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Proprietor: **Pilot Precision Kabushiki Kaisha, 1667, Tamura, Hiratsuka-shi Kanagawa-ken(JP)**

(72)

Inventor: **Watanabe, Hiroyuki, 5-13-26, Hiratsuka, Hiratsuka-Shi Kanagawa-Ken(JP)**

(74)

Representative: **Reichel, Wolfgang, Dipl.-Ing. et al, Reichel und Reichel Parkstrasse 13, D-6000 Frankfurt am Main 1(DE)**

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Description

This invention relates to writing or marking implements in general and, in particular, to a mechanical pencil featuring provisions for automatically propelling the lead, whenever the same is worn to a prescribed degree by writing by the same degree.

U.S. Patent 4,538,934 represents a typical prior art mechanical pencil with an automatic lead propelling capability. This known device comprises a tubular lead guide which has a friction member attached thereto for frictionally engaging the lead and which is sprung with respect to the pencil body toward its writing end, and a one-way locking mechanism for engaging the lead so as to permit its travel toward, and out of, the writing end with comparatively small resistance but to lock the lead against retraction into the body.

An objection to the noted prior art device is that it automatically expels the lead out whenever its tip is moved off the writing surface, regardless of the extent to which the lead has been worn by that time. Therefore, as the implement is repeatedly moved into and out of contact with the writing surface, the one-way locking mechanism can ruin the cylindrical surface of the lead by repeatedly engaging and disengaging the same and by engaging the same at different points thereon. With its surface so ruined, the lead becomes easy to retract into the body when subjected to writing pressure as the locking mechanism may fail to positively engage the ruined surface of the lead against such retraction.

The invention as claimed is intended to remedy the foregoing weaknesses of the prior art by providing an improved mechanical pencil capable of automatically propelling the lead just as required.

With this objective in view the invention provides a mechanical pencil of the type comprising substantially tubular body means having a writing end, a tubular lead guide which is received in the body means for axial displacement therein and which partly protrudes from the writing end thereof under the bias of a spring, the lead guide receiving a lead therein and being retractable relative to the body means in a direction away from the writing end thereof against the bias of the spring with the wear of the lead, a friction member mounted to the lead guide and engaging the lead so as to normally cause the lead to travel with the lead guide in the axial direction of the body means and to permit the lead to move axially relative to the lead guide when a force in excess of a prescribed degree is exerted on the lead, and chuck means mounted within the body means for gripping the lead against axial displacement relative to the body means in a direction away from the writing end thereof while permitting the lead to slide axially toward the writing end of the body means, characterized by comprising one-way locking means for permitting the lead guide to retract into the body means with the wear of the lead during writing and for locking the lead guide against displacement toward the writing end of the body means under the bias of the spring when the mechanical pencil is moved out of contact with a

writing surface, and unlocking means for causing the one-way locking means to permit the lead guide, as well as the lead being engaged by the friction member, to travel toward the writing end of the body means under the bias of the spring (6) when the lead is worn to a prescribed degree.

Among the advantages offered by the above summarized invention is that the one-way locking means engages the lead at the same point thereon until the lead wears to a preassigned degree, thereby avoiding the possibility of ruining its surface. Moreover, after the lead has been propelled a unit distance, the one-way locking means can firmly engage an unruined surface part of the lead.

Some preferable ways of carrying out the invention will now be described in detail with reference to the drawings which illustrate some specific embodiments, in which:-

Figure 1 is a fragmentary axial section through the mechanical pencil incorporating the novel concepts of the invention, with the tubular lead guide shown extending from the body,

Figure 2 is a cross section through the mechanical pencil, taken along the line II-II in FIG. 1,

Figure 3 is a view similar to Figure 1 except that the lead guide is shown retracted into the body,

Figure 4 is a fragmentary axial section through a slight modification of the mechanical pencil of Figure 1,

Figure 5 is a fragmentary axial section, partly in elevation, through another slight modification of the Figure 1 mechanical pencil,

Figure 6a is a fragmentary axial section through another preferred form of the mechanical pencil in accordance with the invention,

Figure 6b is a fragmentary axial section through that part of the Figure 6a device which is not shown in that figure,

Figures 7 and 8 are fragmentary sectional views also showing the Figure 6a mechanical pencil but in different states of operation,

Figure 9 is a fragmentary axial section through still another preferred form of the mechanical pencil in accordance with the invention,

Figure 10 is a fragmentary axial section through a slight modification of the Figure 9 embodiment,

Figure 11 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention, with the lead guide shown extended from the body,

Figure 12 is a view somewhat similar to Figure 11 except that the lead guide is shown retracted,

Figure 13 is a fragmentary axial section through a slight modification of the Figure 11 embodiment,

Figure 14 is a fragmentary axial section, partly in elevation, through a further preferred form of the mechanical pencil in accordance with the invention,

Figure 15 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention,

Figure 16 is a fragmentary axial section through a slight modification of the Figure 15 embodiment,

Figure 17 is a fragmentary axial section through a further preferred form of the mechanical pencil in

accordance with the invention, with the lead guide shown extended,

Figure 18 is a view somewhat similar to Figure 17 except that the lead guide is shown retracted,

Figure 19 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention,

Figure 20 is a fragmentary axial section through a slight modification of the Figure 19 embodiment,

Figure 21 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention, with the lead guide shown extended,

Figure 22 is an enlarged, fragmentary, axial section through the Figure 21 mechanical pencil, with the lead guide shown retracted,

Figure 23 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention,

Figure 24 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention,

Figure 25 is a fragmentary axial section through a further preferred form of the mechanical pencil in accordance with the invention, and

Figure 26 is a fragmentary axial section through a still further preferred form of the mechanical pencil in accordance with the invention.

The mechanical pencil of Figures 1-3 has a substantially tubular body 1 in which a tubular lead guide 2, capable of guiding a lead 3 therethrough, is concentrically mounted for axial sliding motion. The body 1 has a front or writing end, shown directed to the left in Figure 1, from which the lead guide 2 partly protrudes outwardly, as has been known heretofore. The lead guide 2 carries on its inner end, disposed within the body 1 and shown directed to the right in Figure 1, a friction shoe 4 of rubber or like elastic material for frictionally engaging the lead 3 as the latter extends into the lead guide.

Coaxially mounted within the rear part, away from the writing end, of the body 1 for axial sliding motion is a substantially tubular socket 5 having an internal taper 5G at or adjacent its forward end. The socket 5 is additionally configured to provide an intermediate shoulder 5A facing forwardly of the body 1, a rear shoulder 5B facing rearwardly, and a front shoulder 5D facing forwardly. A helical compression spring 6 extends between the intermediate shoulder 5A of the socket 5 and a collar 2A on the lead guide 2. The compression spring 6 normally holds the shoulder 2B of the lead guide 2 in abutment against the step 1A of the body 1, and the rear shoulder 5B of the socket 5 in abutment against the front end of a sheath 7 which is screwed into the rear end of the body 1 to form its top part.

A sleeve 2L, integrally and concentrically joined to the lead guide 2 via the shoulder 2B, is formed to include an annular inside surface 2C which tapers toward the rear end of the body 1, and an annular inside ridge 2D located rearwardly of the taper surface 2C.

As will be seen also from Figure 2, the socket 5 is formed to include a tubular forward extension 5E of

reduced outside diameter concentrically nested in the sleeve 2L and terminating in a flange 5C. A ball cage 8 in the form of a tube with a pair of flanges at both ends is concentrically interposed between sleeve 2L and socket extension 5E for axial sliding motion between the flange 5C of the socket extension 5E and the shoulder 5D of the socket 5. The ball cage 8 has a plurality of, three in this embodiment, holes 8A defined therein at constant circumferential spacings. Balls 9 are rotatably received one in each hole 8A. Normally, all these balls are wedged in between the taper surface 2C of the sleeve 2L and the socket extension 5E under the pressure of a compression spring 10 acting between the surface 2E of the lead guide shoulder 2B and the flanged front end of the ball cage 8. The balls 9 form parts of the one-way locking means constituting a feature of the invention.

The flange 8B at the rear end of the ball cage 8 is engageable with the inside ridge 2D of the sleeve 2L with a force that is greater than the rearward force of the compression spring 10 acting on the ball cage 8 but less than the forward force of the compression spring 6 acting on the sleeve 2L.

Concentrically disposed within the socket 5, a chuck 11 takes the form of a tube loosely surrounding the lead 3. The front end of the chuck 11 is enlarged and split axially to provide a plurality of gripping jaws 11C for frictionally gripping the lead 3. The gripping jaws 11C are self-biased outwardly. An annular groove or a series of depressions 11A formed in the outer surfaces of the gripping jaws 11C rotatably receive balls 12 which are also held against the internal taper 5G of the socket 5 under pressure from a compression spring 13 acting between a flange 11B on the rear end of the chuck 11 and an inside annular shoulder 5F of the socket 5. The force of the spring 13, biasing the chuck 11 rearwardly with respect to the socket 5, is less than that of the spring 6 biasing the lead guide 2 forwardly of the body 1. The internal taper 5G of the socket 5 decreases in diameter as it extends rearwardly.

Normally, or when the chuck 11 is fully retracted into the socket 5 under the force of the compression spring 13 as shown in Figure 1, the gripping jaws 11C are held closed as the balls 12 are captured between the jaws 11C and the socket taper 5G. The lead 3 is then positively locked against axial rearward displacement. However, since the socket taper 5G increases in diameter as it extends forwardly, the lead 3 is slidable forwardly through the gripping jaws 11C when forced in that direction. Further, when the chuck 11 is itself thrust forwardly of the socket 5 against the force of the compression spring 13 in a manner yet to be described, the gripping jaws 11C will spread apart under their own bias, permitting the free passage of the lead 3 axially therethrough.

At 14 in Figures 1 and 3 is seen a lead housing mounted within the sheath 7 for accommodating a suitable supply of leads, one of which is shown extending into the lead guide 2, as indicated at 3. The lead housing 14 has a tubular forward extension 14C of reduced diameter extending into the socket 5 and terminating in an enlargement 14B in engagement with the annular inside rim 5H of the socket. An ad-

ditional compression spring 15, having a force greater than that of the spring 6, acts between the annular inside shoulder 7A of the sheath 7 and the front end 14A of the lead housing 14. The spring 15 biases the lead housing 14 rearwardly with respect to the sheath 7, so that the front end enlargement 14B of the lead housing extension 14C is normally held against the inside rim 5H of the socket 5.

A friction band 16 of elastic material is wrapped around the enlargement 14B of the lead housing extension 14C against axial displacement. The friction band 16 makes frictional contact with the inside surface of the socket 5. Thus, upon depression of the lead housing 14 deeper into the sheath 7 against the force of the spring 15 for the delivery of a new lead into the lead guide 2, the socket 5 will travel forwardly in opposition to the bias of the spring 6 into abutment against the shoulder 1B of the body 1.

In operation, Figure 1 depicts the normal state of the mechanical pencil in use, with the lead 3 received in the lead guide 2 and with the tip of the lead disposed substantially flush with the tip of the lead guide. Not only the lead tip but also the lead guide tip is to be held against a desired surface for writing. However, while the lead 3 is locked against retraction by the one-way locking member 11 coacting with the taper socket 5, the lead guide 2 is retractable into the body 1 against the force of the spring 6 even though the balls 9 are caught between taper surface 2C and socket extension 5E. Therefore, with the wear of the lead 3 as a result of writing, the lead guide 2 will gradually retract into the body 1 against the bias of the compression spring 6.

It is an operational feature of the invention that before fully retracting to the Figure 3 position, the lead guide 2 is not to travel back to the Figure 1 position in the face of the forward bias of the compression spring 6 when the mechanical pencil is moved off the writing surface. This is because the balls 9 are wedged under the force of the compression spring 10 between socket extension 5E and taper surface 2C, the latter being formed on the sleeve 2L integral with the lead guide 2. During the lead guide retraction from its Figure 1 position to that of Figure 3, the balls 9 function to permit such retraction but to prevent the forward displacement of the lead guide.

As illustrated in Figure 3, the rear end flange 8B of the ball cage 8 will ride over the inside ridge 2D of the sleeve 2L against the force of the compression spring 10 immediately following the abutting engagement of the ball cage with the shoulder 5D of the socket 5. Thereupon the balls 9 will be released from between the socket extension 5E and the taper surface 2C. The lead 3 has now been worn to a predetermined degree.

If now the pencil is moved off the writing surface, the balls 9 will allow the lead guide 2 to travel forwardly under the bias of the compression spring 6. The ball cage 8 will also travel forwardly with the lead guide 2 as the ridge 2D of the sleeve 2L pushes the rear end flange 8B of the ball cage. Further, being caught by the friction shoe 4 on the rear end of the lead guide 2, the lead 3 will travel forwardly with the lead guide by sliding through the gripping

jaws 11C of the chuck 11. Thus the lead 3 is propelled by the same degree to which it has been worn as above stated. As the front end of the ball cage 8 subsequently comes into abutment against the flange 5C on the front end of the socket extension 5E, the rear end flange 8B of the ball cage will again ride over the ridge 2D back to the Figure 1 position.

When the lead 3 is used up by the repetition of the foregoing cycle, a new lead must be delivered from the lead housing 14 into the lead guide 2. Toward this end the lead housing 14 is depressed manually into the sheath 7 against the force of the compression spring 15. The forward thrust of the lead housing 14 will be transmitted via the friction band 16 to the socket 5 thereby causing the latter to travel forwardly against the force of the compression spring 6 until the socket comes to butt on the shoulder 1B of the body 1. With the continued depression of the lead housing 14, its forward extension 14C will come into end-to-end abutment against the chuck 11 and will thrust the same forwardly against the force of the compression spring 13. The jaws 11C at the front end of this chuck 11 will then spread apart under their own bias thereby permitting a new lead to fall from the lead housing 14 into the lead guide 2 under its own weight.

The manual pressure on the lead housing 14 may now be released. As the lead housing 14 travels back to its normal position under the bias of the compression spring 15, so will the socket 5 under the bias of the compression spring 6. The chuck 11 will also be sprung back to its normal position with respect to the socket 5 for gripping the new lead with its jaws 11C. Having thus regained the normal state represented by Figure 1, the mechanical pencil is now ready for writing.

As a possible modification of the Figures 1-3 embodiment, the ball cage 8 may have several slits extending forwardly from its rear end. Such slits will serve to impart resiliency to the rear end portion of the ball cage 8 as its flange 8B rides back and forth over the ridge 2D of the sleeve 2L.

Figure 4 shows another slight modification of the Figures 1-3 embodiment, in which the inside ridge 2D on the sleeve 2L and the rear end flange 8B of the ball cage 8 are both absent. There are provided, instead, an annular permanent magnet (or annular row of discrete permanent magnets) 17 disposed just rearwardly of the taper surface 9 on the inside surface of the sleeve 2L, and an annular piece of magnetizable material (or annular row of discrete pieces of magnetizable material) 18 on the rear end of the retainer 8. The attractive force of the permanent magnet or magnets 17 exerted on the magnetizable piece or pieces 18 should be greater than the force of the compression spring 10 so that the balls 9 may act to prevent, and permit, the forward displacement of the lead guide 2 as in the Figures 1-3 embodiment.

In another slight modification of the Figures 1-3 embodiment shown in Figure 5, the flange 8B on the rear end of the ball cage 8 makes frictional contact with a tubular lining 19 of elastic material disposed just rearwardly of the taper surface 2C and immovably attached to the inside surface of the sleeve

2L. The frictional force between flange 8B and elastic lining 19 should be slightly less than the force of the compression spring 10. This modified mechanical pencil can be identical in the other details of construction with the first disclosed embodiment.

In the use of the Figure 5 mechanical pencil the flange 8B on the ball cage 8 will slide forwardly over the elastic lining 19 upon abutting engagement of the ball cage with the shoulder 5D of the collet 5, with the consequent disengagement of the balls 9 from between the socket extension 5E and the taper surface 2C of the sleeve 2L. As the pencil is subsequently moved off the writing surface, the lead guide 2 will be sprung back to the illustrated normal position before the ball cage 8 moves rearwardly with respect to the lead guide under the bias of the compression spring 10. Being in frictional contact with the elastic lining 19, the retainer 8 will permit the balls 9 to be wedged in between taper surface 2C and socket extension 5E after the lead guide 2 has travelled back to its normal position.

It is to be noted in connection with the Figure 5 embodiment that the provision of the compression spring 10 is not a requirement. Even in the absence of this spring the balls 9 will perform the desired wedging action if the forward end portion of the ball cage 8 is urged toward the taper surface 2C by virtue of the frictional engagement of its flange 8B with the elastic lining 19. The balls 9 will further move into and out of frictional engagement between taper surface 2C and socket extension 5E with the bidirectional axial displacement of the ball cage 8 relative to the sleeve 2L.

Figures 6a, 6b, 7 and 8 illustrate another preferred embodiment of the invention. In this embodiment, as well as in all the other embodiments to be presented subsequently, parts corresponding to those of the Figures 1-3 embodiment will be identified by the same reference characters for the ease of understanding.

With reference to Figure 6a this alternative embodiment features a thrust member 20 which has a lead passageway 20J defined axially therethrough and which is coaxially disposed behind the chuck 11 within the sheath 7. The thrust member 20 is coupled to the sleeve 2L, and thence to the lead guide 2, via connective strips 2F extending rearwardly from the sleeve 2L through clearance holes 5J in the socket 5. Thus, with the axial displacement of the lead guide 2 relative to the body 1, the thrust member 20 is movable into and out of end-to-end abutment against the chuck 11. When the lead guide 2 is in its extreme forward position as in Figure 6a, the thrust member 20 pushes the chuck 11 forwardly against the force of the compression spring 13, only to such an extent that the gripping jaws 11C are slightly open.

This mechanical pencil also differs from that of Figures 1-3 in that the sheath 7 is itself formed to include a partition 7A forming the bottom of a lead housing 14 accommodating a supply of leads. The partition 7A has a funnel-shaped opening 7B in alignment with the lead passageway 20J in the thrust member 20. As seen in Figure 6b, the lead housing 14 has its rear end closed by an eraser 21, which in turn is enveloped by a cap 22 removably fitted over

the rear or top end of the sheath 7. The other details of construction can be as previously set forth in connection with the Figures 1-3 embodiment.

The present device is to be put to use in the state of Figure 6a. Both lead guide 2 and lead 3 will slightly retract into the body 1 against the bias of the compression spring 6 as the tip of the lead guide is pressed against the writing surface. Being coupled fast to the lead guide 2, the thrust member 20 will also retract out of abutting contact with the chuck 11, whereupon the latter will also retract under the bias of the compression spring 13, with the consequent gripping of the lead 3 by the gripping jaws 11C.

Figure 7 represents this state. By virtue of the wedging action of the balls 12 caught between the gripping jaws 11C and the internal taper 5G of the socket 5, the chuck 11 is now conditioned to firmly lock the lead against further retraction into the body 1 but to permit the lead to be propelled forwardly upon exertion of a relatively small force thereon. If the pencil is put to use in this state, the lead guide 3 as well as the sleeve 2L and thrust member 20 will gradually retract further into the body 1 with the wear of the lead 3. Both ball cage 8 and balls 9 will also retract with the lead guide 3 since these balls do not stick between socket extension 5E and taper surface 2C during such retraction of the lead guide 3.

Moreover, as in the Figures 1-3 embodiment, the lead guide 2 and the other parts coupled thereto will not travel forwardly of the body 1 despite the forward bias of the spring 6 when the pencil is moved off the writing surface. This is because the balls 9 become wedged in between taper surface 2C and socket extension 5E. Also, since the lead 3 is now engaged by the gripping jaws 11C against retraction, writing can be continued without any such difficulties as have been encountered heretofore.

As depicted in Figure 8, the ball cage 8 will come to butt on the shoulder 5D of the socket 5 when the lead 3 is worn to the prescribed degree. Thereupon the ball cage flange 8B will ride forwardly over the ridge 2D on the sleeve 2L, resulting in the disengagement of the balls 9 from between taper surface 2C and socket extension 5E. If now the pencil is moved off the writing surface, the balls 9 will remain disengaged from between taper surface 2C and socket extension 5E because the ball cage flange 8b remains engaged with the front side of the ridge 2D against the force of the spring 10. Consequently, the lead guide 2 as well as the thrust member 20 will travel forwardly of the body 1 under the bias of the spring 6. The lead 3, being frictionally engaged by the shoe 4 on the rear end of the lead guide 2, will also travel with the lead guide without being impeded by the wedging action of the balls 12.

