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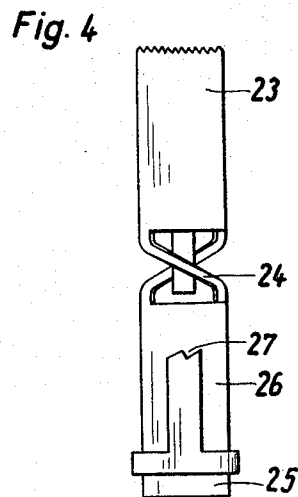
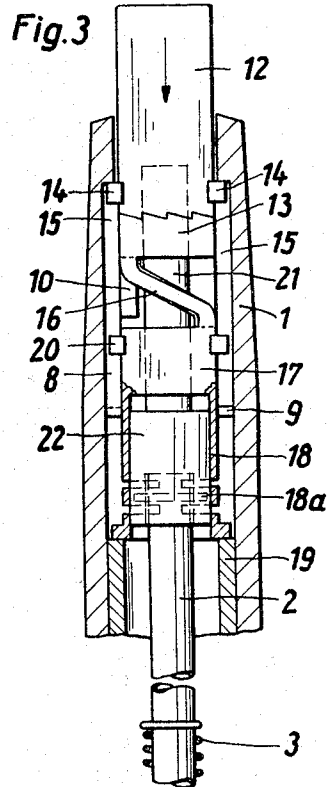
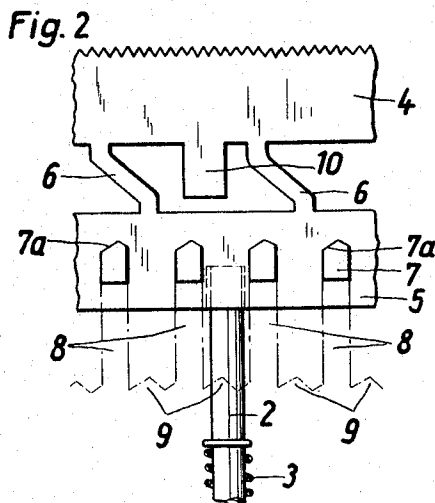
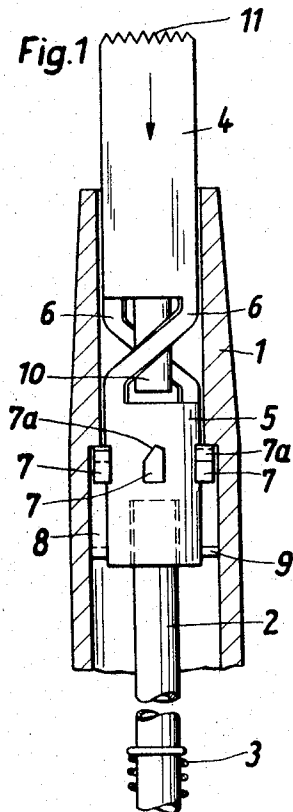
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3,298,357

