

Dec. 23, 1958

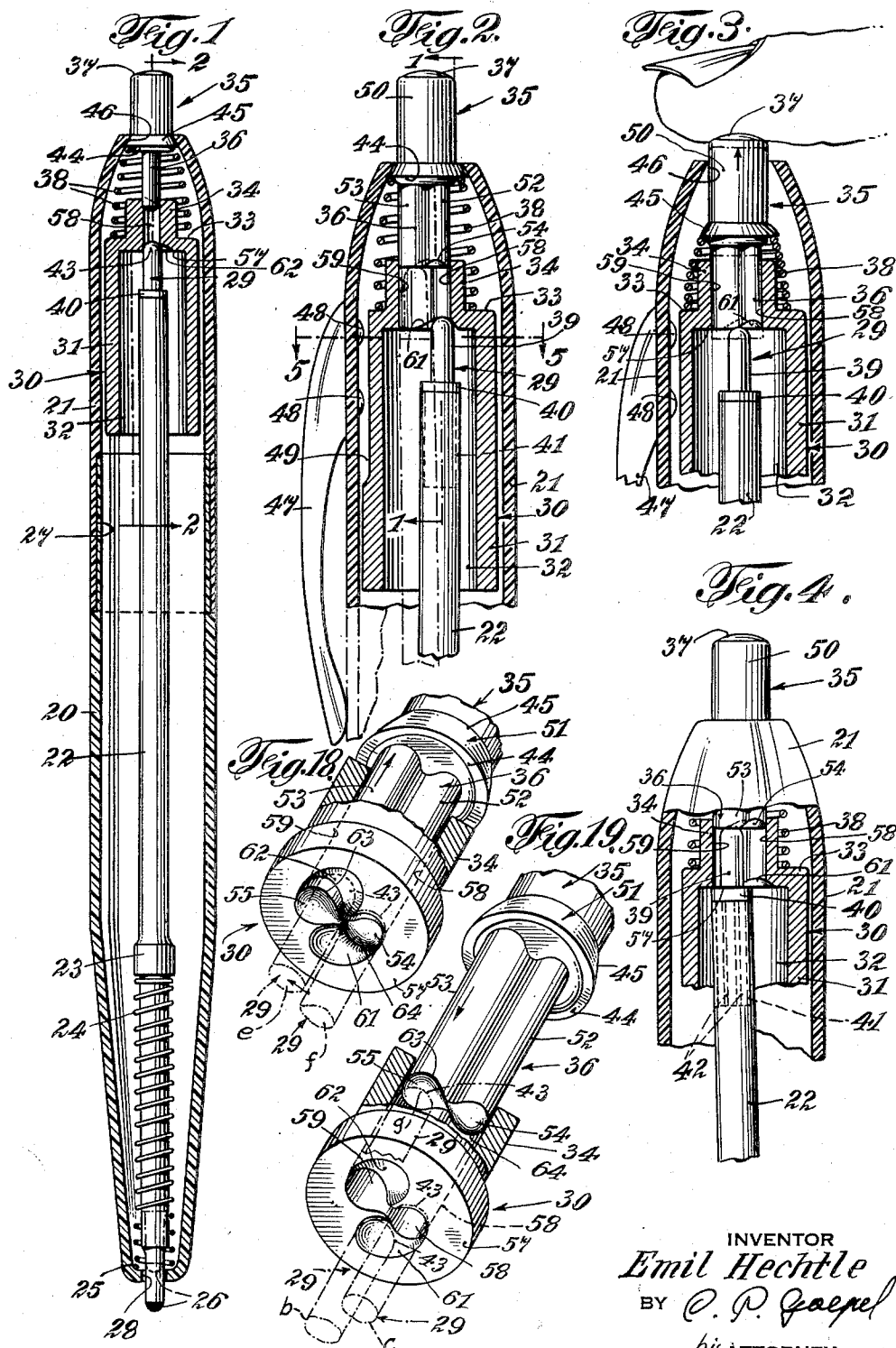
E. HECHTLE

2,865,333

WRITING IMPLEMENTS

Filed Oct. 20, 1954

2 Sheets-Sheet 1



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E. HECHTLE

2,865,333

WRITING IMPLEMENTS

Filed Oct. 20, 1954

2 Sheets-Sheet 2

Fig. 6.

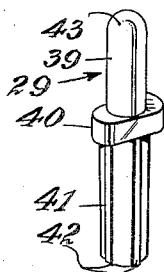


Fig. 4.

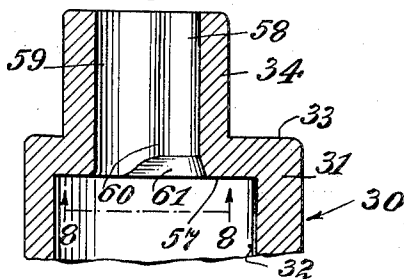


Fig. 9.