Sprung forwardly with the lead guide 2, the thrust member 20 will come into abutment against the chuck 11 and thrust the same forwardly against the force of the spring 13. The gripping jaws 11C will then spread apart under their own bias to permit the free passage of the lead 3. With some more forward travel of the lead guide 2 with the thrust member 20, the ridge 2D on the sleeve 2L will force the ball cage 8 into abutment against the flange 5C on the front

end of the socket extension 5E whereupon the ball cage flange 8B will ride back over the ridge 2D. Finally, as illustrated in Figure 6a, the forward travel of the lead guide 3 will come to an end as its shoulder 2B comes to butt on the inside shoulder 1A of the body 1. The balls 9 will become re-engaged between taper surface 2C and socket extension 5E as the spring 10 urges the ball cage 8 rearwardly with respect to lead guide 3 and socket 5.

In Figure 9 is shown a further preferred embodiment of the invention which is equivalent to that of Figures 6a-8 in having the thrust member 20 coupled to the lead guide 3. In this embodiment, however, the socket extension 5E is externally tapered at 5K on its front end portion, with the taper surface decreasing in diameter as it extends rearwardly of the socket extension. The socket extension 5E also has an annular ridge 5L formed on its outer surface and spaced rearwardly from the taper surface 5K.

Interposed between sleeve 2L and socket extension 5E for rotatably carrying the balls 9 as in all the foregoing embodiments, the ball cage 8 has an inverted rim 8C on its rear end so as to ride back and forth over the ridge 5L on the socket extension 5E. The ball cage rim 8C normally lies forwardly of the ridge 5L. The rear end of the ball cage 8 is also arranged for movement into and out of abutting engagement with an annular inside rim 2G of the sleeve 2L. The compression spring 10 extends between the ball cage rim 8C and the socket shoulder 5A, biasing the ball cage 8 forwardly. Normally, therefore, the balls 9 are caught between the inside surface 2H of the sleeve 2L and the taper surface 5K of the socket extension 5E under the bias of the spring 10. The ball cage rim 8C and ridge 5L are capable of locking engagement with each other in opposition to the force of the spring 10 but are to disengage when the ball cage is acted upon by the spring 6 biasing the lead guide 2 forwardly of the body 1.

This Figure 9 mechanical pencil is analogous in operation with that of Figures 6a-8, with the lead guide 2 retreating into the body 1 with the wear of the lead 3 without being impeded by the balls 9. It will also be seen that the balls 9 function to prevent the lead guide 2 from being sprung forwardly when the pencil is moved off the writing surface during the progress of lead wear. The gripping jaws 11C are held closed under the force of the spring 13 during writing as in all the foregoing embodiments.

When the lead 3 is worn to the predetermined degree, the shoulder 2E of the lead guide 3 will push the ball cage 8 rearwardly until the ball cage rim 8C rides over the ridge 5L on the socket extension 5E. Despite the forward thrust of the spring 10, the ball cage rim 8C will remain in engagement with the rear side of the socket extension ridge 5L when the pencil is subsequently moved off the writing surface, thereby holding the balls 9 disengaged from between sleeve 2L and taper surface 5K. Accordingly, the lead guide 2 is free to travel back to the illustrated position with the lead 3 and thrust member 20 under the bias of the spring 6. During such return travel of the lead guide 2 the inside ridge 2G on the sleeve 2L will engage the rear end of the ball cage 8

for pushing the same back to the illustrated position by overriding the ridge 5L on the socket extension 5E.

Figure 10 shows a slight modification of the Figure 9 embodiment. The modification resides in a mouthpiece 23 of conical shape screw-threadedly attached to the front end of the body 1 and defining an axial hole 23A through which the lead guide 2 extends for axial displacement. Being removable from the body 1, the mouthpiece 23 permits the socket 5 and other parts of the pencil to be inserted in the body 2 through its front end.

As will be readily understood, the thrust member 20 used in some of the foregoing embodiments need not be coupled to the lead guide 2 via the connective strips 2F integral with the sleeve 2L. All these parts may be formed in one piece, or divided into discrete units, to conform to design preferences or assemblage conveniences without departing from the scope of the invention.

A further preferred embodiment of the invention shown in Figures 11 and 12 also has the mouthpiece 23 screwed to the front end of the body 1, with the lead guide 2 extending through its axial hole 23A. The lead guide 2 is biased forwardly of the body 1 by the spring 6 disposed the shoulder 5A of the socket 5 and the collar 2A on the sleeve 2L integral with the lead guide. The socket 5 has the internal taper 5G adjacent its front end. The sleeve 2L has the connective strips 2J extending rearwardly therefrom through clearance holes 5J in the socket 5 and secured to the thrust member 20.

Concentrically disposed within the socket 5 is the chuck 11 coacting with its internal taper 5G to firmly grip the lead 3 against rearward displacement but to permit its forward sliding motion, as in all the foregoing embodiments. Normally, the thrust member 20 is held endwise against the chuck 11, urging the latter forwardly with respect to the socket 5 against the force of the spring 13 so that the gripping jaws 11C are slightly open under their own bias.

The one-way locking means constituting a feature of the invention is provided between body 1 and thrust member 20 in this embodiment. Concentrically interposed between body 1 and thrust member 20, the ball cage 8 rotatably carrying the balls 9 takes the form of a tube having a pair of interned rims at its opposite ends. The ball cage 8 is capable of axial displacement between the rearwardly facing shoulder 1C of the body 1 and the front end of the sheath 7 screwed into the rear end of the body 1. The compression spring 10 extends between the shoulder 20B of the thrust member 20 and the front end rim of the ball cage 8 for biasing the ball cage rearwardly with a force less than that of the spring 6. With the ball cage 8 so sprung rearwardly, the balls 9 are normally captured between the inside surface 1D of the body 1 and an external taper 20A formed on the thrust member 20. The taper 20A increases in diameter as it extends rearwardly of the thrust member 20.

The thrust member 20 is further formed to include an annular ridge 20C disposed rearwardly of the taper 20A for engagement with the rear end rim 8C of the ball cage 8. The ball cage 8 has several parallel

slits extending forwardly from its rear end in order to impart radially inward self-bias to its rear end rim 8C. This self-bias is such that the ball cage rim 8C can positively engage the thrust member ridge 20C in opposition to the force of the spring 10 but will disengage the ridge 20C when the thrust member 20 is forced forwardly by the spring 6.

As this mechanical pencil is held against a desired writing surface with its various working parts in the state of Figure 11, the lead 3 will slightly retract against the force of the spring 6 with the lead guide 2 and thrust member 20. With the slight retraction of the thrust member 20 the chuck 11 will also retract under the bias of the spring 13, with the consequent engagement of its gripping jaws 11C in the socket taper 5G. Now the lead 3 is locked against any further retraction but is relatively free to travel forwardly. The pencil is to be put to marking in this state.

The lead guide 2 and thrust member 20 will gradually retract against the force of the spring 6 with the wear of the lead 3 as a result of writing. Such members are not to be sprung back by virtue of the wedging action of the balls 9 if the pencil is moved off the writing surface.

As the wear of the lead 3 proceeds, the ball cage 8 will come to butt on the front end of the sheath 7. Then, with some more wear of the lead 3, the annular ridge 20C on the thrust member 20 will travel rearwardly past the rear end rim 8C of the ball cage 8, and the balls 9 will be dislodged from between body 1 and thrust member taper 20A against the force of the spring 10, as illustrated in Figure 12. The rear end rim 8C of the ball cage 8 is capable of positive engagement with the thrust member ridge 20C against the force of the spring 10. Therefore, when the pencil is subsequently moved off the writing surface, the balls 9 will remain dislodged from between body 1 and thrust member taper 20A thereby permitting the lead guide 2 to be propelled forwardly with the lead 3 under the bias of the spring 6.

Travelling forwardly with the thrust member 20, the ball cage 8 will then come into abutment against the internal shoulder 1C of the body 1. The ball cage rim 8C will then disengage the thrust member rim 20C and ride rearwardly thereafter as the thrust member 20 is further forced forwardly to the Figure 1 position by the spring 6.

In a slight modification of the Figures 11 and 12 embodiment shown in Figure 13, the flange portion 5M of the socket 5 is capable of axial displacement between a pair of opposed inside shoulders 1E and 1F of the body 1. There is additionally employed in this mechanical pencil a helical compression spring 24 mounted between the flange portion 5M of the socket 5 and the shoulder 1F of the body 1. The spring 24 biases the socket 5 forwardly with respect to the body 1 with a force greater than the resultant of the force of the spring 6 and the normal manual pressure to be exerted on the pencil during writing.

The lead guide 2 of the Figure 13 device can be returned to the illustrated normal position regardless of the extent to which the lead 3 has been worn. To this end a pressure in excess of the normal writing pressure is exerted on the tip of the lead guide 2

thereby retracting the same, as well as the socket 5, ball cage 8 and thrust member 20, further into the body 1 against the forces of the springs 6 and 24 until, with the ball cage rim 8C held against the front end of the sheath 7, the thrust member ridge 20C travels rearwardly past the ball cage rim 8C. Thereupon the balls 9 will become dislodged from between body 1 and thrust member taper 20A thereby permitting the lead guide 2 and other parts to be sprung back to their Figure 13 positions.

A further embodiment of the invention shown in Figure 14 is also akin to the Figures 11 and 12 embodiment in that the one-way locking means is provided between body 1 and thrust member 20. The body 1 is formed to include an annular inside ridge 1G providing a taper surface 1H increasing in diameter as it extends rearwardly, and a smaller annular inside ridge 1J spaced rearwardly from the taper surface 1H. Rotatably carrying the balls 9, the tubular ball cage 8 having a pair of flanges on its opposite ends is concentrically mounted between body 1 and thrust member 20 for axial displacement between a pair of opposed shoulders 20D and 20E of the thrust member. The spring 10 extends between the front end of the sheath 7 and the rear end flange 8B of the ball cage 8, normally biasing the balls 9 into frictional engagement between the taper surface 1H of the body 1 and the outer surface of the thrust member 20.

As has been set forth in connection with Figure 5, however, the provision of the spring 10 is not essential. Alternatively, the ball cage 8 may be held in frictional contact with the body 1 as via a lining of elastic material secured to the inside surface of the body.

Normally, the ball cage flange 8B lies forwardly of the body ridge 1J. With the axial displacement of the thrust member 20 relative to the body 1, the ball cage flange 8B will positively engage the body ridge 1J in opposition to the force of the spring 10 but will disengage the same when the thrust member 20 is thrust forwardly under the force of the spring 6, not shown in Figure 14. The other details of construction can be similar to those of the Figures 11 and 12 embodiment. The operation of this Figure 14 mechanical pencil is also believed to be self-evident from the foregoing operational description of the Figures 11 and 12 embodiment.

A further preferred embodiment of Figure 15 is analogous with that of Figures 6a-8 but differs therefrom in that the one-way locking means is provided between the body 1 and the sleeve 2L integral with the lead guide 2. Thus the sleeve 2L is formed to include an external annular taper surface 2C, increasing in diameter as it extends axially rearwardly of the sleeve, and an external annular ridge 2D spaced rearwardly from the taper surface. In the shape of a tube having a pair of intumed rims at its opposite ends, the ball cage 8 is concentrically mounted between body 1 and sleeve 2L for axial displacement between the inside shoulder 1K of the body 1 and the front end 5A of the flange portion of the socket 5. The spring 10 acts between the collar 2A of the sleeve 2L and the front end rim of the ball cage 8, normally biasing the balls 9 into frictional engagement between the taper surface 2C of the

sleeve 2L and the inside surface 1J of the body 1. The spring 6 extends between the inside surface 2E of the lead guide shoulder 2B and the front end of the socket 5 for urging the lead guide 2 forwardly with respect to the body 1. The other details of construction can be as set forth in connection with the Figures 6a-8 embodiment.

In this Figure 15 embodiment, too, the rear end rim 8C of the ball cage 8 can positively engage the sleeve rim 2C in opposition to the force of the spring 10 but will disengage the sleeve rim when the lead guide 2 is forced forwardly by the spring 6. It is therefore apparent that the one-way locking means of this embodiment operates as in all the previously disclosed embodiments.

A further preferred embodiment of Figure 16 is equivalent to that of Figure 15 in that the one-way locking means is provided between body 1 and sleeve 2L. However, in this Figure 16 embodiment, the body 1 has an annular taper surface 1H and annular ridge 1L formed on its inside surface. The taper surface 1H increases in diameter as it extends rearwardly of the body 1, and the ridge 1L is spaced forwardly from the taper surface 1H for selective engagement with the front end flange 8A of the ball cage 8. The compression spring 10 extends between the rear end flange 8B of the ball cage 8 and the shoulder 5A of the socket 5, normally holding the balls 9 in frictional engagement between the outside surface 2J of the sleeve 2L and the taper surface 1H of the body 1. The other details of construction are identical with those of the Figure 15 embodiment, and the method of operation is believed to be apparent from the foregoing description.

In a further preferred embodiment of the invention shown in Figures 17 and 18, a different type of one-way locking means is provided between body 1 and thrust member 20. The thrust member 20 is formed to include a rearward extension 20F of tubular shape having a plurality of parallel slits extending forwardly from its rear end. These slits are intended to permit at least the rear end portion of the thrust member extension 20F to be resiliently constricted as shown in Figure 18. Formed on the outside surface of the thrust member extension 20F is an annular ridge 20G which tapers toward the rear end of the thrust member extension and which forms a part of the one-way locking means of this embodiment.

Concentrically surrounding at least part of the thrust member extension 20F is a lining 25 of rubber or like elastic material immovably attached to the inside surface of the body 1. Normally, as illustrated in Figure 17, the taper ridge 20G on the thrust member extension 20F is frictionally held against, or at least partly buried in, the elastic lining 25. Thus, by reason of the tapering shape of the ridge 20G, the thrust member 20 is normally firmly locked against forward displacement with respect to the elastic lining 25 but is relatively free to travel rearwardly in sliding contact therewith.

An unlocking member 26 is disposed rearwardly of the elastic lining 25 for axial displacement between the rear end of the elastic lining and the returned rim 7A of the sheath 7. Generally in the

shape of a short tube or ring, the unlocking member 26 has an internal taper 26A which decreases in diameter toward the rear end of the unlocking member.

The Figures 17 and 18 mechanical pencil is substantially identical in the other details of construction with that of Figures 6a-8. It will be observed from comparison of Figures 6a and 17 that the one-way locking means of the Figures 17 and 18 has no spring equivalent the spring 10.

In operation the lead guide 2 as well as the sleeve 2L and thrust member 20 will gradually retract from their Figure 17 toward their Figure 18 positions against the force of the spring 6 with the wear of the lead 3. During such retraction of the thrust member 20 the taper ridge 20G on the thrust member extension 20F will travel in sliding contact with the elastic lining 25. When the pencil is moved off the writing surface, the taper ridge 20G will become firmly embedded in the elastic lining 25 thereby preventing the lead guide 2 from being sprung back to the Figure 17 position.

As illustrated in Figure 18, the thrust member extension 20F will have its rear end portion become engaged in the internal taper 26A of the unlocking member 26 when the lead 3 is worn to a predetermined degree. Being slitted longitudinally, the thrust member extension 20F will then be reduced in diameter to such an extent as to result in the disengagement of the taper ridge 20G from the elastic lining 25. The thrust member 20 will travel forwardly with the lead guide 2 under the force of the spring 6 upon subsequent movement of this implement out of contact with the marking surface. The lead 3 will also travel forwardly in frictional engagement with the friction member 4 on the rear end of the lead guide 2.

Toward the end of its forward stroke the thrust member 20 will butt on the chuck 11 and thrust the same forwardly against the force of the spring 13 thereby opening the gripping jaws 11C of the chuck under their own bias. The unlocking member 26, which has been engaged with the thrust member extension 20F, will butt on the elastic lining 25 when the lead guide 2 returns to the Figure 17 position. The thrust member extension 20F will then become disengaged from the unlocking member 26, and its slitted rear end portion will expand under its own bias, with the consequent re-engagement of the taper ridge 20G in the elastic lining 25 as in Figure 17.

The one-way locking means of Figures 17 and 18 is modifiable as shown in Figure 19, in which the inside surface of the body 1 is knurled to provide a series of small annular ridges or beads 1M in substitution for the elastic lining 25 of Figures 17 and 18. Preferably, and as shown, the annular beads 1M are of saw-toothed axial section, with the front slope of each tooth being less steep than the rear slope. The taper ridge 20G is formed on the slitted rearward extension 20F of the thrust member 20 for engagement with the saw-toothed beads 1M. The other details of construction can be identical with those of the Figures 17 and 18 embodiment.

Figure 20 shows another similar modification of the one-way locking means of Figures 17 and 18. In this modification the series of saw-toothed annular

beads are formed on the slitted rearward extension 20F of the thrust member 20, as indicated at 20H, for engagement with a taper ridge 1N formed on the inside surface of the body 1. The taper ridge 1N tapers rearwardly of the body 1. The other details of construction can be similar to those of the Figures 17 and 18 embodiment.

In the various embodiments shown in Figures 17-20 the assembly of lead guide 2, sleeve 2L and thrust member 20 could be of one-piece construction or could be composed of a greater number of discrete units joined together, as in the embodiments of Figures 6a-16. Also, the taper ridge or the set of saw-toothed beads shown formed on the thrust member extension 20F in the Figures 17-20 embodiments could be formed on a rearward extension of the sleeve 2L within the scope of the invention.

Figures 21 and 22 are illustrations of a further preferred embodiment of the invention, in which a substantially tubular sleeve 30, having a slightly different shape from that of the sleeve 2L of the foregoing embodiments, is rigidly affixed to the lead guide 2 in coaxial relation thereto for axial displacement within the body 1. The friction member 4 is mounted fast to this sleeve 30, instead of to the lead guide as in all the preceding embodiments, but its functions are unchanged.

The one-way locking means of this embodiment includes a taper member 31 in the form of a short tube or ring having an internal taper surface 31A and immovably mounted within the body 1 so as to concentrically surround the sleeve 30. The taper surface 31A decreases in diameter as it extends forwardly of the taper member 31A. Rotatably carrying the balls 9, the tubular ball cage 8 is concentrically disposed between sleeve 30 and taper member 31. The ball cage 8 is axially displaceable relative to the sleeve 30 between a pair of flanges 30A and 30B on its opposite ends, so that these flanges serve as abutments or limit stops for limiting the axial displacement of the ball cage relative to the sleeve.

Additionally incorporated in the one-way locking means of this embodiment is a ball cage retarder 32 herein shown as a short tube of hard rubber or like more or less elastic material. The ball cage retarder 32 is rigidly mounted within the taper member 31 and has an inturned rim 32A in frictional contact with a rear end portion of the ball cage 8. A ball pusher 34 in the form of a flanged tube is loosely fitted over the sleeve 30 and is disposed rearwardly of the balls 9. A helical compression spring 35 extends between the ball pusher 34 and the rear end flange 30C of the sleeve 30 for biasing the balls 9 forwardly via the ball pusher. Normally, therefore, the balls 9 are caught between the outer surface 30B of the sleeve 30 and the taper surface 31A of the member 31 under the bias of the spring 35.

The spring 6 extends between the taper member 31 and the front end flange 30A of the sleeve 30 for biasing the lead guide 2 forwardly of the body 1. The noted ball cage retarder 32 can frictionally retain the ball cage 8 against axial displacement in opposition to the forward force of the spring 35 but will yield to permit the ball cage to slide forwardly there-

past when the force of the spring 6 acts on the ball cage via the rear end flange 30C of the sleeve 30.

The Figures 21 and 22 mechanical pencil additionally incorporates, of course, the lead-chucking means comprising the socket 5, chuck 11 with the gripping jaws 11C, balls 12, spring 13, etc. It will be seen by referring back to Figure 1 that the arrangement of these and other parts of the Figures 21 and 22 embodiment is essentially akin to that of the corresponding parts of the first disclosed embodiment.

In this embodiment, too, the lead guide 2 as well as the sleeve 30 attached thereto retracts against the force of the spring 6 with the wear of the lead 3 as a result of marking. The lead guide 2 is not to be sprung back if the pencil is moved off the writing surface, because the balls 9 are firmly captured between sleeve surface 30B and taper surface 31A under the force of the spring 35 against such forward displacement of the lead guide 2, and in the face of the possible lateral displacement or oscillations of the sleeve 30.

As pictured in Figure 22, the sleeve flange 30A on the retracting lead guide 2 will come into abutment against the ball cage 8 and will move the balls 9 out of engagement between sleeve surface 30B and taper surface 31A in opposition to the resultant of the force of the spring 35 and the frictional force of the friction member 32 in contact with the ball cage. So displaced rearwardly of the taper surface 31A, the balls 9 will permit the lead guide 2 to return to the Figure 21 position under the bias of the spring 6 when the pencil is moved off the writing surface.