BALL-POINT PENCIL

Filed Nov. 19, 1964

2 Sheets-Sheet 1



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BY

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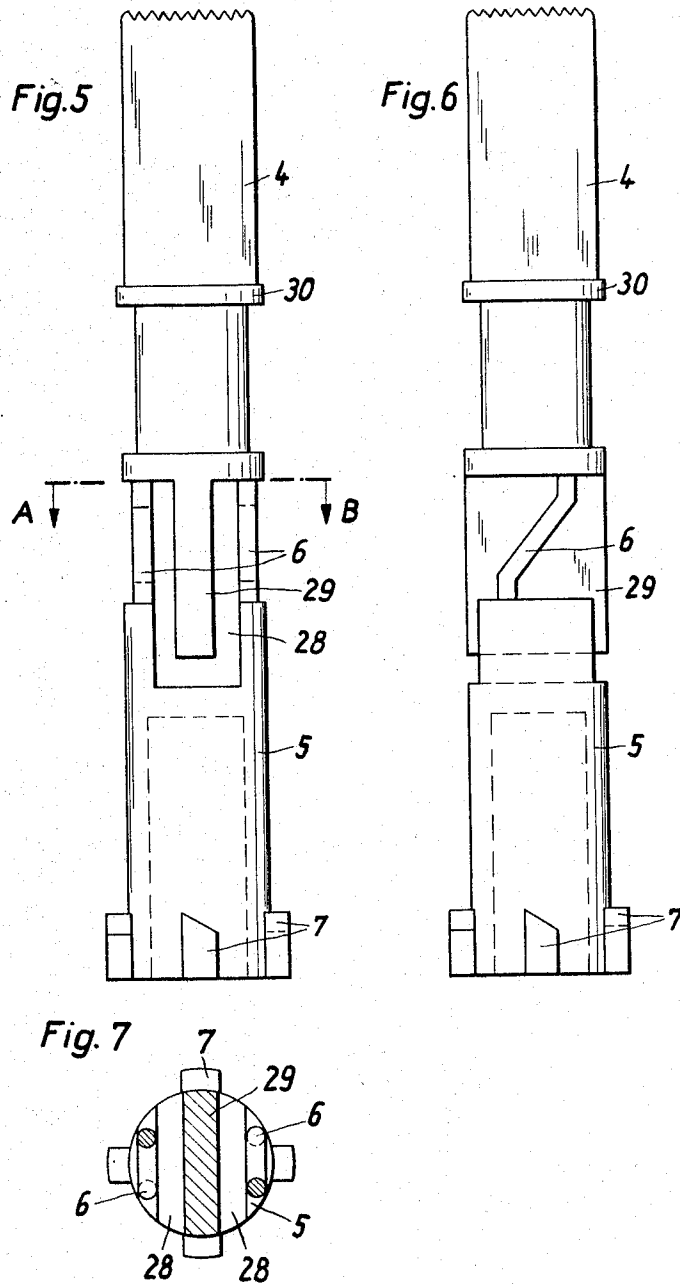
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BALL-POINT PENCIL

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## BALL-POINT PENCIL

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8 Claims. (Cl. 120—42.03)

This invention concerns a pencil, especially a ball-point pencil having a longitudinally adjustable spring-loaded refill, of the kind having, for adjusting the refill, a pressing pin arranged in the pencil barrel and a rotatable operating member acting directly on the refill and having bevelled cams which engage alternately in long and short notches formed in the barrel, the cams being disengaged, when the pressing pin is actuated, from the momentarily assumed notches and owing to a short rotary movement of the operating member subject to the action of the refill spring engage in the adjacent notches. In a known ball-point pen of this kind the rotary movement of the operating member is caused by downwardly projecting teeth with bevelled tooth profiles arranged on the pressing pin and adapted to cooperate with correspondingly bevelled elements of the operating member in such a manner that the operating member leaves one operating position when the pressing pin is actuated and executes a rotary movement corresponding to the magnitude of bevel of the tooth profiles into the next operating position. The adjusting mechanism of a pencil constructed in this manner requires at least three independent individual parts. Since the rotary movement of the operating member is caused by inclined surfaces sliding one on the other, the mechanism is also liable to impairment in its ready operating ability.

In accordance with the invention a pencil of the kind referred to has the pressing pin and the operating member for bringing about the rotary movement of the operating member operationally interengaged by means of a rotary elastic intermediate member.

In place of one rotary elastic intermediate member two or more such intermediate members may be used which together form the operational engagement. Preferably the rotary elastic intermediate members comprise resilient supports arranged out of center extending in an inclined plane or about the longitudinal axis of the pressing pin in the manner of a coil. The elastic intermediate members may also consist of inclined supports with bending joints at both ends. The extent of twist and the axial compression of the rotary elastic intermediate member when the pressing pin is actuated is preferably limited by a stop, for example, a stop pin mounted at the bottom of the pressure pin, between the latter and the operating member.

In a mechanism constructed in accordance with the invention the rotary movement of the operating member is brought about by the fact that the rotary elastic intermediate member is twisted between the pressing pin and the operating member on actuation of the pressing pin, and the operating member has a torsional stress imparted to it which, when the cam of the operating member emerges from an operating position, comes into effect and causes the operating member to be released into the next operating position by bending the elastic

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intermediate member or members. It will be appreciated that inclined surfaces adapted to slide one on the other and causing friction on component parts for causing the rotary movement of the operating member are omitted in accordance with the invention. The pressing pin, the torsionally elastic intermediate member or the rotary elastic intermediate members, the operating member and also the stop member limiting the relative movement of pressing pin and operating member in accordance with the invention can be produced integrally and, for example, of plastics material mass produced by injection molding or die casting, so that the ball point pen—with the exception of the refill with adjusting spring, which always have to be present—can be made of only two individual components, namely the pencil barrel and the operating unit if the pencil barrel is adapted at its upper end to be enlarged elastically, e.g. by forming a slot, so that the operating unit can be introduced. The pencil barrel however is preferably constructed in two parts in the conventional manner.

