1,029,358

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,029,358

Date of Application and filing Complete Specification: Nov. 19, 1964.

No. 47261/64.

Application made in Germany (No. B74402 VIIb/70b) on Nov. 26, 1963.

Complete Specification Published: May 11, 1966.

© Crown Copyright 1966.

Index at acceptance:—B6 P11M

Int. Cl.:—B 43 c

COMPLETE SPECIFICATION

Retractable Ball-Point Pens

I, JACOB RITTER trading as JACOB RITTER K.G. of Brensbach, Odenwald, Germany; a German national do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a ball-point pen 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 co-operate 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 pen substantially of the kind referred to incorporates a pressing pin and an operating member operationally interengaged by means of a torsionally elastic intermediate member which brings about the rotary movement of the operating member.

In place of one torsionally elastic intermediate member two or more such intermediate members may be used which together form the operational engagement. Preferably the elastic intermediate members comprise resilient supports arranged out of centre 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 elastic intermediate member when the pressing pin is actuated is preferably limited by at least one stop. Such a stop may be a pin mounted at the bottom of the pressing pin, between the latter and the operating member. Alternatively such a stop may be a pin secured externally to an elastic intermediate 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 torsionally 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. 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, 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 moulding or die casting, so that the ball point pen—with the exception of the refill with adjusting

[Price 4s. 6d.]

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 a developed view of the adjusting mechanism for the pens of Figs. 1 and 3,

Fig. 4 shows an adjusting element separately,

Fig. 4*a* shows a modification of an adjusting element,

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 centre 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 7*a* 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 Fig. 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 approach 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 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, whilst 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 18*a* 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.

The stop pin is designated 10 in Fig. 3. In contrast to the embodiment shown in Fig. 1, wherein the stop pin 10 is secured in the centre of the pressing pin, the stop 10 is in this case mounted on the periphery of the pressing pin cross section. The general construction may be even further modified and, as illustrated in Fig. 4*a* the stop pins may be secured on the outside of the elastic intermediate members so that when the pressing pin is actuated, they are stopped against the pressing pin and against the operating member.

These constructions are both distinguished from the construction shown in Fig. 1 wherein the pressing pin acts directly on the refill 2. For this purpose a pressing bolt 21 is provided which engages 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 and with them the pressing member 22; 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 pressure member 22 takes place against the pressure of the refill spring 3, whilst the displacement of the unit 13, 17, 18 takes place against the pressure of the resilient part 18*a* 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 7, under the pressure of the spring 18*a* during its return movement, engage in the adjacent short notches 9.

On cessation of the pressure against the pressing pin, the pressure member 22 and hence the pressing bolt 21 and also the pressing pin part 12 are upwardly displaced by the distance *a*, which separates the pressing member 22 from the operating member 17. The displacement movement of the pressure member 22 on passing the distance *a* is terminated by the pressure 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 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 comprises pressing pin 23, ~~bond~~ bend ing 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 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, also a lateral abutment of the stop member 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.

WHAT WE CLAIM IS:—

1. A ball-point pen with a longitudinally adjustable spring-loaded refill having, for adjusting the refill, a pressing pin and a rotatable operating member acting on the refill and having bevelled cams or long and short notches for engaging alternately in long and short notches or bevelled cams respectively, the said notches extending in the axial direction in the pencil barrel, the cams being disengaged, when the pressing pin is actuated, from the momentarily occupied notches and owing to a short rotary movement of the operating member under action of the refill spring engage in adjacent notches, in which the pressing pin and the operating member are operationally interengaged by means of a torsionally elastic intermediate member or members.

2. A pen as claimed in claim 1 in which the intermediate member is a diagonally or helically extending resilient support or sup-

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 and with them the pressing member 22; 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 pressure member 22 takes place against the pressure of the refill spring 3, whilst the displacement of the unit 13, 17, 18 takes place against the pressure of the resilient part 18*a* 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 7, under the pressure of the spring 18*a* during its return movement, engage in the adjacent short notches 9.

On cessation of the pressure against the pressing pin, the pressure member 22 and hence the pressing bolt 21 and also the pressing pin part 12 are upwardly displaced by the distance *a*, which separates the pressing member 22 from the operating member 17. The displacement movement of the pressure member 22 on passing the distance *a* is terminated by the pressure 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 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 comprises pressing pin 23, ~~bond~~ bend ing 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 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, also a lateral abutment of the stop member 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.

WHAT WE CLAIM IS:—

1. A ball-point pen with a longitudinally adjustable spring-loaded refill having, for adjusting the refill, a pressing pin and a rotatable operating member acting on the refill and having bevelled cams or long and short notches for engaging alternately in long and short notches or bevelled cams respectively, the said notches extending in the axial direction in the pencil barrel, the cams being disengaged, when the pressing pin is actuated, from the momentarily occupied notches and owing to a short rotary movement of the operating member under action of the refill spring engage in adjacent notches, in which the pressing pin and the operating member are operationally interengaged by means of a torsionally elastic intermediate member or members.

2. A pen as claimed in claim 1 in which the intermediate member is a diagonally or helically extending resilient support or sup-

ports, arranged out of centre, or inclined with bending joints at both ends.

3. A pen as claimed in claims 1 or 2 having a stop for limiting the approaching movement between pressing pin and operating member when turning the torsionally elastic intermediate member.

4. A pen as claimed in claim 3 in which the pressing pin consists of two parts serrated at the contact surfaces, the upper part of which is guided non-rotatably in the pen barrel by means of guide cams whilst the lower rotatable part is connected to form a unit by means of resilient supports with an operating member, a downwardly directed tubular extension is provided on the operating member, the lower part of the extension being of resilient construction and supported on the fixed stop in the pencil sleeve by means of horizontally extending slots offset through 90° relative to one another, and a pressing bolt is mounted in the pressing pin, the pressing bolt being secured to a pressure member which is guided in a tubular extension of the operating member, and the pressure member being directly mounted on the refill in each position of the latter.

5. A pen as claimed in any previous claim in which the rotatable operating member acts directly on the refill.

6. A pen as claimed in any of the preceding claims in which the operating member in the upper part has a recess defined by lateral inner surfaces and a corresponding flat stop element is provided between the pressing pin and the operating member, and projects into the recess.

7. A pen as claimed in any of the preceding claims in which the long and short notches are in the operating member and the cams co-operating therewith are arranged on the inner surface of the pencil barrel.

8. A pen as claimed in any of the preceding claims in which a shoulder is provided on the pressing pin and a corresponding stop is provided in the pencil barrel in order to safeguard the pressing pin against being pulled out of the pencil sleeve.

9. A pen as claimed in any preceding claim in which stopping pins not connected to the pressing pin are secured externally to the elastic intermediate member or intermediate members, in such a manner that when the pressing pin is actuated they are supported against the pressing pin and the operating member.

10. A ball-point pen, having a longitudinally adjustable spring-loaded refill, substantially as described with reference to and as illustrated in Figs. 1 and 2 of the accompanying drawings.

11. A ball-point pen, having a longitudinally adjustable spring-loaded refill, substantially as described with reference to and as illustrated in Figs. 2 and 3 of the accompanying drawings.

12. An adjusting element for a ball-point pen substantially as described with reference to and as illustrated in Fig. 4 or Fig 4*a* of the accompanying drawings.

13. A ball-point pen, having a longitudinally adjustable spring-loaded refill, substantially as described with reference to and as illustrated in Figs 5, 6 and 7 of the accompanying drawings.

POTTS & CO.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press (Leamington) Ltd.—1966. Published by The Patent Office, 25 Southampton Buildings, London. W.C.2, from which copies may be obtained

* C L M S *