It is to be appreciated in connection with this embodiment that although the lead guide 2 is sprung back to the Figure 21 position immediately when the pencil is moved off the writing surface as above stated, the balls 9 do not immediately become re-engaged between sleeve surface 30B and taper surface 31A under the force of the spring 35. This is because the ball cage retarder 32 acts to retard the forward displacement of the ball cage 8 against the force of the spring 35. Immediately before the lead guide 2 returns to the Figure 21 position, the rear end flange 30C of the sleeve 30 will come into abutment against the rear end of the ball cage 8 and will thrust the ball cage forwardly against the frictional force of the ball cage retarder 32. Thus the balls 9 will become captured between sleeve surface 30B and taper surface 31A approximately concurrently with the return of the lead guide 2 to the Figure 21 position.

When the lead 3 is used up by the repetition of the foregoing cycle of operation, a new lead may be supplied from the lead housing 14 into the lead guide 2, as has been explained in connection with the Figures 1-3 embodiment.

Figure 23 shows only those parts of a modification of the Figures 21 and 22 embodiment which are more or less directly associated with the one-way locking means, it being understood that this Figure 23 embodiment is similar in the other details of construction to that of Figures 21 and 22. The sleeve 30 rigidly joined to the lead guide 2 is formed to include an annular ridge 30D on its outer surface. The ridge 30D provides a taper surface 30E decreasing in di-

ameter as it extends forwardly of the sleeve 30. Concentrically and loosely surrounding the sleeve 30 is the tubular ball cage 8 rotatably carrying the balls 9. A tubular ball cage retarder 36 of rubber or like elastic material is rigidly mounted on the sleeve 30 and is disposed just rearwardly of the taper ridge 30D. A flange 36A of the ball cage retarder 36 makes frictional contact with the inside surface of the ball cage 8.

Immovably mounted within the body 1 in coaxial relation thereto is a tubular member 39 having an inside surface 39C for contact with the balls 9. The tubular member 39 has a pair of intumed rims 39A and 39B on its opposite ends. The spring 6 extends between the front end rim 39A of the tubular member 39 and the flange 30A of the sleeve 30 for biasing the lead guide 2 forwardly with respect to the body 1. Another helical compression spring 38, equivalent to the spring 35 of the Figures 21 and 22 embodiment, acts between the tubular member rim 39A and a tubular ball pusher 37, equivalent to the ball pusher 34 of the Figures 21 and 22 embodiment, for normally urging the balls 9 into engagement between the taper surface 30E of the sleeve 30 and the inside surface 39C of the tubular member 39.

It will be apparent that the one-way locking means of this Figure 23 embodiment is also effective to prevent the lead guide 2 from being sprung back to its initial position during the progress of the wear of the lead 3 to a preassigned degree. The ball cage 8 will come into abutment against the rear end flange 39B of the tubular member 39 when the lead 3 is worn to the preassigned degree, with the consequent dislodgement of the balls 9 from between taper ridge 30D and tubular member 39 against the resultant of the force of the spring 38 and the frictional force of the ball cage retarder 36 acting on the ball cage 8.

As in the preceding embodiment, the ball cage retarder 36 functions to frictionally retard the re-engagement of the balls 9 between taper ridge 30D and tubular member 39 against the force of the spring 38 as the lead guide 2 starts travelling toward the illustrated normal position under the force of the spring 6. The balls 9 will be re-engaged between the two members only after the ball cage 8 has come to butt on the front end rim 39A of the tubular member 39 during the return stroke of the lead guide 2, because then the ball cage retarder 36 will slide over the ball cage 8 under the force of the spring 6.

Figure 24 shows a slight modification of the Figures 21 and 22 embodiment, in which modification a tubular ball cage retarder 40 of elastic material is firmly sleeved upon the ball cage 8. The ball cage retarder 40 has a flange 40A frictionally held against the inside surface 31B of a tubular rearward extension 31C of the taper member 31. The other details of construction can be as previously set forth in connection with the Figures 21 and 22 embodiment.

In another slight modification of the Figures 21 and 22 embodiment shown in Figure 25, a tubular ball cage retarder 41 is immovably secured to the inside surface of the body 1, instead of to the taper member extension as in the Figures 21 and 22 embodi-

ment. An intumed rim 41A of the ball cage retarder 41 is in frictional engagement with the ball cage 8. This embodiment can also be identical in other details of construction with the Figures 21 and 22 embodiment.

Regardless of the part to which they are affixed, the ball cage retarders 32, 36, 40 and 41 of Figures 21-25 perform the same function of retarding the ball cage 8 so as to assure the complete return of the lead guide to its normal position after the lead has been worn to the prescribed degree. It will also be apparent in connection with the Figures 21 and 25 embodiments that the taper member and the sleeve could be formed integral with the body and the lead guide, respectively.

Figure 26 illustrates a still further preferred embodiment which represents an adaptation of the one-way locking means of the invention to a mechanical pencil of the type such that when one lead is used up, another is automatically fed into the lead guide. The lead guide 2 having the friction member 4 and formed integral with the sleeve 2L is concentrically mounted in the body 1, complete with the mouthpiece 23, for axial displacement. The lead guide 2 is biased forwardly of the body 1 by the spring 6 acting between the shoulder 5A of the taper socket 5 and the collar 2A on the sleeve 2L, with the result that the collar 2A is normally held against the inside shoulder 23A of the mouthpiece 23. The sleeve 2L is rigidly coupled to the thrust member 20 via connective strips 2B loosely extending through holes 5B in the taper socket 5.

Coaxially disposed within the taper socket 5 is the chuck 11 having the gripping jaws 11C with the balls 9 rotatably mounted thereon for rolling engagement with the internal taper of the socket 5. The spring 13 acts between the internal shoulder 5C of the taper socket 5 and the shoulder 11A of the chuck 11, biasing the chuck balls 9 toward engagement with the internal taper of the socket. Normally, however, the tubular forward extension 44 of the thrust member 20 acts on the gripping jaws 11C at 11B thereby opening the jaws against their own bias.

The one-way locking means in accordance with the invention is disposed in a rear part of the body 1. It comprises the ball cage 8 with the balls 9, taper member 31, ball cage retarder 32, ball pusher 34 and the spring 35. The arrangement of these parts is essentially equivalent to that of the corresponding parts of the Figures 21 and 22 embodiment, except that the one-way locking means of the Figure 26 embodiment is provided between body 1 and the tubular rearward extension of the thrust member 20 whereas the one-way locking means of the Figures 21 and 22 embodiment is provided between the body 1 and the sleeve 30 coupled to the lead guide 2.

When the Figure 26 mechanical pencil, with its various working parts in the depicted state, is first pressed against a desired writing surface, the lead guide 2 will slightly retract into the body 1 against the force of the spring 6. With such retraction of the lead guide 2 the forward extension 44 of the thrust member 20 will disengage the gripping jaws 11C thereby permitting the chuck 11 to be displaced rearwardly under the force of the spring 6. Thus the

gripping jaws 11C will close for firmly gripping the lead 3 against rearward displacement as the balls 12 roll over the internal taper of the socket 5. The pencil is to be put to writing with its working parts in this state. The one-way locking means functions as in all the foregoing embodiments to assure the gradual retraction of the lead guide 2 with the wear of the lead 3.

When the lead 3 is worn to a predetermined degree, the shoulder 20A of the thrust member 20 will come to butt on the front end of the ball cage 8 whereupon the balls 9 will become dislodged from between the thrust member 20 and the internal taper 31A of the taper member 31 as in the Figures 21 and 22 embodiment. Consequently, urged by the spring 6, the lead guide 2 will travel back to the illustrated position together with the lead 3 in engagement with the friction member 4. As has been stated, the gripping jaws 11C are opened by the thrust member extension 44 when the lead guide 2 is in its normal position. If then the lead 3 in use has been so worn that its rear end is located forwardly of the gripping jaws 11C, another lead will fall under its own weight from the lead housing 14 into and through the chuck 11 into end-to-end abutment against the worn lead. This new lead will be automatically used for writing when the old lead is used up.

Claims

1. A mechanical pencil with an automatically propelled lead, comprising substantially tubular body means (1, 7, 23) having a writing end, a tubular lead guide (2) which is received in the body means for axial displacement therein and which partly protrudes from the writing end thereof under the bias of a spring (6), the lead guide receiving a lead (3) therein and being retractable relative to the body means in a direction away from the writing end thereof against the bias of the spring with the wear of the lead, a friction member (4) mounted to the lead guide and engaging the lead so as to normally cause the lead to travel with the lead guide in the axial direction of the body means and to permit the lead to move axially relative to the lead guide when a force in excess of a prescribed degree is exerted on the lead, and chuck means (5, 11, 12, 13) mounted within the body means for gripping the lead against axial displacement relative to the body means in a direction away from the writing end thereof while permitting the lead to slide axially toward the writing end of the body means, characterized by comprising one-way locking means (9, 2C; 9, 5K; 9, 20A; 9, 1H; 20G, 25; 1M, 20G; 1N, 20H; 9, 31A; 9, 30E) for permitting the lead guide (2) to retract into the body means (1, 7, 23) with the wear of the lead (3) during writing and for locking the lead guide against displacement toward the writing end of the body means under the bias of the spring (6) when the mechanical pencil is moved out of contact with a writing surface, and unlocking means (2D, 8B; 17, 18; 8B, 19; 5L, 8C; 8C, 20C; 8B, 1J; 8C, 2D; 20F, 26; 8, 30A; 8, 39B; 8, 30A; 8, 20A) for causing the one-way locking means to permit the lead guide, as well as the lead being engaged by the friction member (4), to travel

toward the writing end of the body means under the bias of the spring (6) when the lead is worn to a prescribed degree.

2. A mechanical pencil as claimed in claim 1, wherein the chuck means includes a taper socket (5) immovably mounted within the body means (1, 7, 23), characterized in that the one-way locking means comprises an annular internal taper surface (2C) formed on a sleeve (2L) which is formed substantially integral with the lead guide (2) and which is coaxially mounted within the body means, the taper surface (2C) decreasing in diameter as it extends away from the writing end of the body means, a tubular extension (5E) extending from the taper socket (5) of the chuck means and disposed concentrically inwardly of the taper surface (2C), and a plurality of balls (9) normally caught between the taper surface (2C) and the extension (5E).

3. A mechanical pencil as claimed in claim 2, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the taper surface (2C) and the extension (5E) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (2C) and the extension (5E) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (2C) and the extension (5E).

4. A mechanical pencil as claimed in claim 3, characterized in that the unlocking means comprises stop means (5D) formed in fixed relation to the body means (1, 7, 23) so as to be abutted upon by the ball cage (8) upon retraction of the lead guide (2) to a prescribed degree, the ball cage upon abutment against the stop means being effective to disengage the balls (9) from between the taper surface (2C) and the extension (5E) against the bias of the second spring (10) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the first recited spring (6), and retarder means (2D, 8B; 17, 18; 19) for holding the balls disengaged from between the taper surface (2C) and the extension (5E) against the bias of the second spring (10) during the return of the lead guide toward the writing end of the body means.

5. A mechanical pencil as claimed in claim 4, characterized in that the stop means is a shoulder (5D) formed on the taper socket (5) of the chuck means.

6. A mechanical pencil as claimed in claim 4, characterized in that the retarder means comprises a permanent magnet (17) attached to either of the sleeve (2L) and the ball cage (8), and a piece (18) of magnetizable material attached to the other of the sleeve and the ball cage.

7. A mechanical pencil as claimed in claim 4, characterized in that the retarder means comprises a lining (19) of elastic material attached the inside surface of the sleeve (2L), the ball cage being in frictional engagement with the lining.

8. A mechanical pencil as claimed in claim 1, wherein the chuck means includes a taper socket (5) immovably mounted within the body means (1, 7, 23), characterized in that the one-way locking

means comprises an annular external taper surface (5K) formed on a tubular extension (5E) extending from the taper socket (5) of the chuck means in coaxial relation to the body means, the taper surface (5K) decreasing in diameter as it extends away from the writing end of the body means, a sleeve (2L) formed substantially integral with the lead guide (2) and coaxially disposed between the body means and the tubular extension of the taper socket, and a plurality of balls (9) normally caught between the taper surface (5K) and the sleeve (2L).

9. A mechanical pencil as claimed in claim 8, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the taper surface (5K) and the sleeve (2L) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (5K) and the sleeve (2L) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (5K) and the sleeve (2L).

10. A mechanical pencil as claimed in claim 9, characterized in that the unlocking means comprises a shoulder (2E) formed on the lead guide (2) for pushing the ball cage (8) in a direction away from the writing end of the body means (1, 7, 23) upon retraction of the lead guide (2) to a prescribed degree, the ball cage when pushed by the shoulder (2E) being effective to disengage the balls (9) from between the taper surface (5K) and the sleeve (2L) against the bias of the second spring (10) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the first recited spring (6), and retarder means (5L, 8C) for holding the balls disengaged from between the taper surface (5K) and the sleeve (2L) against the bias of the second spring (10) during the return of the lead guide toward the writing end of the body means.

11. A mechanical pencil as claimed in claim 10, wherein the retarder means comprises an annular ridge (5L) formed on the tubular extension (5E) of the taper socket (5), and an intumed rim (8C) formed on the ball cage (8) for positive engagement with the annular ridge (5L) upon retraction of the lead guide (2) to the prescribed degree.

12. A mechanical pencil as claimed in claim 1, wherein a thrust member (20) is disposed within the body means (1, 7, 23) and rigidly coupled to the lead guide (2) for opening and closing the chuck means (5, 11, 12, 13) with the displacement of the lead guide relative to the body means, characterized in that the one-way locking means comprises an annular external taper surface (20A) formed on the thrust member (20) in coaxial relation to the body means, the taper surface (20A) decreasing in diameter as it extends toward the writing end of the body means, and a plurality of balls (9) normally caught between the taper surface (20A) and a cylindrical inside surface (1D) of the body means.

13. A mechanical pencil as claimed in claim 12, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the taper surface (20A) and the cylindrical surface (1D) and rotatably carrying

the balls (9), the ball cage being axially displaceable relative to the taper surface (20A) and the cylindrical surface (1D) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (20A) and the cylindrical surface (1D).

14. A mechanical pencil as claimed in claim 13, characterized in that the unlocking means comprises stop means (7) formed in fixed relation to the body means (1, 7, 23) so as to be abutted upon by the ball cage (8) upon retraction of the lead guide (2) to a prescribed degree, the ball cage upon abutment against the stop means being effective to disengage the balls (9) from between the taper surface (20A) and the cylindrical surface (1D) against the bias of the second spring (10) and hence to permit the lead guide to travel back toward the marking end of the body means under the bias of the first recited spring (6), and retarder means (8C, 20C) for holding the balls disengaged from between the taper surface (20A) and the cylindrical surface (1D) against the bias of the second spring (10) during the return of the lead guide toward the marking end of the body means.

15. A mechanical pencil as claimed in claim 14, wherein the retarder means comprises an annular ridge (20C) formed on the thrust member (20), and an intumed rim (8C) formed on the ball cage (8) for positive engagement with the annular ridge (20C) during the return of the lead guide (2) toward the writing end of the body means (1, 7, 23).

16. A mechanical pencil as claimed in claim 1, wherein a thrust member (20) is disposed within the body means (1, 7, 23) and rigidly coupled to the lead guide (2) for opening and closing the chuck means (5, 11, 12, 13) with the displacement of the lead guide, characterized in that the one-way locking means comprises an annular internal taper surface (1H; 31A) formed coaxially on the body means and in opposed relation to the thrust member (20), the taper surface (1H; 31A) decreasing in diameter as it extends toward the writing end of the body means, and a plurality of balls (9) normally caught between the taper surface (20A) and the thrust member (20).

17. A mechanical pencil as claimed in claim 12, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the taper surface (1H; 31A) and the thrust member (20) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (1H; 31A) and the thrust member (20) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (1H; 31A) and the thrust member (20).

18. A mechanical pencil as claimed in claim 17, characterized in that the unlocking means comprises a shoulder (20D) formed on the thrust member (20) for pushing the ball cage (8) in a direction away from the writing end of the body means (1, 7, 23) against the bias of the second spring (10) upon retraction of the lead guide (2) to a prescribed degree, the ball cage when pushed by the shoulder

(20D) being effective to disengage the balls (9) from between the taper surface (1H; 31A) and the thrust member (20) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the first recited spring (6), and retarder means (1J, 8B) for holding the balls disengaged from between the taper surface (1H, 31A) and the thrust member (20) against the bias of the second spring (10) during the return of the lead guide toward the writing end of the body means.

19. A mechanical pencil as claimed in claim 1, characterized in that the one-way locking means comprises an annular external taper surface (2C) formed on a sleeve (2L) which is formed substantially integral with the lead guide (2) and which is coaxially mounted within the body means (1), the taper surface (2C) decreasing in diameter as it extends toward the writing end of the body means, and a plurality of balls (9) normally caught between the taper surface (2C) and the body means (1).

20. A mechanical pencil as claimed in claim 19, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the body means (1) and the sleeve (2L) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (2C) and the body means (1) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (2C) and the body means (1).

21. A mechanical pencil as claimed in claim 20, characterized in that the unlocking means comprises stop means (5A) formed in fixed relation to the body means (1) so as to be abutted upon by the ball cage (8) upon retraction of the lead guide (2) to a prescribed degree, the ball cage upon abutment against the stop means being effective to disengage the balls (9) from between the taper surface (2C) and the body means (1) against the bias of the second spring (10) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the first recited spring (6), and retarder means (2D, 8C) for holding the balls disengaged from between the taper surface (2C) and the body means (1) against the bias of the second spring (10) during the return of the lead guide toward the writing end of the body means.

22. A mechanical pencil as claimed in claim 1, characterized in that the one-way locking means comprises an annular internal taper surface (1H) formed coaxially on the body means (1), and decreasing in diameter as it extends toward the writing end of the body means, a sleeve (2L) formed substantially integral with the lead guide (2) and coaxially mounted within the body means (1), and a plurality of balls (9) normally caught between the taper surface (1H) and the sleeve (2L).

23. A mechanical pencil as claimed in claim 22, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the body means (1) and the sleeve (2L) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the ta-

per surface (1H) and the sleeve (2L) for carrying the balls into and out of engagement therebetween, and a second spring (10) acting on the ball cage for biasing the balls into engagement between the taper surface (1H) and the sleeve (2L).

24. A mechanical pencil as claimed in claim 23, characterized in that the unlocking means comprises a collar (2A) formed on the sleeve (2L) for pushing the ball cage (8) in a direction away from the writing end of the body means (1, 23) against the bias of the second spring (10) upon retraction of the lead guide (2) to a prescribed degree, the ball cage when pushed by the collar (2A) being effective to disengage the balls (9) from between the taper surface (1H) and the sleeve (2L) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the first recited spring (6), and retarder means (1L, 8A) for holding the balls disengaged from between the taper surface (1H) and the sleeve (2L) against the bias of the second spring (10) during the return of the lead guide toward the writing end of the body means.

25. A mechanical pencil as claimed in claim 1, wherein a thrust member (20) is disposed within the body means (1) and rigidly coupled to the lead guide (2) for opening and closing the chuck means (5, 11, 12, 13) with the displacement of the lead guide relative to the body means, characterized in that the one-way locking means comprises a tubular extension (20F) of the thrust member (20) disposed within the body means in coaxial relation thereto, a tubular lining (25) of elastic material immovably attached to the inside surface of the body means, and an annular taper ridge (20G) formed on the extension (20F) of the thrust member (20) for frictional engagement with the elastic lining (25), the taper ridge (20G) tapering as it extends away from the writing end of the body means.

26. A mechanical pencil as claimed in claim 25, characterized in that at least part of the tubular extension (20F) of the thrust member (20) is slitted for elastic deformation in a radially inward direction, and that the unlocking means comprises a tubular member (26) coaxially mounted within the body means (1) for axial displacement relative to the same and having an internal taper (26A) for engagement with the thrust member extension (20F) upon retraction of the lead guide (2) to a prescribed degree, the tubular member (26) upon engagement with the thrust member extension (20F) being effective to cause its elastic deformation in a radially inward direction and hence to disengage the taper ridge (20G) thereon from the elastic lining (25) on the inside surface of the body means.

27. A mechanical pencil as claimed in claim 1, wherein a thrust member (20) is disposed within the body means (1) and rigidly coupled to the lead guide (2) for opening and closing the chuck means (5, 11, 12, 13) with the displacement of the lead guide relative to the body means, characterized in that the one-way locking means comprises a tubular extension (20F) of the thrust member (20) disposed within the body means in coaxial relation thereto, a series of annular beads (1M) of sawtooth-shaped axial section formed on the inside surface of the body

means, and an annular taper ridge (20G) formed on the extension (20F) of the thrust member (20) for engagement with the annular beads (1M), the taper ridge (20G) tapering as it extends away from the writing end of the body means.

