support must be effective, as will be gathered from the description above. According to a further feature of the invention the locking means are therefore so arranged that they are controlled by the actuating members for bringing the sharpening device into the operative position, this control being such that the locking

means are operative when the sharpening device is out of operation and vice versa. In the constructional example shown in Fig. 4 the locking ring 30 is for this purpose connected resiliently with the supporting ring 17 of the sharpening blades 18, the actuating knob 32 for the locking means at the same time forming the push knob for moving the sharpening device into and out of the operative position. When the sharpening device is to be moved into the operative position, the locking means must first be released by depressing the knob 32. This releases the locking ring 30 from engagement with the abutment 31 of the sleeve 7. The knob 32 and with it the sharpening device 17, 18 can then be pushed forward into the sharpening position. When the sharpening operation has been completed, the knob 32 is pushed back again, until the locking ring 30 snaps in behind the abutment 31. The sharpening device will at the same time have been moved back into the inoperative position shown in Fig. 4.

I claim:

1. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling provided between the feed element and the pencil case, and a spring for determining the closing force of the friction coupling.

2. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a feed element constituted by a sleeve containing a helical spring capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling provided between the feed element and the pencil case, and a spring for determining the closing force of the friction coupling.

3. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier, for producing the forward feed of the lead carrier owing to its rotary motion, a cone friction coupling provided between the feed element and the pencil case and a spring for determining the closing force of the friction coupling.

4. A propelling pencil comprising a rotary knob, a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a pressure-regulating spring for determining the closing force of the said coupling, which spring is gripped between the feed element and the end surface of the rotary knob of the pencil.

5. A propelling pencil comprising a rotary knob, a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a pressure-regulating spring for determining the closing force of the said coupling, which spring is gripped between the movable coupling part and the end surface of the rotary knob of the pencil.

6. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be varied, the said spring being gripped between the feed element and the said adjustable member.

7. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be varied, the said spring being gripped between the movable coupling part and the said adjustable member.

8. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be varied, the said spring being gripped between the feed element and the said adjustable member, the adjustable member having the form of a bush which is capable of sliding in the case and of being actuated from the outside.

9. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be varied, the said spring being gripped between the movable coupling part and the said adjustable member, the adjustable member having the form of a bush which is capable of sliding in the case and of being actuated from the outside.

10. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be

varied, the said spring being gripped between the feed element and the said adjustable member, a spindle which is capable of being actuated from the outside and bears against the rotary knob and a screw drive provided between the adjustable member and the spindle.

11. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling disposed between the feed element and the pencil case, a spring for determining the closing force of the said coupling, an adjustable member which enables the initial stressing of the spring to be varied, the said spring being gripped between the movable coupling part and the said adjustable member, a spindle which is capable of being actuated from the outside and bears against the rotary knob and a screw drive provided between the adjustable member and the spindle.

12. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element cable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling provided between the feed element and the pencil case, a spring for determining the closing force of the friction coupling and locking means capable of being put into operation from the outside and of acting on the guiding means of the lead carrier, which is resiliently supported in the pencil case, and of fixing the said guiding means together with the lead carrier and the lead during writing.

13. A propelling pencil comprising a lead sharpening device capable of being brought into and out of the operative position, a displaceable lead carrier, a screw-thread-like feed element capable of coacting with the lead carrier for producing the forward feed of the lead carrier owing to its rotary motion, a friction coupling provided between the feed element and the pencil case, a spring for determining the closing force of the friction coupling, locking means capable of being put into operation from the outside and of acting on the guiding means of the lead carrier, which is resiliently supported in the pencil case, and of fixing the said guiding means together with the lead carrier and the lead during writing and means for enabling the locking means to be controlled in dependence on the actuating members for bringing the lead sharpening device into and out of the operative position.

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