The invention is illustrated by way of example in the accompanying drawings in which:

FIGS. 1 and 3 each show a longitudinal section through the upper end of a ball-point pen constructed in accordance with the invention.

FIG. 2 shows the unrolled adjusting mechanism for the pens of FIGS. 1 and 3,

FIG. 4 shows the adjusting element separately,

FIGS. 5 and 6 show a further embodiment of an adjusting element in two views, and

FIG. 7 shows a section on the line A—B of FIG. 5.

In FIGS. 1 and 3 the numeral 1 designates the pencil barrel, 2 the refill and 3 the refill adjusting spring.

The adjusting mechanism consists of a pressing pin 4, an operating member 5 and resilient supports 6 which—arranged out of center of the longitudinal axis of the pressing pin and enclosing it in a coil—interconnect the pressing pin and the operating member. The adjusting member moreover also includes—see also FIG. 2—cams 7 mounted on the operating member and having bevelled upper end faces 7a and notches 8 and 9 inside in the pencil barrel. The numeral 10 designates a stop pin mounted at the bottom of the pressing pin 4. The pressing pin 4, in order to prevent it on pressing actuation from rotating relative to the pressing finger, is provided e.g. with a fluted pressing surface 11.

The operation of refill adjustment by means of the mechanism shown in FIGS. 1 and 2 is effected as follows:

In the position shown in the drawings the refill 2 is in the inoperative retracted position. In this position the cams 7 of the operating member 5 are disposed in the long notches 8 in the pencil sleeve 1. If, in order to cause the refill to assume the writing position, pressure is exerted on the pressing pin 4 in the direction of the arrow shown, then the pressing pin 4, the operating member 5 and the refill 2 are displaced in the pressing direction. The displacement takes place against the pressure of spring 3 with the result that the pressing pin 4 and the operating member 5 during displacement slightly approach one another, the resilient supports being slightly bent and imparting a torsional stress to the operating member. The approaching movement of the pressing pin and the operating member is limited by the stop pin 10 which after a distance determined by its length settles on the operating member 5, so that the bending supports are prevented from being excessively stressed. The feed

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movement of pressing pin 4 and operating member 5 moreover causes the operating member cams 7 to slide downwards and finally to be disengaged from the notches 8 and released. Releasing the cams 7 causes the resilient supports 6 already slightly bent to be further bent; due to the action of the refill spring they bend further and thereby rotate the operating member 5, so that its cams 7, during the return movement of the pressing pin and operating member under the pressure of spring 3, engage in the adjacent short notches 9. In this position the refill assumes the writing position.

Moving the refill from the writing position back into the inoperative position, i.e. transferring the cams 7 from the short notches 9 into the long notches 8 takes place in the same manner.

In the embodiment shown in FIG. 3, the pressing pin comprises two parts 12 and 13, the upper part of which is guided non-rotatably by means of guide cams 14 in guide grooves 15 formed in the pencil barrel, while the lower rotatable part 13 is connected by means of resilient supports 16 with an operating member 17 to form a unit. The parts 12 and 13 at their contact surfaces are serrated with a sawtooth-like construction, so that part 13 is able to rotate relative to part 12 only in one direction. Mounted on the operating member 17 in this construction is a downwardly directed tubular extension 18, the lower part of which is of resilient construction due to horizontally extending slots 18a offset through 90° relative to one another and supported against a fixed stop 19 in the pencil sleeve. The operating cams are designated by 20.

This construction is distinguished from the construction shown in FIG. 1 by the feature that the pressing pin acts directly on the refill 2. For this purpose a pressing bolt 21 engaging in the pressing pin part 12, to the bottom of which bolt is secured a pressure member 22 guided in the tubular extension 18 of the operating member, the pressure member in any position being mounted directly on the refill 2.

The mechanism shown in FIG. 3 operates as follows: In the position of the parts as shown, the refill 2 is in the inoperative retracted position. In this position the cams 20 of the operating member 17 are engaged in the long notches 8 of the pencil sleeve 1. If, in order to cause the refill to assume a writing position, pressure is exerted on the pressing pin 12 in the direction of the arrow shown, then on the one hand the pressing pin 12, 13 and the pressing bolt 21 are displaced with the pressing member 22 and on the other hand the operating member 17, connected by resilient supports 16 with the pressing pin part 13, together with the tubular extension 18 is displaced in the direction of pressure. The displacement of the pressing pin 12, the pressing bolt 21 and the pressing member 22 takes place against the pressure of the refill spring 3, while the displacement of the unit 13, 17, 18 takes place against the pressure of the resilient part 18a supported against the stop 19.