28. A mechanical pencil as claimed in claim 27, characterized in that at least part of the tubular extension (20F) of the thrust member (20) is slitted for elastic deformation in a radially inward direction, and that the unlocking means comprises a tubular member (26) coaxially mounted within the body means (1) for axial displacement relative to the same and having an internal taper (26A) for engagement with the thrust member extension (20F) upon retraction of the lead guide (2) to a prescribed degree, the tubular member (26) upon engagement with the thrust member extension (20F) being effective to cause its elastic deformation in a radially inward direction and hence to disengage the taper ridge (20G) thereon from the annular beads (1M) on the inside surface of the body means.

29. A mechanical pencil as claimed in claim 1, wherein a thrust member (20) is disposed within the body means (1) and rigidly coupled to the lead guide (2) for opening and closing the chuck means (5, 11, 12, 13) with the displacement of the lead guide relative to the body means, characterized in that the one-way locking means comprises a tubular extension (20F) of the thrust member (20) disposed within the body means in coaxial relation thereto, a series of annular beads (20H) of sawtooth-shaped axial section formed on the outside surface of the thrust member extension (20F), and an annular internal taper ridge (1N) formed on the thrust member extension (20F) for engagement with the annular beads (20H), the internal taper ridge (1N) tapering as it extends toward the writing end of the body means.

30. A mechanical pencil as claimed in claim 29, characterized in that at least part of the tubular extension (20F) of the thrust member (20) is slitted for elastic deformation in a radially inward direction, and that the unlocking means comprises a tubular member (26) coaxially mounted within the body means (1) for axial displacement relative to the same and having an internal taper (26A) for engagement with the thrust member extension (20F) upon retraction of the lead guide (2) to a prescribed degree, the tubular member (26) upon engagement with the thrust member extension (20F) being effective to cause its elastic deformation in a radially inward direction and hence to disengage the annular beads (20H) thereon from the taper ridge (1N) on the inside surface of the body means.

31. A mechanical pencil as claimed in claim 1, characterized in that the one-way locking means comprises a sleeve (30) secured to the lead guide (2) and coaxially disposed within the body means (1) for axial displacement therein, a taper member (31) immovably mounted within the body means and having an annular internal taper surface (31A) concentrically surrounding the sleeve (30), the taper surface (31A) decreasing in diameter as it extends toward the writing end of the body means, and a plurality of balls (9) normally caught between the sleeve (30) and the taper surface (31A) of the taper member

(31).

32. A mechanical pencil as claimed in claim 31, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the taper member (31) and the sleeve (30) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (31A) and the sleeve (2L) for carrying the balls into and out of engagement therebetween, and a ball cage retarder (32; 40; 41) acting between the body means (1) and the ball cage (8) for frictionally retarding the axial displacement of the latter with respect to the former.

33. A mechanical pencil as claimed in claim 32, characterized in that the ball cage retarder (32; 41) is in the form of a tube of elastic material and is immovably mounted within the body means (1) in coaxial relation thereto, the ball cage retarder having an in-turned rim (32A; 41A) for frictional engagement with the ball cage (8).

34. A mechanical pencil as claimed in claim 32, characterized in that the ball cage retarder (40) is in the form of a tube of elastic material and is immovably fitted over the ball cage (8), the ball cage retarder having a flange (40A) for frictional engagement with the body means (31C).

35. A mechanical pencil as claimed in claim 32, characterized in that the unlocking means comprises a first flange (30A) formed on one end of the sleeve (30) for pushing the ball cage (8) away from the writing end of the body means (1) against the frictional force of the ball cage retarder (32; 40; 41) upon retraction of the lead guide (2) to a prescribed degree, the ball cage when pushed by the first flange being effective to disengage the balls (9) from between the sleeve (30) and the taper surface (31A) and hence to permit the lead guide to travel back toward the writing end of the body means under the bias of the spring (6), and a second flange (30C) formed on the other end of the sleeve (30) for pushing the ball cage (8) toward the writing end of the body means (1) against the frictional force of the ball cage retarder (32; 40; 41) toward the end of the travel of the lead guide back toward the writing end of the body means.

36. A mechanical pencil as claimed in claim 35, characterized in that the one-way locking means further comprises a tubular ball pusher (34) fitted over the sleeve (30) for axial displacement relative to the same and held against the balls (9), and a second spring (35) acting between the ball pusher (34) and the second flange (30C) of the sleeve (30) for biasing the balls (9) into engagement between the sleeve (30) and the taper surface (31A).

37. A mechanical pencil as claimed in claim 1, characterized in that the one-way locking means comprises an annular external taper surface (30E) formed coaxially on a sleeve (30) which is rigidly joined to the lead guide (2) and which is coaxially disposed within the body means (1) for joint axial displacement with the lead guide relative to the body means, the taper surface (30E) decreasing in diameter as it extends toward the writing end of the body means, a tubular member (39) immovably and coaxially mounted within the body means and disposed radi-

ally outwardly of the sleeve (30), and a plurality of balls (9) normally caught between the taper surface (30E) and the tubular member (39).

38. A mechanical pencil as claimed in claim 37, characterized in that the one-way locking means further comprises a tubular ball cage (8) concentrically disposed between the sleeve (30) and the tubular member (39) and rotatably carrying the balls (9), the ball cage being axially displaceable relative to the taper surface (30E) and the tubular member (39) for carrying the balls into and out of engagement therebetween, and a ball cage retarder (36) acting between the sleeve (30) and the ball cage (8) for frictionally retarding the axial displacement of the latter with respect to the former.

39. A mechanical pencil as claimed in claim 38, characterized in that the ball cage retarder (36) is in the form of a tube of elastic material and is immovably fitted over the sleeve (30) in coaxial relation thereto, the ball cage retarder having a flange (36A) for frictional engagement with the ball cage (8).

40. A mechanical pencil as claimed in claim 38, characterized in that the unlocking means comprises a first inturned rim (39B) on one end of the tubular member (39) to be abutted upon by the ball cage (8) upon retraction of the lead guide (2) to a prescribed degree, the ball cage upon abutment against the first rim being effective to disengage the balls (9) from between the taper surface (30E) and the tubular member (39) against the frictional force of the ball cage retarder (36) and hence to permit the lead guide (2) to travel back toward the writing end of the body means under the bias of the spring (6), and a second inturned rim (39A) on the other end of the tubular member (39) to be abutted upon by the ball cage (8) toward the end of the travel of the lead guide back toward the writing end of the body means, the ball cage upon abutment against the second rim being effective to re-engage the balls between the taper surface (30E) and the tubular member (39) against the frictional force of the ball cage retarder 36.

41. A mechanical pencil as claimed in claim 40, characterized in that the one-way locking means further comprises a tubular ball pusher (37) fitted over the ball cage (8) for axial displacement relative to the same and held endwise against the balls (9), and a second spring (38) acting between the ball pusher (37) and the second rim (39A) of the tubular member (39) for biasing the balls (9) into engagement between the taper surface (30E) and the tubular member (39).

Revendications

1. Portemine ayant une mine qui avance automatiquement, comprenant un dispositif à corps sensiblement tubulaire (1, 7, 23) ayant une extrémité d'écriture, un guidemine tubulaire (2) logé dans le dispositif à corps, destiné à se déplacer axialement dans celui-ci et qui dépasse en partie de l'extrémité d'écriture, sous l'action de la force de rappel d'un ressort (6), le guide-mine contenant une mine (3) et pouvant reculer par rapport au dispositif à corps en s'écar-

tant de l'extrémité d'écriture de celui-ci malgré la force de rappel du ressort, lors de l'usure de la mine, un organe de friction (4) monté sur le guide-mine et coopérant avec la mine afin qu'il provoque normalement le déplacement de la mine avec le guide-mine dans la direction axiale du dispositif à corps et permette un déplacement axial de la mine par rapport au guide-mine lorsqu'une force dépassant un degré prédéterminé est appliquée à la mine, et un dispositif à pince de serrage (5, 11, 12, 13) monté dans le dispositif à corps et destiné à serrer la mine afin qu'elle ne se déplace pas axialement par rapport au dispositif à corps dans le sens qui l'écarte de son extrémité d'écriture, tout en permettant le coulisement axial de la mine vers l'extrémité d'écriture du dispositif à corps, caractérisé en ce qu'il comprend un dispositif unidirectionnel de blocage (9, 2C; 9, 5K; 9, 20A; 9, 1H; 20G, 25; 1M, 20G; 1N, 20H; 9, 31A; 9, 30E) destiné à permettre le recul du guide-mine (2) dans le dispositif à corps (1, 7, 23) suivant l'usure de la mine (3) pendant l'écriture et à bloquer le guide-mine afin qu'il ne puisse pas se déplacer vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du ressort (6) lorsque le portemine est écarté de la position du contact avec une surface d'écriture, et un dispositif de déblocage (2D, 8B; 17, 18; 8B, 19; 5L, 8C; 8C, 20C; 8B, 1J; 8C, 2D; 20F, 26; 8, 30A; 8, 39B; 8, 30A; 8, 20A) destiné à commander le dispositif unidirectionnel de blocage de manière qu'il permette un déplacement du guide-mine ainsi que de la mine coopérant avec l'organe de friction (4), vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du ressort (6) lorsque la mine est usée à un degré prédéterminé.

2. Portemine selon la revendication 1, dans lequel le dispositif à pince de serrage comporte une douille tronconique (5) montée à demeure dans le dispositif à corps (1, 7, 23), caractérisé en ce que le dispositif unidirectionnel de blocage comporte une surface annulaire tronconique interne (2C) formée sur un manchon (2L) qui est formé de manière pratiquement solidaire du guide-mine (2) et qui est monté coaxialement dans le dispositif à corps, la surface tronconique (2C) ayant un diamètre qui diminue à l'opposée de l'extrémité d'écriture du dispositif à corps, un prolongement tubulaire (5E) dépassant de la douille tronconique (5) du dispositif à pince de serrage et étant placé concentriquement à l'intérieur de la surface tronconique (2C), et plusieurs billes (9) retenues normalement entre la surface tronconique (2C) et le prolongement (5E).

3. Portemine selon la revendication 2, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre la surface tronconique (2C) et le prolongement (5E) et retenant les billes (9) afin qu'elles puissent tourner, la cage étant mobile axialement par rapport à la surface tronconique (2C) et au prolongement (5E) afin qu'elle mette les billes en coopération entre eux ou les en écarte, et un second ressort (10) agissant sur la cage et destiné à rappeler les billes en position de coopération avec la surface tronconique (2C) et le prolongement (5E).

4. Portemine selon la revendication 3, caractérisé en ce que le dispositif de déblocage comprend un dispositif d'arrêt (5D) formé en position fixe par rapport au dispositif à corps (1, 7, 23) afin qu'il soit en butée contre la cage (8) après recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est en butée contre le dispositif d'arrêt, provoquant une séparation des billes (9) de la surface tronconique (2C) et du prolongement (5E) malgré la force de rappel du second ressort (10), et permettant au guide-mine de se déplacer à nouveau vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif à organe de retardement (2D, 8B; 17, 18; 19) destiné à retenir les billes séparées de la surface tronconique (2C) et du prolongement (5E) malgré la force de rappel du second ressort (10) pendant le retour du guide-mine vers l'extrémité d'écriture du dispositif à corps.

5. Portemine selon la revendication 4, caractérisé en ce que le dispositif d'arrêt est un épaulement (5D) formé sur la douille tronconique (5) du dispositif à pince de serrage.

6. Portemine selon la revendication 4, caractérisé en ce que le dispositif à organe de retardement comprend un aimant permanent (17) fixé au manchon (2L) ou à la cage (8), et une pièce (18) d'un matériau aimantable, fixée à la cage ou au manchon respectivement.

7. Portemine selon la revendication 4, caractérisé en ce que le dispositif à organe de retardement comprend un revêtement (19) d'un matériau élastique fixé à la surface interne du manchon (2L), la cage étant en coopération par friction avec le revêtement.

8. Portemine selon la revendication 1, dans lequel le dispositif à pince de serrage comporte une douille tronconique (5) montée à demeure dans le dispositif à corps (1, 7, 23), et caractérisé en ce que le dispositif unidirectionnel de blocage comporte une surface annulaire tronconique externe (5K) formée sur un prolongement tubulaire (5E) dépassant de la douille (5) du dispositif à pince de serrage, coaxialement au dispositif à corps, la surface tronconique (5K) ayant un diamètre qui diminue du côté opposé à l'extrémité d'écriture du dispositif à corps, un manchon (2L) formé afin qu'il soit pratiquement solidaire du guide-mine (2) et placé coaxialement dans le dispositif à corps et dans le prolongement tubulaire de la douille, et plusieurs billes (9) normalement retenues entre la surface tronconique (5K) et le manchon (2L).

9. Portemine selon la revendication 8, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre la surface tronconique (5K) et le manchon (2L) et retenant les billes (9) afin qu'elles puissent tourner, la cage pouvant se déplacer axialement par rapport à la surface tronconique (5K) et au manchon (2L) afin qu'elle mette les billes en coopération avec eux ou les en écarte, et un second ressort (10) agissant sur la cage et destiné à rappeler les billes en coopération avec la surface tronconique (5K) et le manchon (2L).

10. Portemine selon la revendication 9, caractérisé

5 sé en ce que le dispositif de déblocage comprend un épaulement (2E) formé sur le guide-mine (2) et destiné à repousser la cage (8) du côté opposé à l'extrémité d'écriture du dispositif à corps (1, 7, 23) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est repoussée par l'épaulement (2E), provoquant la séparation des billes (9) de la surface tronconique (5K) et du manchon (2L) malgré la force de rappel du second ressort (10) et permettant ainsi au guide-mine de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif à organe de retardement (5L, 8C) destiné à maintenir les billes séparées de la surface tronconique (5K) et du manchon (2L) malgré la force de rappel du second ressort (10) au cours du retour du guide-mine vers l'extrémité d'écriture du dispositif à corps.

11. Portemine selon la revendication 10, dans lequel le dispositif à organe de retardement comprend une nervure annulaire (5L) formée sur le prolongement tubulaire (5E) de la douille (5), et un rebord (8C) tourné vers l'intérieur, formé sur la cage (8) et destiné à venir positivement au contact de la nervure annulaire (5L) lors du recul du guide-mine (2) d'un degré prédéterminé.

12. Portemine selon la revendication 1, dans lequel un organe de poussée (20) est placé dans le dispositif à corps (1, 7, 23) et est couplé rigidement au guide-mine (2) afin que le dispositif à pince de serrage (5, 11, 12, 13) soit ouvert et fermé lors du déplacement du guide-mine par rapport au dispositif à corps, caractérisé en ce que le dispositif unidirectionnel de blocage comprend une surface annulaire tronconique externe (20A) formée sur l'organe de poussée (20) coaxialement au dispositif à corps, la surface tronconique (20A) ayant un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, et plusieurs billes (9) normalement retenues entre la surface tronconique (20A) et une surface interne cylindrique (1D) du dispositif à corps.

13. Portemine selon la revendication 12, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre la surface tronconique (20A) et la surface cylindrique (1D) et retenant les billes (9) afin qu'elles puissent tourner, la cage pouvant se déplacer axialement par rapport à la surface tronconique (20A) et à la surface cylindrique (1D) en déplaçant les billes afin qu'elles viennent à leur contact et s'en séparent, et un second ressort (10) agissant sur la cage afin qu'il rappelle les billes au contact de la surface tronconique (20A) et de la surface cylindrique (1D).

14. Portemine selon la revendication 13, caractérisé en ce que le dispositif de déblocage comprend un dispositif d'arrêt (7) formé à demeure sur le dispositif à corps (1, 7, 23) afin qu'il soit en butée contre la cage (8) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est en butée contre le dispositif d'arrêt, provoquant la séparation des billes (9) de la surface tronconique (20A) et de la surface cylindrique (1D) malgré la force de rappel du second ressort (10) et permettant ainsi au guide-mine de revenir vers l'extrémité de marquage

du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif à organe de retardement (8C, 20C) destiné à maintenir les billes séparées de la surface tronconique (20A) et de la surface cylindrique (1D) malgré la force de rappel du second ressort (10) pendant le retour du guide-mine vers l'extrémité de marquage du dispositif à corps.

15. Portemine selon la revendication 14, dans lequel le dispositif à organe de retardement comprend une nervure annulaire (20C) formée sur l'organe de poussée (20) et un rebord (8C) replié vers l'intérieur, formé sur la cage (8) et destiné à coopérer positivement avec la nervure annulaire (20C) pendant le retour du guide-mine (2) vers l'extrémité d'écriture du dispositif à corps (1, 7, 23).

16. Portemine selon la revendication 1, dans lequel un organe de poussée (20) est placé dans le dispositif à corps (1, 7, 23) et est couplé rigidement au guide-mine (2) afin que le dispositif à pince de serrage (5, 11, 12, 13) soit ouvert et fermé lors du déplacement du guide-mine, caractérisé en ce que le dispositif unidirectionnel de blocage comprend une surface annulaire tronconique interne (1H; 31A) formée coaxialement sur le dispositif à corps et en face de l'organe de poussée (20), la surface tronconique (1H; 31A) ayant un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, et plusieurs billes (9) normalement coincées entre la surface tronconique (20A) et l'organe de poussée (20).

17. Portemine selon la revendication 12, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement contre la surface tronconique (1H; 31A) et l'organe de poussée (20) et retenant les billes (9) afin qu'elles puissent tourner, la cage pouvant se déplacer axialement par rapport à la surface tronconique (1H; 31A) et à l'organe de poussée (20) afin qu'elle mette les billes en coopération avec eux ou les en écarte, et un second ressort (10) agissant sur la cage afin qu'il rappelle les billes en coopération avec la surface tronconique (1H; 31A) et l'organe de poussée (20).

18. Portemine selon la revendication 17, caractérisé en ce que le dispositif de déblocage comporte un épaulement (20D) formé sur l'organe de poussée (20) et destiné à repousser la cage (8) du côté opposé à l'extrémité d'écriture du dispositif à corps (1, 7, 23) malgré la force de rappel du second ressort (10) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est poussée par l'épaulement (20D), provoquant la séparation des billes (9) de la surface tronconique (1H; 31A) et de l'organe de poussée (20) et permettant ainsi au guide-mine de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif à organe de retardement (1J, 8B) destiné à maintenir les billes à distance de la surface tronconique (1H; 31A) et de l'organe de poussée (20) malgré la force de rappel du second ressort (10) pendant le retour du guide-mine vers l'extrémité d'écriture du dispositif à corps.

19. Portemine selon la revendication 1, caractérisé en ce que le dispositif unidirectionnel de blocage comporte une surface annulaire tronconique exter-

ne (2C) formée sur un manchon (2L) qui est réalisé afin qu'il soit pratiquement solidaire du guide-mine (2) et qui est monté coaxialement dans le dispositif à corps (1), la surface tronconique (2C) ayant un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, et plusieurs billes (9) normalement retenues entre la surface tronconique (2C) et le dispositif à corps (1).

20. Portemine selon la revendication 19, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre le dispositif à corps (1) et le manchon (2L) et retenant les billes (9) afin qu'elles puissent tourner, la cage étant mobile axialement par rapport à la surface tronconique (2C) et au dispositif à corps (1) afin qu'elle mette les billes en coopération avec eux ou les écarte de ceux-ci, et un second ressort (10) agissant sur la cage afin qu'il rappelle les billes au contact de la surface tronconique (2C) et du dispositif à corps (1).

21. Portemine selon la revendication 20, caractérisé en ce que le dispositif de déblocage comprend un dispositif d'arrêt (5A) placé à demeure par rapport au dispositif à corps (1) afin qu'il soit en butée contre la cage (8) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est en butée contre le dispositif d'arrêt, provoquant la séparation des billes (9) de la surface tronconique (2C) et du dispositif à corps (1) malgré la force de rappel du second ressort (10) et permettant ainsi au guide-mine de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif à organe de retardement (2D, 8C) destiné à maintenir les billes à distance de la surface tronconique (2C) et du dispositif à corps (1) malgré la force de rappel du second ressort (10) pendant le retour du guide-mine vers l'extrémité d'écriture du dispositif à corps.

22. Portemine selon la revendication 1, caractérisé en ce que le dispositif unidirectionnel de blocage comporte une surface annulaire tronconique interne (1H) formée coaxialement sur le dispositif à corps (1) et ayant un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, un manchon (2L) formé afin qu'il soit pratiquement solidaire du guide-mine (2) et monte coaxialement dans le dispositif à corps (1), et plusieurs billes (9) normalement retenues entre la surface tronconique (1H) et le manchon (2L).

23. Portemine selon la revendication 22, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre le dispositif à corps (1) et le manchon (2L) et retenant les billes (9) afin qu'elles puissent tourner, la cage étant mobile axialement par rapport à la surface tronconique (1H) et au manchon (2L) afin qu'elle mette les billes en coopération avec eux ou les écarte de ceux-ci, et un second ressort (10) agissant sur la cage et destiné à rappeler les billes au contact de la surface tronconique (1H) et du manchon (2L).

24. Portemine selon la revendication 23, caractérisé en ce que le dispositif de déblocage comporte un collier (2A) formé sur le manchon (2L) et destiné à repousser la cage (8) du côté opposé à l'extrémité

d'écriture du dispositif à corps (1, 23) malgré la force de rappel du second ressort (10) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est poussée par le collier (2A), séparant les billes (9) de la surface tronconique (1H) et du manchon (2L) et permettant ainsi au guide-mine de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du premier ressort (6), et un dispositif de retardement (1L, 8A) destiné à maintenir les billes séparées de la surface tronconique (1H) et du manchon (2L) malgré la force de rappel du second ressort (10) pendant le retour du guide-mine vers l'extrémité d'écriture du corps.

25. Portemine selon la revendication 1, dans lequel un organe de poussée (20) est placé dans le dispositif à corps (1) et est rigidement couplé au guide-mine (2) afin qu'il ouvre et ferme le dispositif à pince de serrage (5, 11, 12, 13) lors du déplacement du guide-mine par rapport au dispositif à corps, caractérisé en ce que le dispositif unidirectionnel de blocage comporte un prolongement tubulaire (20F) de l'organe de poussée (20) placé dans le dispositif à corps et coaxialement à celui-ci, un revêtement tubulaire (25) formé d'un matériau élastique, fixé à demeure à la surface interne du dispositif à corps, et une nervure annulaire tronconique (20G) formée sur le prolongement (20F) de l'organe de poussée (20) afin qu'il coopère par friction avec le revêtement élastique (25), la nervure tronconique (20G) ayant une dimension qui diminue du côté opposé à celui de l'extrémité d'écriture du dispositif à corps.

26. Portemine selon la revendication 25, caractérisé en ce qu'une partie au moins du prolongement tubulaire (20F) de l'organe de poussée (20) est fendue afin qu'elle se déforme élastiquement radialement vers l'intérieur, et en ce que le dispositif de déblocage comporte un organe tubulaire (26) monté coaxialement dans le dispositif à corps (1), destiné à se déplacer axialement par rapport à lui et ayant une partie tronconique interne (26A) destinée à coopérer avec le prolongement (20F) de l'organe de poussée lors du recul du guide-mine (2) d'un degré prédéterminé, l'organe tubulaire (26), lors de la coopération avec le prolongement (20F) de l'organe de poussée, provoquant sa déformation élastique radialement vers l'intérieur et la séparation de la nervure tronconique (20G) du revêtement élastique (25) placé à la surface interne du dispositif à corps.

27. Portemine selon la revendication 1, dans lequel un organe de poussée (20) est placé dans le dispositif à corps (1) et est couplé rigidement au guide-mine (2) afin qu'il ouvre et ferme le dispositif à pince de serrage (5, 11, 12, 13) lors du déplacement du guide-mine par rapport au dispositif à corps, caractérisé en ce que le dispositif unidirectionnel de blocage comprend un prolongement tubulaire (20F) de l'organe de poussée (20) placé dans le dispositif à corps coaxialement à celui-ci, une série de cordons annulaires (1M) ayant une section axiale en dents de scie, formée sur la surface interne du dispositif à corps, et une nervure tronconique annulaire (20G) formée sur le prolongement (20F) de l'organe de poussée (20) et destinée à coopérer avec les cordons annulaires (1M), la nervure tronconique (20G) diminuant de dimension du côté opposé à celui

de l'extrémité d'écriture du dispositif à corps.

28. Portemine selon la revendication 27, caractérisé en ce qu'une partie au moins du prolongement tubulaire (20F) de l'organe de poussée (20) est fendue afin qu'elle se déforme élastiquement radialement vers l'intérieur, et en ce que le dispositif de déblocage comprend un organe tubulaire (26) monté coaxialement dans le dispositif à corps (1) et destiné à se déplacer axialement par rapport à celui-ci et ayant une partie tronconique interne (26A) destinée à coopérer avec le prolongement (20F) de l'organe de poussée lors du recul du guide-mine (2) d'un degré prédéterminé, l'organe tubulaire (26), lorsqu'il coopère avec le prolongement (20F) de l'organe de poussée, provoquant la déformation élastique radialement vers l'intérieur et en conséquence la séparation de la nervure tronconique (20G) des cordons annulaires (1M) de la surface interne du dispositif à corps.

29. Portemine selon la revendication 1, dans lequel un organe de poussée (20) est disposé dans le dispositif à corps (1) et est couplé rigidement au guide-mine (2) afin que le dispositif à pince de serrage (5, 11, 12, 13) soit ouvert et fermé lors du déplacement du guide-mine par rapport au dispositif à corps, caractérisé en ce que le dispositif unidirectionnel de blocage comporte un prolongement tubulaire (20F) de l'organe de poussée (20) placé dans le dispositif à corps coaxialement à celui-ci, une série de cordons annulaires (20H) ayant une section axiale en dents de scie formée à la surface externe du prolongement (20F) de l'organe de poussée, et une nervure annulaire tronconique interne (1N) formée sur le prolongement (20F) de l'organe de poussée et destinée à coopérer avec les cordons annulaires (20H), la nervure tronconique interne (1N) ayant une dimension qui diminue vers l'extrémité d'écriture du dispositif à corps.

30. Portemine selon la revendication 29, caractérisé en ce qu'une partie au moins du prolongement tubulaire (20F) de l'organe de poussée (20) est fendue afin qu'elle puisse se déformer élastiquement vers l'intérieur en direction radiale, et en ce que le dispositif de déblocage comporte un organe tubulaire (26) monté coaxialement dans le dispositif à corps (1), destiné à se déplacer axialement par rapport à celui-ci et ayant une partie tronconique interne (26A) destinée à coopérer avec le prolongement (20F) de l'organe de poussée lors du recul du guide-mine (2) d'un degré prédéterminé, l'organe tubulaire (26), lorsqu'il coopère avec le prolongement (20F) de l'organe de poussée, provoquant sa déformation élastique radialement vers l'intérieur et en conséquence la séparation des cordons annulaires (20H) de la nervure tronconique (1N) de la surface interne du dispositif à corps.

31. Portemine selon la revendication 1, caractérisé en ce que le dispositif unidirectionnel de blocage comporte un manchon (30) fixé au guide-mine (2) et disposé coaxialement dans le dispositif à corps (1) afin qu'il se déplace axialement dans celui-ci, un organe tronconique (31) monté à demeure dans le dispositif à corps et ayant une surface annulaire tronconique interne (31A) entourant concentriquement le manchon (30), la surface tronconique (31A) ayant

un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, et plusieurs billes (9) normalement retenues entre le manchon (30) et la surface tronconique (31A) de l'organe tronconique (31).

32. Portemine selon la revendication 31, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) disposée concentriquement entre l'organe tronconique (31) et le manchon (30) et retenant les billes (9) afin qu'elles puissent tourner, la cage étant mobile axialement par rapport à la surface tronconique (31A) et au manchon (2L) afin qu'elle déplace les billes en coopération entre eux et à distance de ceux-ci, et un organe de retardement (32; 40; 41) de cage agissant entre le dispositif à corps (1) et la cage (8) et destiné à retarder par friction le déplacement axial de la cage par rapport au dispositif à corps.

33. Portemine selon la revendication 32, caractérisé en ce que l'organe de retardement (32; 41) de cage est sous forme d'un tube d'une matière élastique et est monté à demeure dans le dispositif à corps (1) coaxialement à celui-ci, l'organe de retardement ayant un rebord (32A; 41A) replié vers l'intérieur et destiné à coopérer par friction avec la cage (8).

34. Portemine selon la revendication 32, caractérisé en ce que l'organe de retardement (40) est sous forme d'un tube d'un matériau élastique et est monté à demeure sur la cage (8), l'organe de retardement ayant un flasque (40A) destiné à coopérer par friction avec le dispositif à corps (31C).

35. Portemine selon la revendication 32, caractérisé en ce que le dispositif de déblocage comporte un premier flasque (30A) formé à une première extrémité du manchon (30) et destiné à écarter la cage (8) de l'extrémité d'écriture du dispositif à corps (1) malgré la force de friction de l'organe de retardement (32; 40; 41) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est poussée par le premier flasque, provoquant la séparation des billes (9) du manchon (30) et de la surface tronconique (31A) et permettant ainsi au guide-mine de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du ressort (6), et un second flasque (30C) formé à l'autre extrémité du manchon (30) et destiné à repousser la cage (8) vers l'extrémité d'écriture du dispositif à corps (1) malgré la force de friction de l'organe de retardement (32; 40; 41) vers l'extrémité de déplacement du guide-mine lorsqu'il revient vers l'extrémité d'écriture du dispositif à corps.

36. Portemine selon la revendication 35, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre un organe tubulaire (34) de poussée de billes placé sur le manchon (30) et destiné à se déplacer axialement par rapport à celui-ci, cet organe étant retenu contre les billes (9), et un second ressort (35) agissant entre l'organe (37) de poussée de billes et le second flasque (30C) du manchon (30) afin qu'il repousse les billes (9) au contact du manchon (30) et de la surface tronconique (31A).

37. Portemine selon la revendication 1, caractérisé en ce que le dispositif unidirectionnel de blocage comporte une surface annulaire tronconique externe (30E) formée coaxialement sur un manchon (30)

qui est raccordé rigidement au guide-mine (2) et qui est placé coaxialement dans le dispositif à corps (1) afin qu'il se déplace axialement avec le guide-mine par rapport au dispositif à corps, la surface tronconique (30E) ayant un diamètre qui diminue vers l'extrémité d'écriture du dispositif à corps, un organe tubulaire (39) monté coaxialement à demeure dans le dispositif à corps et disposé radialement à l'extérieur du manchon (30), et plusieurs billes (9) normalement retenues entre la surface tronconique (30E) et l'organe tubulaire (39).

38. Portemine selon la revendication 37, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre une cage tubulaire (8) placée concentriquement entre le manchon (30) et l'organe tubulaire (39) et retenant les billes (9) afin qu'elles puissent tourner, la cage étant mobile axialement par rapport à la surface tronconique (30E) et à l'organe tubulaire (39) afin qu'elle retienne les billes en coopération avec ceux-ci ou à distance de ceux-ci, et un organe (36) de retardement de cage agissant entre le manchon (30) et la cage (8) et destiné à retarder par friction le déplacement axial de cette dernière par rapport au premier.

39. Portemine selon la revendication 36, caractérisé en ce que l'organe (36) de retardement de cage est sous forme d'un tube d'une matière élastique et est monté à demeure sur le manchon (30) coaxialement à celui-ci, l'organe de retardement ayant un flasque (36A) destiné à coopérer par friction avec la cage (8).

40. Portemine selon la revendication 38, caractérisé en ce que le dispositif de déblocage comporte un premier rebord (39B) tourné vers l'intérieur à une première extrémité de l'organe tubulaire (39) afin qu'il soit en butée contre la cage (8) lors du recul du guide-mine (2) d'un degré prédéterminé, la cage, lorsqu'elle est mise en butée contre le premier rebord, pouvant séparer les billes (9) de la surface tronconique (30E) et de l'organe tubulaire (39) malgré la force de friction de l'organe (36) de retardement de cage et permettant ainsi au guide-mine (2) de revenir vers l'extrémité d'écriture du dispositif à corps sous l'action de la force de rappel du ressort (6), et un second rebord (39A) replié vers l'intérieur à l'autre extrémité de l'organe tubulaire (39) afin qu'il soit en butée contre la cage (8) vers l'extrémité de la course de déplacement du guide-mine lorsqu'il revient vers l'extrémité d'écriture du dispositif à corps, la cage, lorsqu'elle est en butée contre le second rebord, provoquant la remise en coopération des billes avec la surface tronconique (30E) et l'organe tubulaire (39) malgré la force de friction de l'organe (36) de retardement de cage.

41. Portemine selon la revendication 40, caractérisé en ce que le dispositif unidirectionnel de blocage comporte en outre un organe tubulaire (37) de poussée de billes placé sur la cage (8) et destiné à se déplacer axialement par rapport à elle et maintenu par son extrémité contre les billes (9), et un second ressort (38) agissant entre l'organe (37) de poussée de billes et le second rebord (39A) de l'organe tubulaire (39) afin que les billes (9) soient rappelées en coopération avec la surface tronconique (30E) et l'organe tubulaire (39).

Patentansprüche

1. Mechanischer Schreibstift mit automatischem Minenvorschub aus einem praktisch röhrenförmigen Gehäuse (1, 7, 23), das ein Schreibende aufweist, einer rohrförmigen Minenführung (2), die in dem Gehäuse axial verschiebbar angeordnet ist und sich unter der Wirkung einer Druckfeder (6) teilweise aus dem Schreibende heraus erstreckt, eine Mine (3) aufnimmt und im Verhältnis zu dem Gehäuse in der dem Schreibende entgegengesetzten Richtung und entgegen der Wirkung der Druckfeder mit der Abnutzung der Mine zurückziehbar ist, einem Reibungsteil (4), das an die Minenführung montiert ist und mit der Mine in Eingriff steht, so daß es normalerweise bewirkt, daß die Mine in axialer Richtung des Gehäuses zusammen mit der Minenführung wandert und erlaubt, daß sich die Mine axial relativ zu der Minenführung bewegt, wenn eine Kraft auf die Mine ausgeübt wird, die einen vorgeschriebenen Wert übersteigt, sowie einer Klemmeinrichtung (5, 11, 12, 13), die innerhalb des Gehäuses montiert ist, um die Mine gegenüber einer axialen Verschiebung relativ zu dem Gehäuse in der dem Schreibende entgegengesetzten Richtung zu erfassen, die Mine jedoch axial in Richtung aus das Schreibende des Gehäuses gleiten zu lassen, dadurch gekennzeichnet, daß er eine in eine Richtung wirkende Arretiereinrichtung (9, 2C; 9, 5K; 9, 20A; 9, 1A; 20G, 25; 1M, 20G; 1N, 20H; 9, 31A; 9 30E), um die Minenführung (2) mit der Abnutzung der Mine (3) während des Schreibens sich in das Gehäuse (1, 7, 23) zurückbewegen zu lassen, und um die Minenführung gegenüber einer Verschiebung in Richtung aus das Schreibende des Gehäuses unter der Wirkung der Druckfeder (6) zu arretieren, wenn der mechanische Schreibstift von einer Schreibfläche zurückgezogen wird, sowie eine Entarretiereinrichtung (2D, 8B; 17, 18; 8B, 19; 5L, 8C; 8C, 20C; 8B, 1J; 8C, 2D; 20F, 26; 8, 30A; 8, 39B; 8, 30A; 8, 20A) enthält, um zu bewirken, daß die in eine Richtung wirkende Arretiereinrichtung die Minenführung sowie die durch das Reibungsteil (4) festgehaltene Mine unter der Einwirkung der Druckfeder (6) in Richtung auf das Schreibende des Gehäuses wandern läßt, wenn die Mine bis zu einem vorgeschriebenen Ausmaß abgenutzt ist.

2. Mechanischer Schreibstift gemäß Anspruch 1, wobei die Klemmeinrichtung einen Einstecksockel (5) umfaßt, der unbeweglich innerhalb des Gehäuses (1, 7, 23) montiert ist, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige, konische Innenfläche (2C), die auf einem Stutzen (2L) gebildet ist, der praktisch einstückig mit der Minenführung (2) ausgebildet und coaxial in dem Gehäuse angeordnet ist, wobei der Durchmesser der konischen Fläche (2C) mit der Entfernung von dem Schreibende des Gehäuses abnimmt, ein röhrenförmiger Ansatz (5E), der sich von dem Einstecksockel (5) der Klemmeinrichtung aus erstreckt und konzentrisch innerhalb der konischen Fläche (2C) angeordnet ist, sowie eine Anzahl Kugeln (9), die normalerweise zwischen der konischen Fläche (2C) und dem Ansatz (5E) vorhanden sind, umfaßt.

3. Mechanischer Schreibstift gemäß Anspruch 2, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen der konischen Fläche (2C) und dem Ansatz (5E) angeordnet ist, und die Kugeln (9) drehbar trägt sowie relativ zu der konischen Fläche (2C) und dem Ansatz (5E) axial verschiebbar ist, um die Kugeln dazwischen in Eingriff und außer Eingriff zu bringen, sowie eine zweite Druckfeder (10) enthält, die auf den Kugelkäfig einwirkt, um die Kugeln zwischen der konischen Fläche (2C) und dem Ansatz (5E) in Eingriff zu bringen.

4. Mechanischer Schreibstift gemäß Anspruch 3, dadurch gekennzeichnet, daß die Entarretiereinrichtung einen Anschlag (5D), der in fester Beziehung zu dem Gehäuse (1, 7, 23), so daß er von dem Kugelkäfig (8) nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß angeschlagen wird, wobei der Kugelkäfig nach dem Anschlagen gegen den Anschlag bewirkt, daß die Kugeln (9) in dem Zwischenraum zwischen der konischen Fläche (2C) und dem Ansatz (5E) entgegen der Wirkung der zweiten Druckfeder (10) außer Eingriff gebracht werden und dadurch die Minenführung unter der Einwirkung der ersten Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie Zurückhaltemittel (2D, 8B; 17, 18; 19) zum Außereingriffhalten der Kugeln zwischen der konischen Fläche (2C) und dem Ansatz (5E) entgegen der Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung auf das Schreibende des Gehäuses aufweist.

5. Mechanischer Schreibstift gemäß Anspruch 4, dadurch gekennzeichnet, daß der Anschlag eine Schulter (5D) ist, die auf dem Einstecksockel (5) der Klemmeinrichtung gebildet ist.

6. Mechanischer Schreibstift gemäß Anspruch 4, dadurch gekennzeichnet, daß die Zurückhaltemittel einen Dauermagneten (17), der entweder an dem Stutzen (2L) oder an dem Kugelkäfig (8) befestigt ist, sowie ein Stück (18) aus magnetisierbarem Material, umfassen, das umgekehrt entweder an dem Kugelkäfig oder an dem Stutzen befestigt ist.

7. Mechanischer Schreibstift gemäß Anspruch 4, dadurch gekennzeichnet, daß die Zurückhaltemittel eine Auskleidung (19) aus elastischem Material umfassen, die an der Innenfläche des Stutzens (2L) angebracht ist, wobei der Kugelkäfig mit der Auskleidung in Reibungseingriff steht.

8. Mechanischer Schreibstift gemäß Anspruch 1, wobei die Klemmeinrichtung einen Einstecksockel (5) aufweist, der unbeweglich innerhalb des Gehäuses (1, 7, 23) montiert ist, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige konische Außenfläche (5K), die auf einem röhrenförmigen Ansatz (5E) gebildet ist, der sich von dem Einstecksockel (5) der Klemmeinrichtung coaxial zum Gehäuse erstreckt, wobei die konische Fläche mit zunehmender Entfernung von dem Schreibende des Gehäuses einen abnehmenden Durchmesser aufweist, einen Stutzen (2L), der im wesentlichen einstückig mit der Minenführung (2) ausgebildet und coaxial zwischen dem Gehäuse und

dem rohrförmigen Ansatz des Einstecksockels angeordnet ist, sowie eine Anzahl Kugeln (9) aufweist, die normalerweise zwischen der konischen Fläche (5K) und dem Stutzen (2L) vorhanden sind.

9. Mechanischer Schreibstift gemäß Anspruch 8, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen der konischen Fläche (5K) und dem Stutzen (2L) angeordnet ist und die Kugeln (9) rotierbar trägt sowie relativ zu der konischen Fläche (5K) und dem Stutzen (2L) axial verschiebbar ist, um die Kugeln dazwischen in Eingriff und außer Eingriff zu bringen, sowie eine zweite Druckfeder (10) aufweist, die auf den Kugelkäfig einwirkt, um die Kugeln zwischen der konischen Fläche (5K) und dem Stutzen (2L) in Eingriff zu bringen.

10. Mechanischer Schreibstift gemäß Anspruch 9, dadurch gekennzeichnet, daß die Entarretiereinrichtung eine auf der Minenführung (2) gebildete Schulter (2E) zum Wegstoßen des Kugelkäfigs (8) in der Richtung vom Schreibende des Gehäuses (1, 7, 23) weg, nachdem ein Rückzug der Minenführung (2) bis zu einem bestimmten Ausmaß erfolgt ist, wobei der Kugelkäfig nach dem Zurückstoßen durch die Schulter (2E) bewirkt, daß die Kugeln (9), die im Zwischenraum zwischen der konischen Fläche (5K) und dem Stutzen (2L) entgegen der Kraft der zweiten Druckfeder (10) außer Eingriff gebracht werden und dadurch die Minenführung unter der Einwirkung der ersten Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie Zurückhaltemittel (5L, 8C) zum Außereingriffhalten der Kugeln zwischen der konischen Fläche (5K) und dem Stutzen (2L) entgegen der Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung auf das Schreibende des Gehäuses aufweist.