When the operating unit 13, 17, 18 is advanced—as described in connection with FIG. 1—the pressing pin 12, 13 and the operating member 17 approach one another, the resilient supports 16 corresponding to the play between pressing knob and operating member being slightly bent and the operating member 17 hereby having a torsional stress imparted thereto. The advancing movement of the operating unit moreover results in the operating cams 20 sliding downwards in the long notches 8 and finally emerging therefrom, with the result that the resilient supports 16 already slightly bent are bent further under the force of the refill spring 3 and thereby rotate the operating member 17 so that its cams 20, under the pressure of the spring 18a during its return movement, engage in the adjacent short notches 9.

On cessation of the pressure against the pressing pin, the pressing member 22 and hence the pressing bolt 21 and also the pressing pin part 12 are upwardly displaced by the distance which separates the pressing member 22

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from the operating member 17. The displacement movement of the pressing member 22 on passing this distance is terminated by the pressing member stopping against the operating member 17.

When the described end positions of the operating unit 13, 17, 18 and the pressing member 22 have been reached, then the operating procedure is ended.

Returning the pencil into the inoperative position takes place in the same manner with the only difference that the cams 20 are transferred from the short notches 9 back into the long notches 8.

The mechanism constructed in accordance with the invention may also be so constructed that the operating cams 7, 20 instead of being formed on the operating member 17 are formed inside the pencil sleeve and the notches alternately receiving the cams are formed on the operating member instead of in the pencil sleeve. An adjusting element constructed in this manner comprising pressing pin 23, bending supports 24 and operating member 25 is shown in FIG. 4. The operating member 25 in this construction is provided with long notches 26 and with short notches 27, with which accordingly arranged cams in the pencil sleeve (not shown) are associated.

A preferred embodiment of an adjusting member is reproduced in FIGS. 5-7. In construction it corresponds substantially to that shown in FIG. 1. The operating element as therein comprises a pressing pin 4, an operating member 5 with cams 7 which is brought into operational engagement with the pressing pin by means of resilient supports 6. The difference relative to the construction shown in FIG. 1 consists in that the operating member 5 in the upper part is provided with a recess 28 and the approaching movement between pressing pin 4 and operating member 5 is limited by means of a flat stop element 29 projecting into this recess. The advantage of this construction is that, by suitable dimensioning of length and width of the stop element and its lateral clearance from the side walls of the notch 28, when the resilient supports are bent, a lateral abutment of the stop member also takes place, so that the stressing of the resilient supports is limited to a minimum and their life consequently extended. It is possible to provide on the pressing pin a projecting stop edge 30 which in the retracted position abuts against an extension of a shank, so that the resilient supports cannot be destroyed by extreme tractive forces exerted on the pressing pin.

I claim:

1. A pencil having a barrel and a spring loaded writing part retractable in the barrel, a pressing pin carried in the barrel for actuating the writing part, a rotatable operating member for abutting the writing part, cammed retracting means comprising long and short notches in said barrel extending in axial direction of the barrel and cam surfaces extending between the barrel and the operating members, the cam surfaces being disposed on said operating member and adapted to engage alternately in said long notches and said short notches in response to movement of said pressing pin, in which a rotatable resilient intermediate member operationally interengages the pressing pin with the operating member.

2. A pencil according to claim 1 in which the long and short notches are provided on the operating member and the cam surfaces are provided in the barrel.

3. A pencil according to claim 1 in which the intermediate member has an inclined resilient support.

4. A pencil according to claim 3 having a stop for limiting movement of the pressing pin toward the operating member.

5. A pencil according to claim 2 in which the operating member has lateral inner surfaces defining a recess and a flat stop element provided between the pressing pin and the operating member projects into said recess.

6. A pencil according to claim 3 in which the pressing pin has upper and lower parts with serrated interengaging faces, the guide ribs in the barrel for non-rotatably

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guiding said upper part and resilient supports connecting the lower part with the operating members, a downwardly extending resilient tubular extension being provided on the operating member and having horizontally extending mutually perpendicular slots, stops on the barrel engaging in said slots, a pressure member being guided in said tubular extension for engaging the writing part, and a pressing bolt being mounted in the pressing pin and secured to the pressure members.

7. A pencil according to claim 6 in which a shoulder is provided on the pressing pin and a corresponding stop is provided in the barrel for preventing inadvertent withdrawal of the pressing pin from the barrel.

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8. A pencil according to claim 6 in which the writing part is a ball-point pen refill.

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