11. Mechanischer Schreibstift gemäß Anspruch 10, wobei die Zurückhaltemittel einen ringförmigen Wulst (5L), der auf dem rohrförmigen Ansatz (5E) des Einstecksockels (5) gebildet ist, sowie einen einwärts gebogenen Kranz (8C), der auf dem Kugelkäfig (8) zum Eingriff mit dem ringförmigen Wulst (5L) gebildet ist, wenn der Rückzug der Minenführung (2) bis zu einem bestimmten Ausmaß erfolgt ist.

12. Mechanischer Schreibstift gemäß Anspruch 1, wobei ein Schubteil (20) innerhalb des Gehäuses (1, 7, 23) angeordnet und starr an die Minenführung (2) gekuppelt ist, um die Klemmeinrichtung (5, 11, 12, 13) in Abhängigkeit von der Verschiebung der Minenführung relativ zu dem Gehäuse zu öffnen und zu schließen, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine auf dem Schubteil (20) coaxial zu dem Gehäuse gebildete ringförmige konische Außenfläche (20A), die einen mit zunehmender Annäherung an das Schreibende des Gehäuses abnehmenden Durchmesser aufweist, sowie eine Anzahl Kugeln (9), die normalerweise zwischen der konischen Fläche (20A) und einer zylindrischen Innenoberfläche (1D) des Gehäuses aufweist.

13. Mechanischer Schreibstift gemäß Anspruch 12, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen

röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen der konischen Fläche (20A) und der zylindrischen Oberfläche (1D) angeordnet ist und rotierbar die Kugeln (9) trägt sowie relativ zu der konischen Oberfläche (20A) und der zylindrischen Oberfläche (1D) axial verschiebbar ist, um die Kugeln dazwischen in und aus dem Eingriff zu bringen, sowie eine zweite Druckfeder (10) aufweist, die auf den Kugelkäfig einwirkt, um die Kugeln zwischen der konischen Oberfläche (20A) und der zylindrischen Oberfläche (1D) in Eingriff zu bringen.

14. Mechanischer Schreibstift gemäß Anspruch 13, dadurch gekennzeichnet, daß die Entarretiereinrichtung einen Anschlag (7), der in fester Beziehung zu dem Gehäuse (1, 7, 23) ausgebildet ist, so daß an ihn nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß der Kugelkäfig (8) anstoßen kann, wobei der Kugelkäfig nach dem Anstoßen gegen den Anschlag die Kugeln (9) aus dem Zwischenraum zwischen der konischen Oberfläche (20A) und der zylindrischen Oberfläche (1D) gegen die Kraft der zweiten Druckfeder (10) außer Eingriff bringen und dadurch die Minenführung unter der Wirkung der ersten Druckfeder (6) zurück in Richtung auf das Markierungsende des Gehäuses wandern lassen kann, sowie Zurückhaltemittel (8C, 20C) zum Außereingriffhalten der Kugeln zwischen der konischen Fläche (20A) und der zylindrischen Fläche (1D) entgegen der Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung auf das Markierungsende des Gehäuses aufweist.

15. Mechanischer Schreibstift gemäß Anspruch 14, worin die Zurückhaltemittel einen ringförmigen Wulst (20C), der auf dem Schubteil (20) gebildet ist, sowie einen einwärts gebogenen Kranz (8C) enthalten, der auf dem Kugelkäfig (8) gebildet ist, um einen Eingriff mit dem ringförmigen Wulst (20C) während der Rückkehr der Minenführung (2) in Richtung auf das Schreibende des Gehäuses (1, 7, 23) zu gewährleisten.

16. Mechanischer Schreibstift gemäß Anspruch 1, wobei ein Schubteil (20) innerhalb des Gehäuses (1, 7, 23) angeordnet und starr mit der Minenführung (2) zum Öffnen und Schließen der Klemmeinrichtung (5, 11, 12, 13) in Abhängigkeit von der Verschiebung der Minenführung gekuppelt ist, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige konische Innenfläche (1H; 31A), die coaxial auf dem Gehäuse und gegenüber dem Schubteil (20) ausgebildet ist und deren Durchmesser mit ihrer Erstreckung in Richtung auf das Schreibende des Gehäuses abnimmt, sowie eine Anzahl von Kugeln (9) aufweist, die sich normalerweise zwischen der konischen Fläche (20A) und dem Schubteil (20) befinden.

17. Mechanischer Schreibstift gemäß Anspruch 12, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen der konischen Fläche (1H, 31A) und dem Schubteil (20) angeordnet ist und die Kugeln (9) rotierbar trägt sowie axial relativ zu der konischen Fläche (1H; 31A) und dem Schubteil (20) verschieb-

bar ist, um die Kugeln dazwischen in Eingriff und außer Eingriff zu bringen, und eine zweite Druckfeder (10) aufweist, die auf den Kugelkäfig einwirkt, um die Kugeln zwischen der konischen Fläche (1H; 31A) und dem Schubteil (20) in Eingriff zu bringen.

18. Mechanischer Schreibstift gemäß Anspruch 17, dadurch gekennzeichnet, daß die Entarretierungseinrichtung eine Schulter (20D), die auf dem Schubteil (20) zum Stoßen des Kugelkäfigs (8) in Richtung vom Schreibende des Gehäuses (1, 7, 23) weg entgegen der Einwirkung der zweiten Druckfeder (10) nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß ausgebildet ist, wobei der Kugelkäfig nach einem Stoß durch die Schulter (20D) bewirkt, daß die Kugeln (9) zwischen der konischen Fläche (1H; 31A) und dem Schubteil (20) außer Eingriff gebracht werden und dadurch die Minenführung unter der Einwirkung der ersten Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie Zurückhaltemittel (1J, 8B) zum Außereingriffhalten der Kugeln. Zwischen der konischen Fläche (1H, 31A) und dem Schubteil (20) gegen die Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung aus das Schreibende des Gehäuses aufweist.

19. Mechanischer Schreibstift gemäß Anspruch 1, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige konische Außenfläche (2C) auf einem Stutzen (2L), der praktisch einstückig mit der Minenführung (2) gebildet und koaxial innerhalb des Gehäuses (1) montiert ist, wobei die konische Fläche (2c) in ihrem Durchmesser in Richtung ihrer Erstreckung auf das Schreibende des Gehäuses hin abnimmt, sowie eine Anzahl Kugeln (9), die sich normalerweise zwischen der konischen Fläche (2C) und dem Gehäuse (1) befinden, aufweisen.

20. Mechanischer Schreibstift gemäß Anspruch 19, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen dem Gehäuse (1) und dem Stutzen (2L) angeordnet ist und die Kugeln (9) rotierbar trägt sowie relativ zu der konischen Fläche (2C) und dem Gehäuse (1) verschiebbar ist, um die Kugeln dazwischen in und außer Eingriff zu bringen, sowie eine zweite Druckfeder (10) aufweist, die auf den Kugelkäfig einwirkt, um die Kugeln zwischen die konische (2C) und das Gehäuse (1) in Eingriff zu bringen.

21. Mechanischer Schreibstift gemäß Anspruch 20, dadurch gekennzeichnet, daß die Entarretierungseinrichtung ein Anschlag (5A), der in fester Beziehung zu dem Gehäuse (1) gebildet ist, so daß an ihm der Kugelkäfig (8) nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß anstößt, wobei der Kugelkäfig nach dem Anstoßen an den Anschlag bewirkt, daß die Kugeln (9) im Zwischenraum zwischen der konischen Fläche (2C) und dem Gehäuse (1) gegen die Wirkung der zweiten Druckfeder (10) außer Eingriff gebracht werden und dadurch die Minenführung unter der Wirkung der ersten Druckfeder (6) zurück in Richtung aus das Schreibende des Gehäuses wandern gelassen wird, sowie Zurückhaltemittel (2D, 8C) zum Außer-

eingriffhalten der Kugeln zwischen der konischen Fläche (2C) und dem Gehäuse (1) entgegen der Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung auf das Schreibende des Gehäuses aufweist.

22. Mechanischer Schreibstift gemäß Anspruch 1, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige konische Innenfläche (1H), die koaxial auf dem Gehäuse (1) gebildet ist und deren Durchmesser mit ihrer Erstreckung in Richtung auf das Schreibende des Gehäuses abnimmt, einen Stutzen (2L), der praktisch einstückig mit der Minenführung (2) ausgebildet und koaxial innerhalb des Gehäuses (1) montiert ist, sowie eine Anzahl Kugeln (9), die sich normalerweise zwischen der konischen Fläche (1H) und dem Stutzen (2L) befinden.

23. Mechanischer Schreibstift gemäß Anspruch 23, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen röhrenförmigen Kugelkäfig (8), der konzentrisch zwischen dem Gehäuse (1) und dem Stutzen (2L) angeordnet ist und rotierbar die Kugeln (9) trägt sowie relativ zu der konischen Fläche (1H) und dem Stutzen (2L) axial verschiebbar ist, um die Kugeln dazwischen in und außer Eingriff zu bringen, sowie eine zweite Druckfeder (10), die auf den Kugelkäfig einwirkt, um die Kugeln zwischen die konische Fläche (1H) und den Stutzen (2L) in Eingriff zu bringen, aufweist.

24. Mechanischer Schreibstift gemäß Anspruch 23, dadurch gekennzeichnet, daß die Entarretierungseinrichtung einen Kragen (2A), der an dem Stutzen (2L) gebildet ist, zum Stoßen des Kugelkäfigs (8) entgegen der Wirkung der zweiten Druckfeder (10), nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß erfolgt ist, in Richtung vom Schreibende des Gehäuses (1, 23) weg, wobei der Kugelkäfig nach dem Stoßen durch den Kragen (2A) bewirkt, daß die Kugeln (9) zwischen der konischen Fläche (1H) und dem Stutzen (2L) außer Eingriff gebracht werden und dadurch die Minenführung unter der Wirkung der ersten Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie Zurückhaltemittel (1L, 8A) zum Außereingriffhalten der Kugeln zwischen der konischen Fläche (1H) und dem Stutzen (2L) entgegen der Wirkung der zweiten Druckfeder (10) während der Rückkehr der Minenführung in Richtung aus das Schreibende des Gehäuses aufweist.

25. Mechanischer Schreibstift gemäß Anspruch 1, bei dem ein Schubteil (20) innerhalb des Gehäuses (1) vorgesehen und starr an die Minenführung (2) gekuppelt ist, um die Klemmeinrichtung (5, 11, 12, 13) in Abhängigkeit von der Verschiebung der Minenführung zu relativ zu dem Gehäuse zu öffnen und zu schließen, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung einen röhrenförmigen Ansatz (20F) des Schubteils (20) der innerhalb des Gehäuses koaxial angeordnet ist, eine röhrenförmige Auskleidung (25) aus elastischem Material, das unbeweglich an der Innenoberfläche des Gehäuses angebracht ist sowie einen ringförmigen konischen Wulst (20G), der an dem Ansatz

(20F) des Schubteils (20) zum reibenden Eingreifen mit der elastischen Auskleidung (25) ausgebildet ist, aufweist, wobei der konische Wulst (20G) mit zunehmender Entfernung von dem Schreibende des Gehäuses einen abnehmenden Durchmesser aufweist.

26. Mechanischer Schreibstift gemäß Anspruch 25, dadurch gekennzeichnet, das mindestens ein Teil des rohrförmigen Ansatzes (20F) des Schubteils (20) Schlitzte aufweist, um eine elastische Deformierung nach radial einwärts zu ermöglichen, und daß die Entarretiereinrichtung ein rohrförmiges Teil (26) aufweist, das coaxial innerhalb des Gehäuses (1) montiert ist, um eine axiale Verschiebung relativ dazu zu erlauben, und daß einen konischen Innenabschnitt (26A) aufweist, um nach Rückzug der Minenführung (2) bis zu einem bestimmten Ausmaß mit dem Ansatz (20F) des Schubteils in Eingriff zu treten, wobei das rohrförmige Teil (26) nach Ineingrifftreten mit dem Schubteilansatz (20F) bewirkt, daß sich dieser radial einwärts deformiert und daß dadurch der konische Wulst (20G) darauf mit der elastischen Auskleidung (25) auf der Innenfläche des Gehäuses außer Eingriff tritt.

27. Mechanischer Schreibstift gemäß Anspruch 1, bei dem ein Schubteil (20) innerhalb des Gehäuses (1) angeordnet und starr an die Minenführung (2) gekuppelt ist, um in Abhängigkeit von der Verschiebung der Minenführung im Verhältnis zu dem Gehäuse die Klemmeinrichtung (5, 11, 12, 13) zu öffnen und zu schließen, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung einen rohrförmigen Ansatz (20F) des Schubteils (20) innerhalb des Gehäuses in coaxialer Beziehung dazu, eine Reihe ringförmiger Rändel (1M) eines sägezahnförmigen axialen Abschnittes, der auf der Innenoberfläche des Gehäuses gebildet ist, sowie einen ringförmigen konischen Wulst (20G), der auf dem Ansatz (20F) des Schubteils (20) gebildet ist, um mit den ringförmigen Rändeln (1M) in Eingriff zu treten und dessen Durchmesser mit der Entfernung von dem Schreibende des Gehäuses abnimmt.

28. Mechanischer Schreibstift gemäß Anspruch 27, dadurch gekennzeichnet, daß mindestens ein Teil des rohrförmigen Ansatzes (20F) des Schubteils (20) mit Schlitzten zur radial einwärts gerichteten elastischen Deformierung versehen ist und daß die Entarretierungseinrichtung ein rohrförmiges Teil (26) aufweist, das coaxial innerhalb des Gehäuses (1) zur axialen Verschiebung relativ dazu montiert ist und einen konischen Innenabschnitt (26a) zum Eingriff mit dem Schubteilansatz (20F) nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß aufweist, wobei das rohrförmige Teil (26) nach Eingriff mit dem Schubteilansatz (20F), dessen elastische Deformierung radial einwärts und dadurch das Außereingrifftreten des konischen Wulstes (20G) darauf von den ringförmigen Rändeln (1M) auf der Innenoberfläche des Gehäuses bewirkt.

29. Mechanischer Schreibstift gemäß Anspruch 1, bei dem ein Schubteil (20) innerhalb des Gehäuses (1) angeordnet und starr an die Minenführung (2) gekuppelt ist, um die Klemmeinrichtung (5, 11, 12, 13) in Abhängigkeit von der Verschiebung der Minenführung im Verhältnis zu dem Gehäuse zu öffnen

und zu schließen, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretierungseinrichtung einen rohrförmigen Ansatz (20F) des Schubteils (20) innerhalb des Gehäuses in coaxialer Beziehung sowie eine Reihe ringförmiger Rändel (20H) eines sägezahnförmigen axialen Abschnittes, der auf der Außenfläche des Schubteilansatzes (20F) gebildet ist, sowie einen ringförmigen konischen Innenwulst (1N), der auf dem Schubteilansatz (20F) gebildet ist, um mit den ringförmigen Rändeln (20H) in Eingriff zu treten, aufweist, wobei der konische Innenwulst mit abnehmender Entfernung zum Schreibende des Gehäuses hin einen geringeren Durchmesser aufweist.

30. Mechanischer Schreibstift gemäß Anspruch 29, dadurch gekennzeichnet, daß mindestens ein Teil des rohrförmigen Ansatzes (20F) des Schubteils (20) mit Schlitzten zur radial einwärts gerichteten elastischen Deformierung versehen ist und daß die Entarretierungseinrichtung ein rohrförmiges Teil (26) aufweist, das coaxial innerhalb des Gehäuses (1) zur axialen Verschiebung relativ dazu montiert ist und einen konischen Innenabschnitt (26a) zum Ineingriffgelangen mit dem Schubteilansatz (20F) nach Rückzug der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß aufweist, wobei das rohrförmige Teil (26) nach Ineingriffgelangen mit dem Schubteilansatz (20F) bewirkt, das sich dieses radial einwärts elastisch deformiert und dadurch die ringförmigen Rändel (20H) darauf von dem konischen Wulst (1N) auf die Innenoberfläche des Gehäuses außer Eingriff treten.

31. Mechanischer Schreibstift gemäß Anspruch 1, dadurch gekennzeichnet, daß die eine Richtung wirkende Arretiereinrichtung einen Stutzen (30), der an der Minenführung (2) befestigt und axial verschiebbar coaxial innerhalb des Gehäuses (1) angeordnet ist, ein konisches Teil (31), das innerhalb des Gehäuses unbeweglich montiert ist und eine ringförmige konische Innenfläche (31A), die den Stutzen (30) konzentrisch umgibt, wobei die konische Fläche (31A) einen mit ihrer Ausdehnung in Richtung auf das Schreibende des Gehäuses abnehmenden Durchmesser aufweist, sowie eine Anzahl Kugeln (9) aufweist, die normalerweise zwischen dem Stutzen (30) und der konischen Oberfläche (31A) des konischen Teils (31) vorhanden sind.

32. Mechanischer Schreibstift gemäß Anspruch 31, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außer dem einen rohrförmigen Kugelkäfig (8), der konzentrisch zwischen dem konischen Teil (31) und dem Stutzen (30) angeordnet ist und rotierbar die Kugeln (9) trägt sowie relativ zu der konischen Fläche (31A) und dem Stutzen (2L) axial verschiebbar ist, um die Kugeln dazwischen in und außer Eingriff zu bringen sowie ein Kugelkäfigzurückhaltemittel (32; 40; 41), das zwischen dem Gehäuse (1) und dem Kugelkäfig (8) durch Reibungskräfte die axiale Verschiebung des letzteren bezüglich des ersteren zurückhält.

33. Mechanischer Schreibstift gemäß Anspruch 32, dadurch gekennzeichnet, daß das Kugelkäfigzurückhaltemittel (32; 41) in Form eines Rohres aus elastischem Material vorliegt und unbeweglich innerhalb des Gehäuses (1) coaxial dazu montiert ist sowie einen einwärts gebogenen Kranz (32A; 41A)

zum Reibungseingriff mit dem Kugelkäfig (8) aufweist.

34. Mechanischer Schreibstift gemäß Anspruch 32, dadurch gekennzeichnet, daß das Kugelkäfigzurückhaltemittel (40) in Form eines Rohres aus elastischem Material vorliegt und über den Kugelkäfig (8) unbeweglich befestigt ist sowie einen Flansch (40A) zum Reibungseingriff mit dem Gehäuse (31C) aufweist.

35. Mechanischer Schreibstift gemäß Anspruch 32, dadurch gekennzeichnet, daß die Entarretierungsvorrichtung einen ersten Flansch (30A), der an einem Ende des Stutzens (30) gebildet ist, um den Kugelkäfig (8) nach Zurückziehen der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß gegen die Reibungskraft des Kugelkäfigzurückhaltemittels (32; 40; 41) vom Schreibende des Gehäuses (1) wegzustoßen, wobei der Kugelkäfig nach dem Stoß durch den ersten Flansch bewirkt, daß die Kugeln (9) zwischen dem Stutzen (30) und der konischen Fläche (31A) außer Eingriff gebracht werden und dadurch die Minenführung unter der Kraft der Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie einen zweiten Flansch (30C) am anderen Ende des Stutzens (30) aufweist, um den Kugelkäfig (8) gegen die Reibungskraft des Kugelkäfigzurückhaltemittels (32; 40; 41) gegen Ende der in Richtung auf das Schreibende des Gehäuses gerichteten Bewegung der Minenführung in Richtung auf das Schreibende des Gehäuses (1) zu stoßen.

36. Mechanischer Schreibstift gemäß Anspruch 35, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem eine rohrförmige Kugelstoßeinrichtung (34), die über dem Stutzen (30) zur axialen Verschiebung relativ zu diesem angeordnet und gegen die Kugeln (9) gehalten ist, sowie eine zweite Druckfeder (35) aufweist, die zwischen der Kugelstoßeinrichtung (34) und dem zweiten Flansch (30C) des Stutzens (30) wirkt, um die Kugeln (9) zwischen dem Stutzen (30) und der konischen Fläche (31A) in Eingriff zu bringen.

37. Mechanischer Schreibstift gemäß Anspruch 1, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung eine ringförmige konische Außenfläche (30E), die coaxial auf einem Stutzen (30) gebildet ist, der starr mit der Minenführung (2) verbunden und coaxial innerhalb des Gehäuses (1) zur gemeinsamen axialen Verschiebung mit der Minenführung im Verhältnis zu dem Gehäuse angeordnet ist, wobei die konische Fläche (30E) mit abnehmender Entfernung zum Schreibende des Gehäuses einen abnehmenden Durchmesser aufweist, ein rohrförmiges Teil (39), das unbeweglich und coaxial innerhalb des Gehäuses montiert und radial auswärts von dem Stutzen (30) aus angeordnet ist, sowie eine Anzahl Kugeln (9) aufweist, die normalerweise zwischen der konischen Fläche (30E) und dem rohrförmigen Teil (39) vorhanden sind.

38. Mechanischer Schreibstift gemäß Anspruch 37, dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem einen rohrförmigen Kugelkäfig (8), der konzentrisch zwischen dem Stutzen (30) und dem rohrförmigen Teil

(39) angeordnet ist und rotierbar die Kugeln (9) trägt sowie relativ zu der konischen Fläche (30E) und dem rohrförmigen Teil (39) axial verschiebbar ist, um die Kugeln dazwischen in und außer Eingriff zu bringen, sowie ein Kugelkäfigzurückhaltemittel (36) aufweist, das zwischen dem Stutzen (30) und dem Kugelkäfig (8) zum Aufhalten der axialen Verschiebung des letzteren in bezug auf den ersteren mittels Reibungskraft wirkt.

39. Mechanischer Schreibstift gemäß Anspruch 38, dadurch gekennzeichnet, daß das Kugelkäfigzurückhaltemittel (36) in der Form eines Rohres aus elastischem Material vorliegt und unbeweglich über den Stutzen (30) coaxial dazu eingepaßt ist sowie einen Flansch (36A) zum reibenden Eingriff mit dem Kugelkäfig (8) aufweist.

40. Mechanischer Schreibstift gemäß Anspruch 38, dadurch gekennzeichnet, daß die Entarretierungseinrichtung einen ersten einwärts gebogenen Kranz (39B) an einem Ende des rohrförmigen Teils (39), gegen den der Kugelkäfig (8) nach Zurückziehen der Minenführung (2) bis zu einem vorgeschriebenen Ausmaß anstößt, wobei der Kugelkäfig nach dem Anstoß gegen den ersten Kranz bewirkt, daß die Kugeln (9) zwischen der konischen Fläche (30E) und dem rohrförmigen Teil (39) entgegen der Reibungskraft des Kugelkäfigzurückhaltemittels (36) außer Eingriff gebracht werden und damit die Minenführung (2) unter der Wirkung der Druckfeder (6) zurück in Richtung auf das Schreibende des Gehäuses wandern gelassen wird, sowie einen zweiten einwärts gebogenen Kranz (39A) am anderen Ende des rohrförmigen Teils (39) aufweist, gegen den der Kugelkäfig (8) gegen Ende der Wanderung der Minenführung zurück in Richtung auf das Schreibende des Gehäuses anstößt, wobei der Kugelkäfig nach dem Anstoßen gegen den zweiten Kranz bewirkt, daß die Kugeln zwischen der konischen Fläche (30E) und dem rohrförmigen Teil (39) entgegen der Reibungskraft des Kugelkäfigzurückhaltemittels (36) erneut in Eingriff gebracht werden.

41. Mechanischer Schreibstift gemäß Anspruch (40), dadurch gekennzeichnet, daß die in eine Richtung wirkende Arretiereinrichtung außerdem eine rohrförmige Kugelstoßeinrichtung (37), die über den Kugelkäfig (8) zur axialen Verschiebung relativ zu diesem gepaßt und mit dem Ende nach vorn gegen die Kugeln (9) gehalten wird, sowie eine zweite Druckfeder (38) aufweist, die zwischen der Kugelstoßeinrichtung (37) und dem zweiten Kranz (39A) des rohrförmigen Teils (39) wirkt, um die Kugeln (9) zwischen der konischen Fläche (30E) und dem rohrförmigen Teil (39) in Eingriff zu bringen.

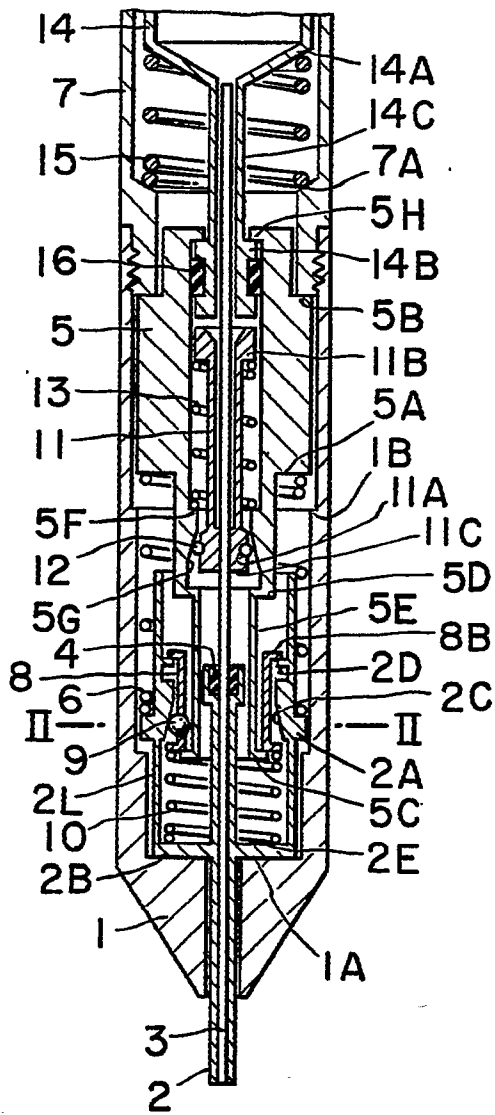


FIG. 1

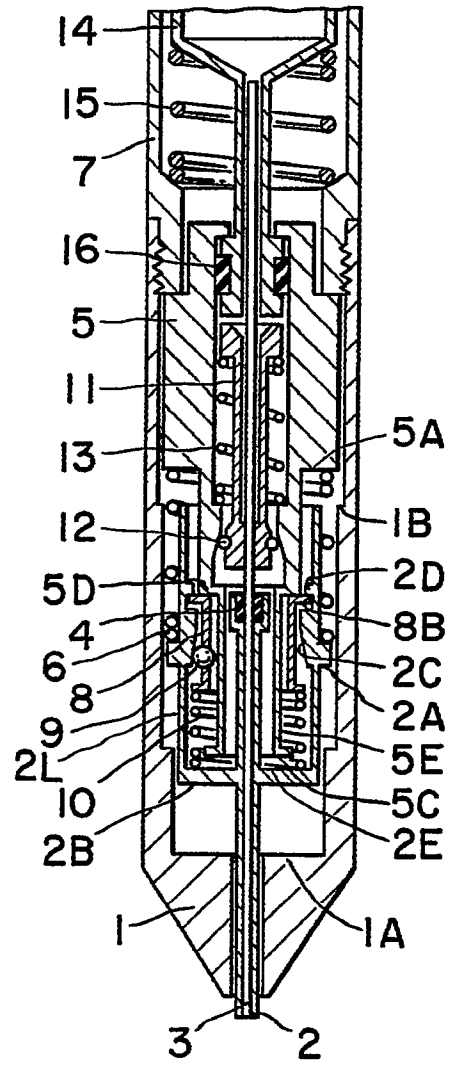


FIG. 3

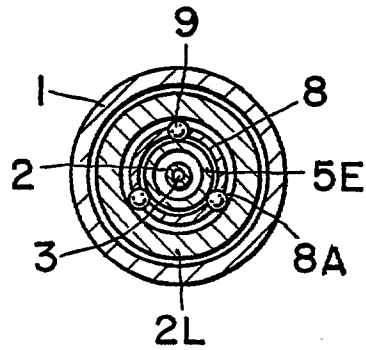


FIG. 2

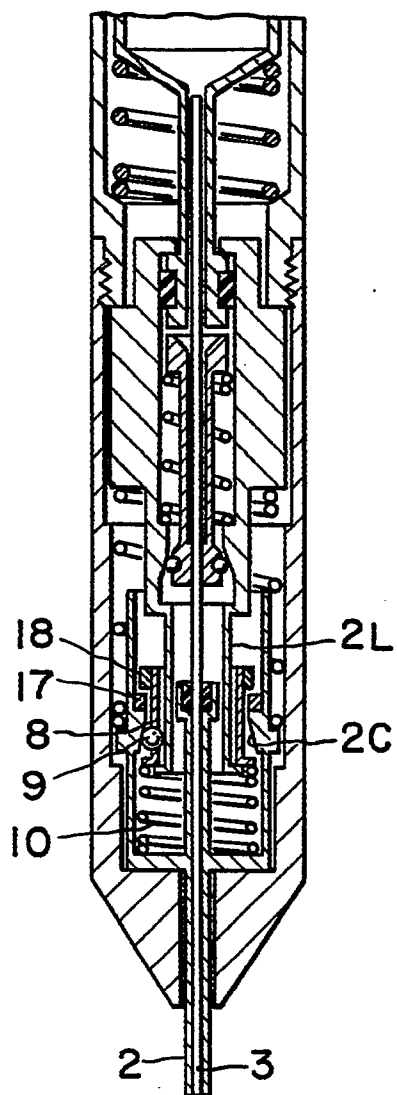


FIG. 4

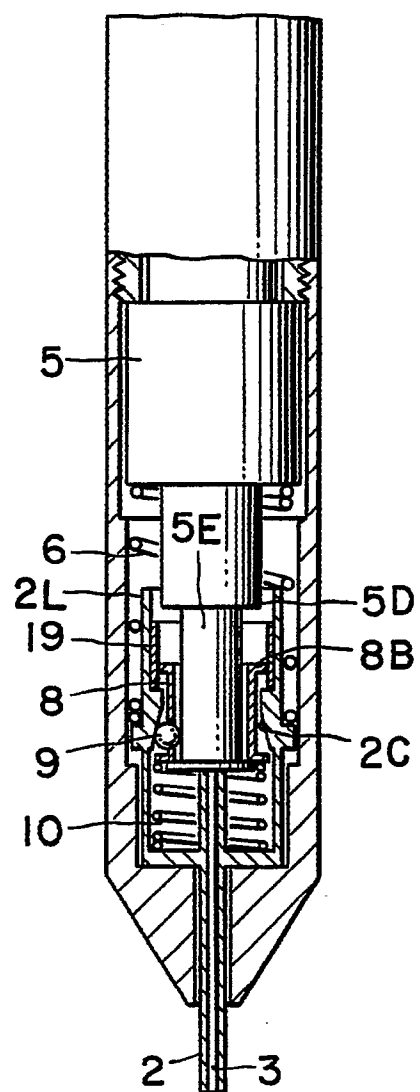


FIG. 5

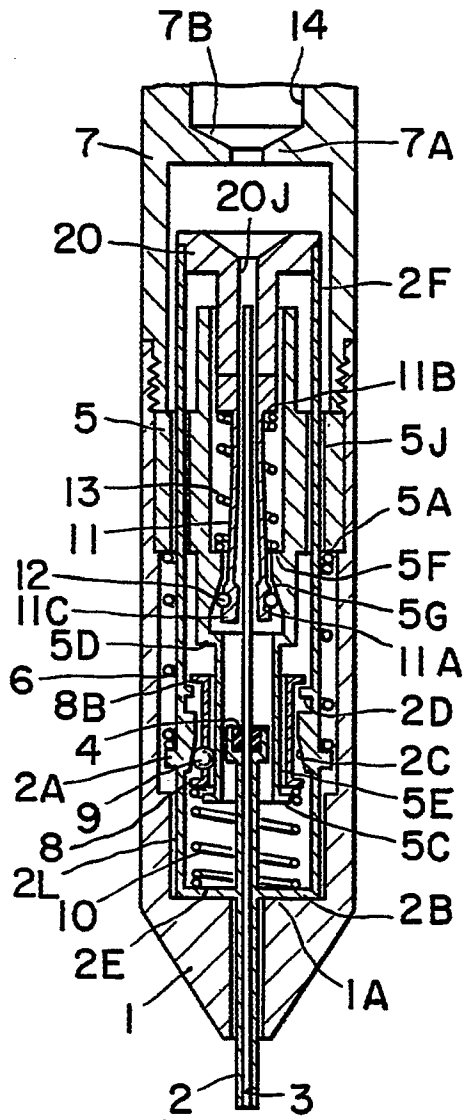


FIG. 6a

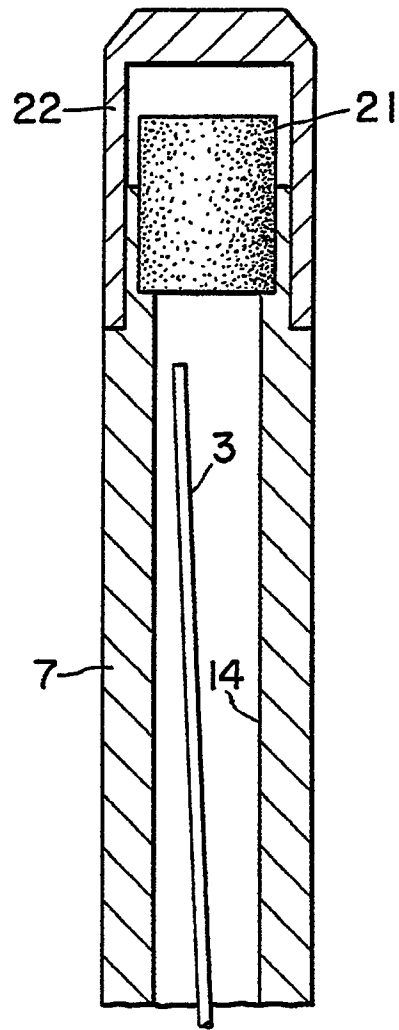


FIG. 6b

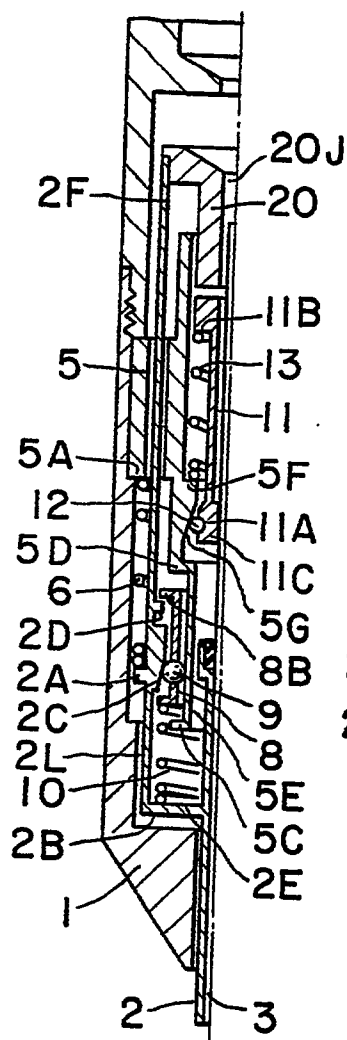


FIG. 7

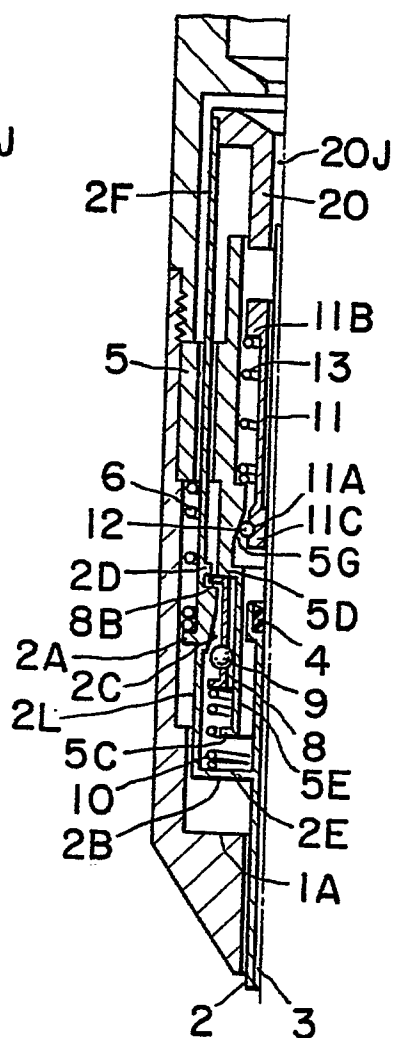


FIG. 8

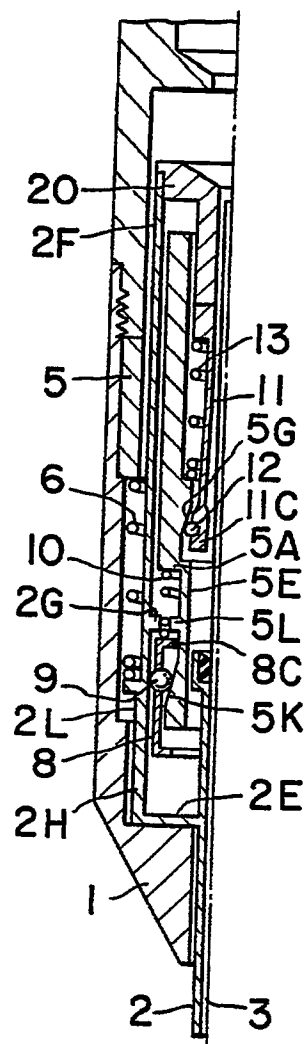


FIG. 9

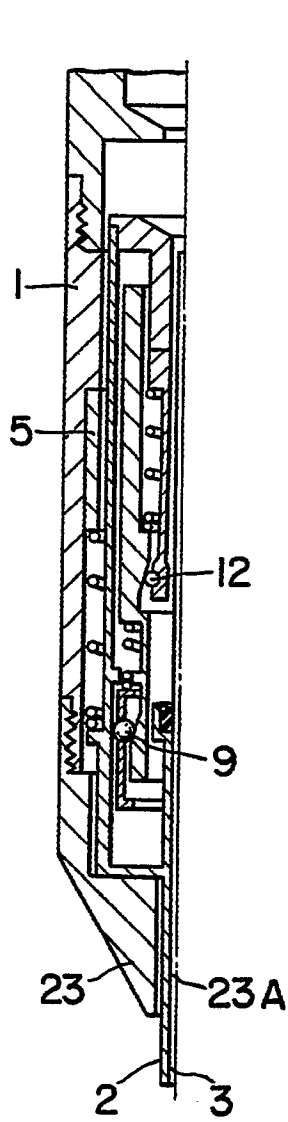


FIG. 10

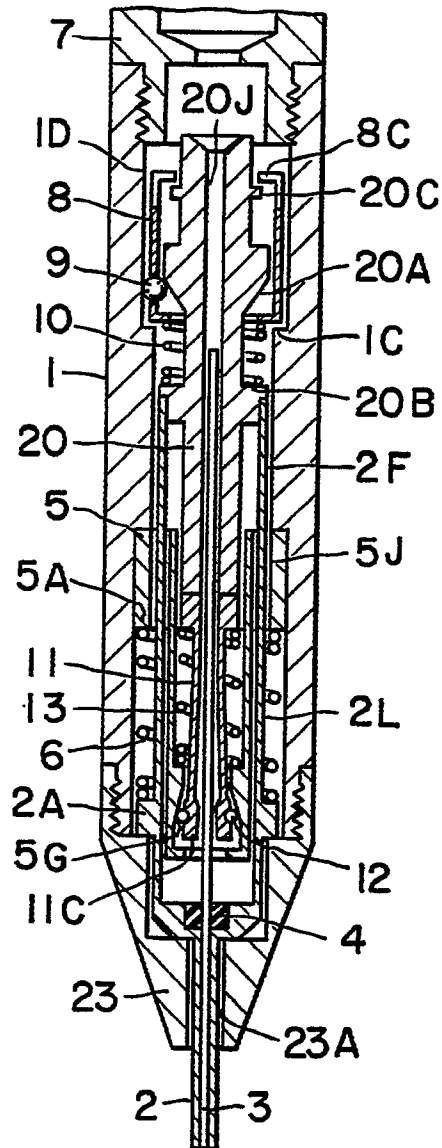


FIG. 11

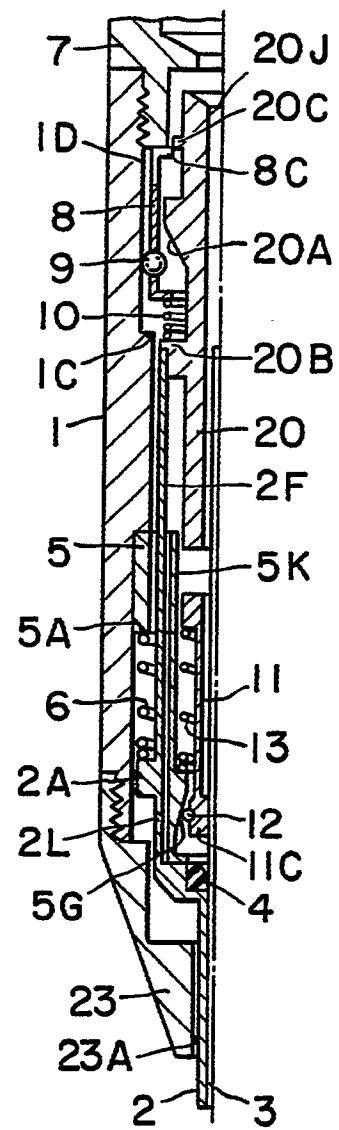


FIG. 12

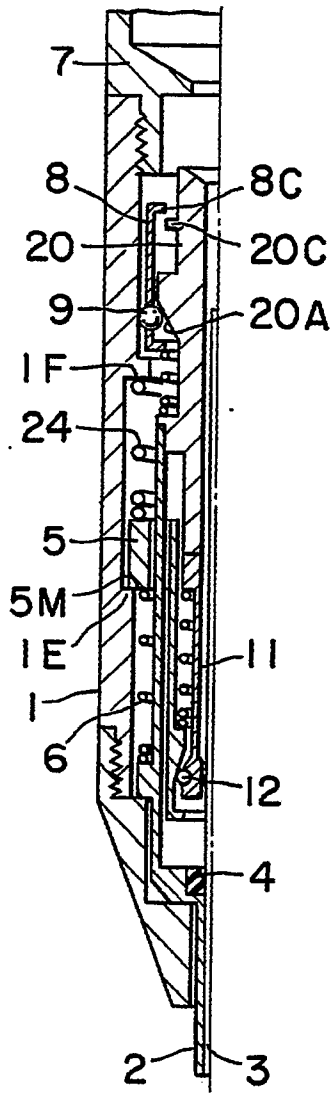


FIG. 13

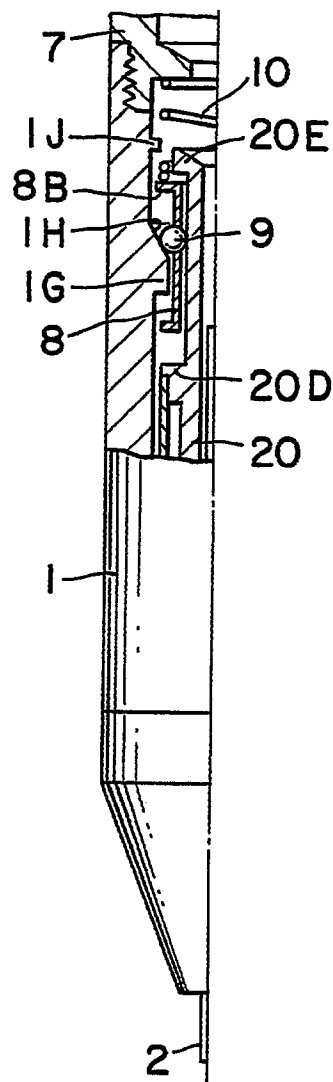


FIG. 14

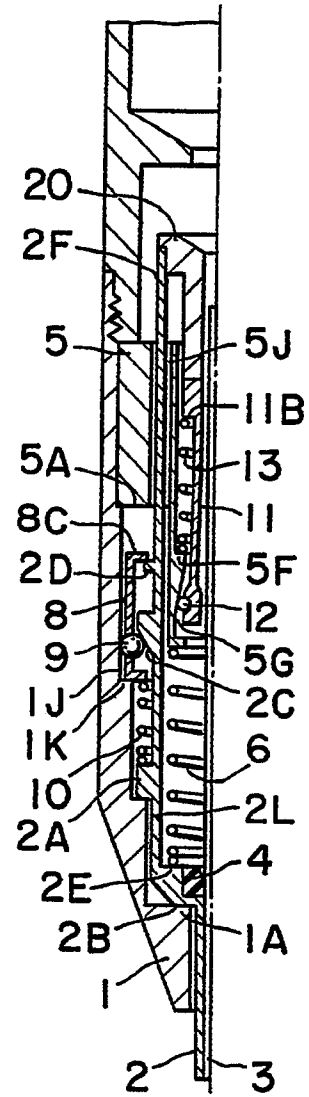


FIG. 15

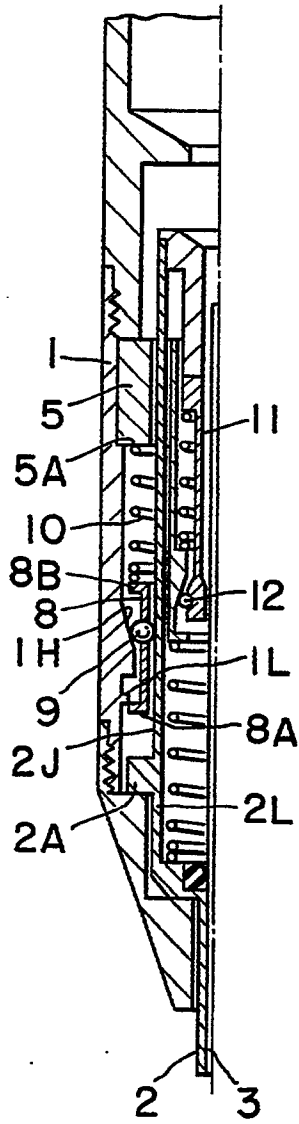


FIG. 16

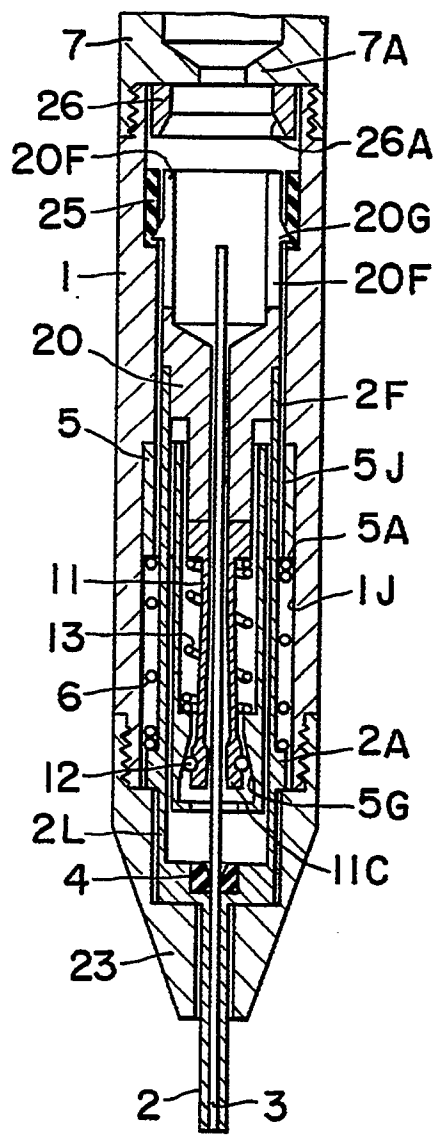


FIG. 17

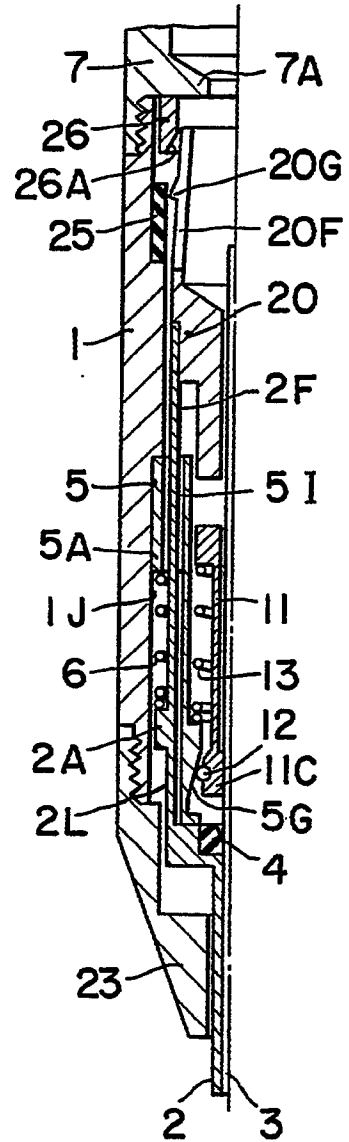


FIG. 18

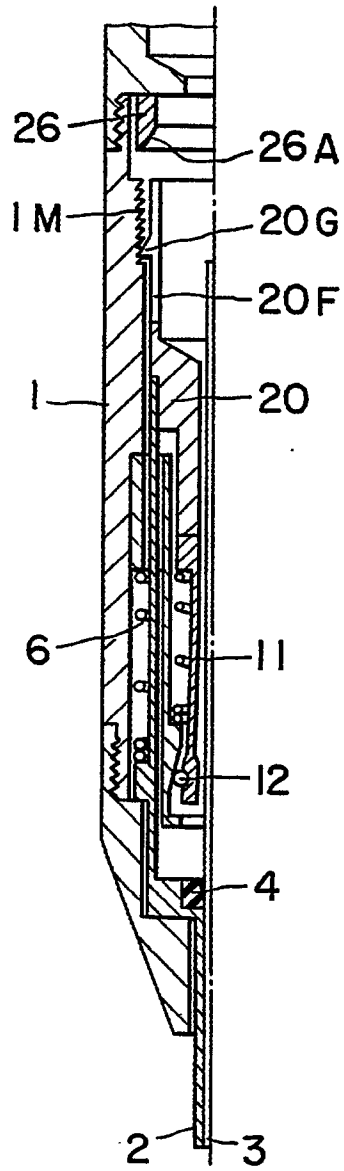


FIG. 19

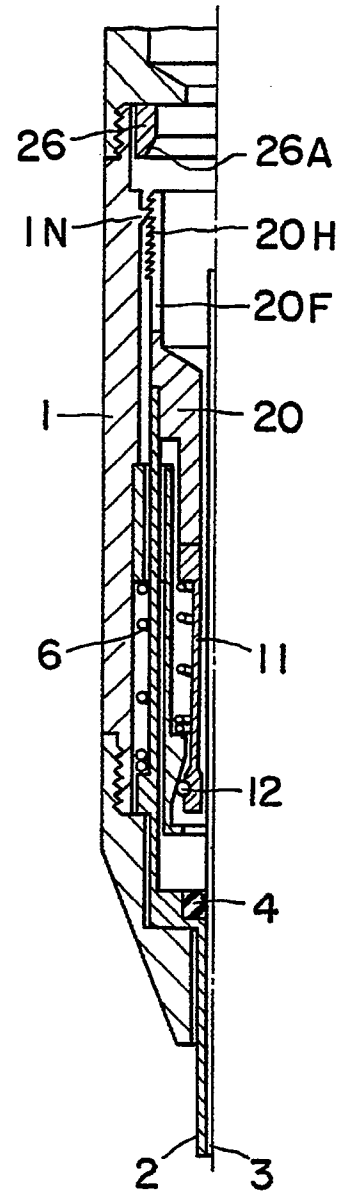


FIG. 20

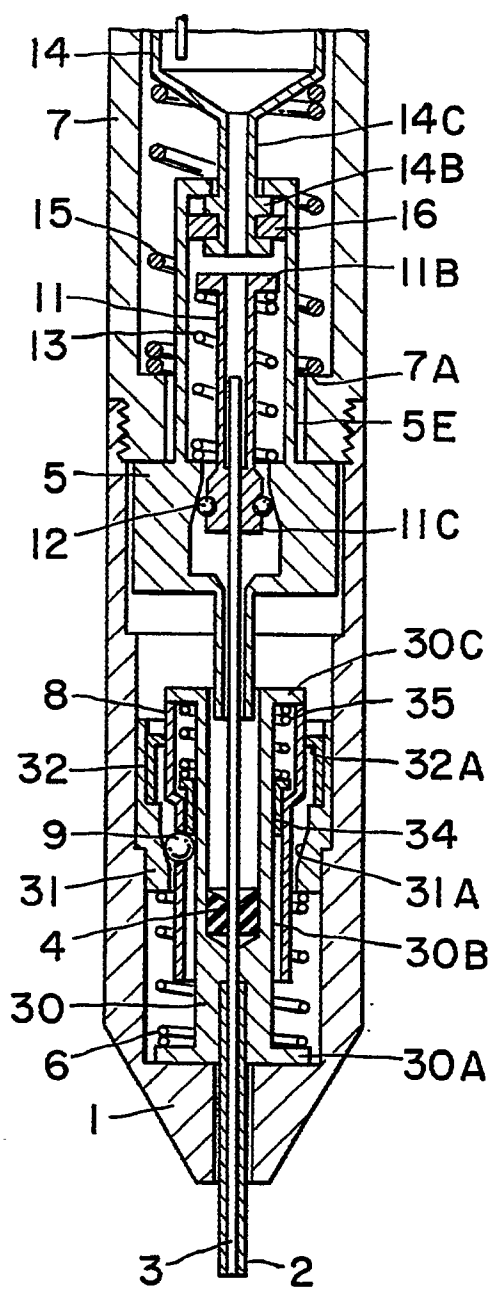


FIG. 21

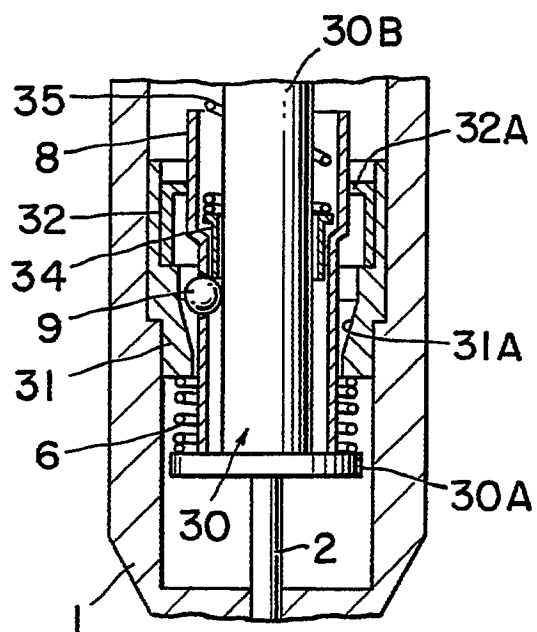


FIG. 22

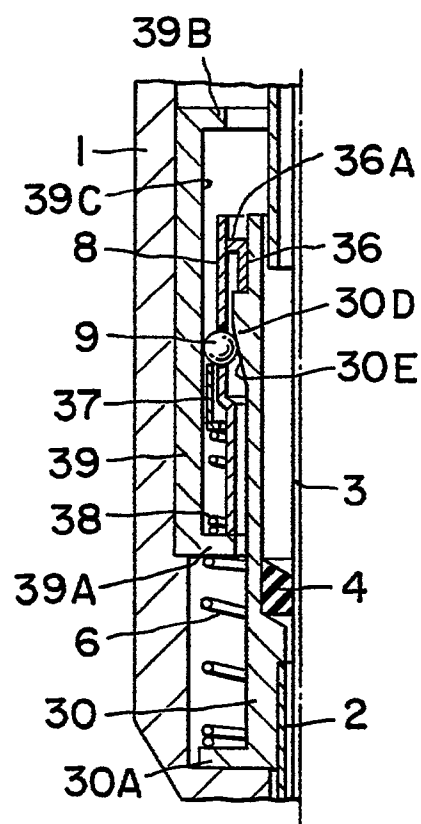


FIG. 23

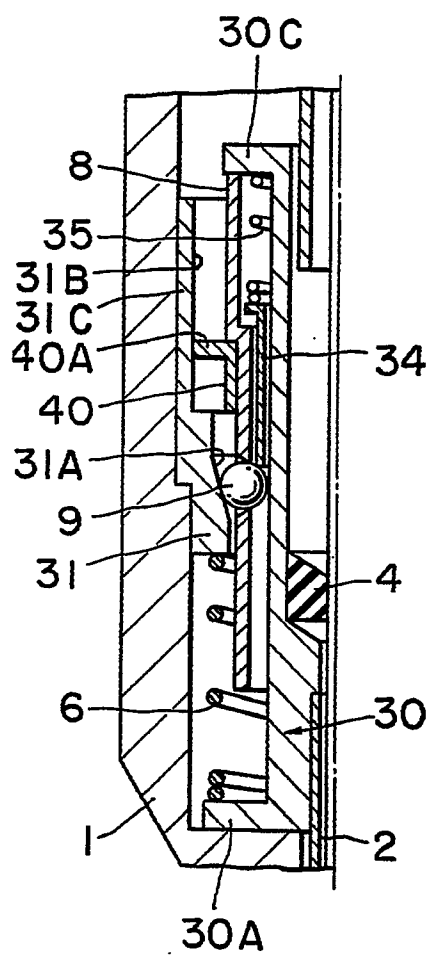


FIG. 24

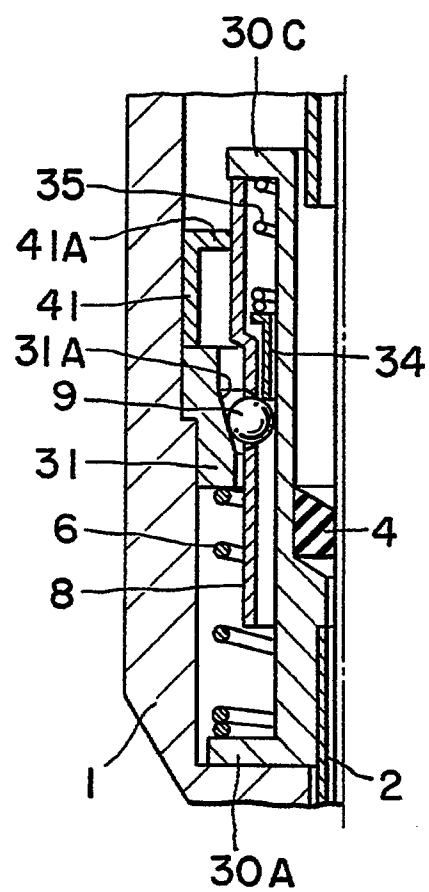


FIG. 25

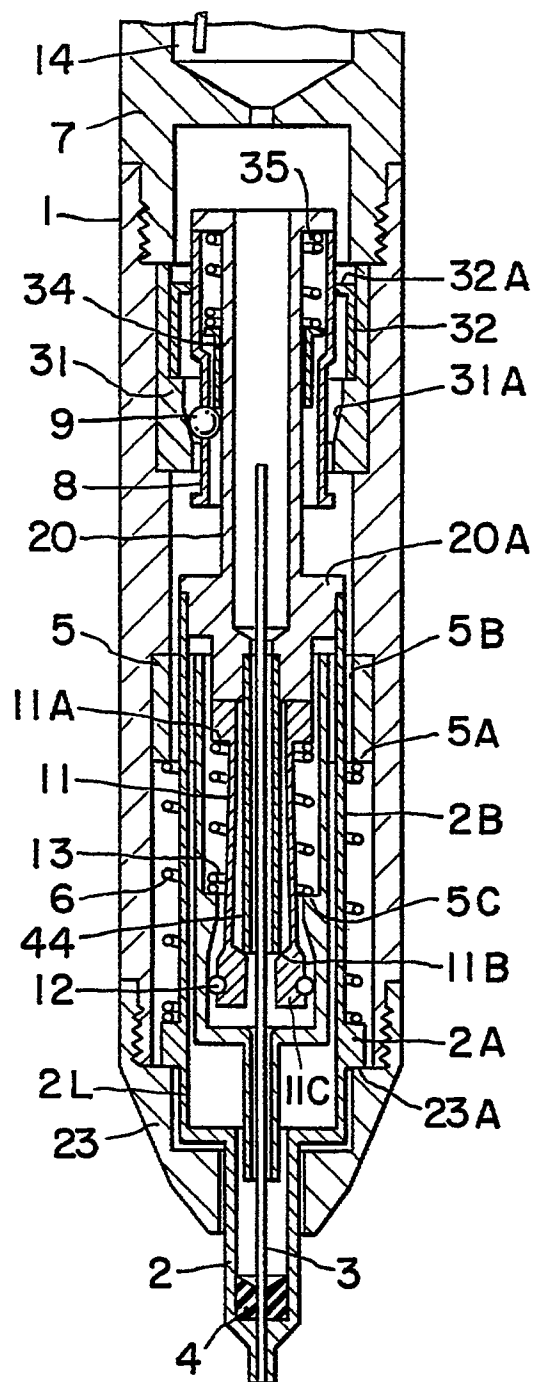


FIG. 26