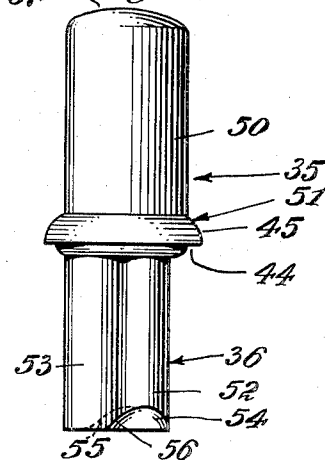


Fig. 5.

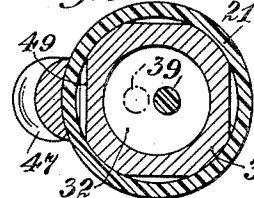


Fig. 8.

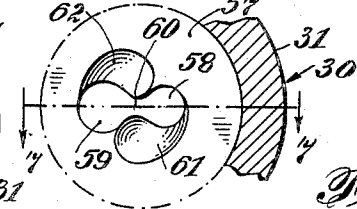


Fig. 11.

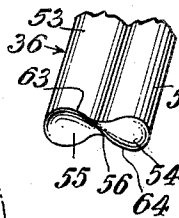


Fig. 10.

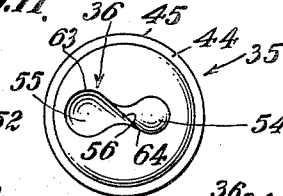


Fig. 12.

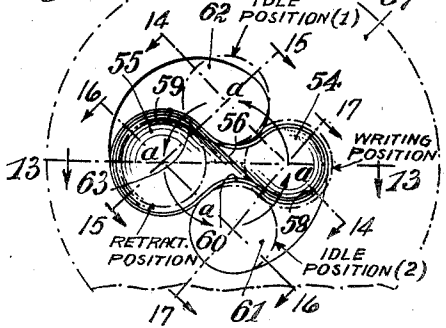


Fig. 13.

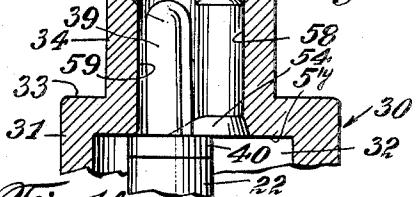


Fig. 16.

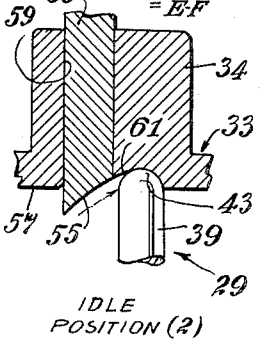


Fig. 17.

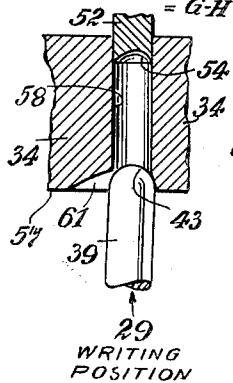


Fig. 14.

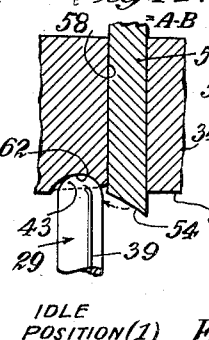
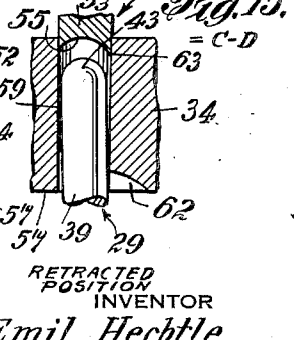


Fig. 15.



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2,865,333

WRITING IMPLEMENTS

Emil Hechtle, Elmhurst, N. Y., assignor, by mesne assignments, to Paper Mate of Puerto Rico, Inc., Salinas, Puerto Rico, a corporation of Puerto Rico

Application October 20, 1954, Serial No. 463,407

12 Claims. (Cl. 120—42.03)

This invention relates to writing implements, and more particularly to a plunger type device having a working point projectable from and retractable into one end of an elongated body.

In its broadest aspects, the invention relates to a novel cam system enabling its user to obtain not only two extreme positions of a follower member, but also a number of intermediate positions between such extreme positions by successive depressions of the plunger into an intermediate member which serves as a receptacle for the follower or as an abutment therefor, depending on the desired position of said follower and on the number and sequence of depressions of the plunger.

The surfaces of the cams on the plunger are inclined as the surfaces on a propeller blade and by the movement of one set of plunger cams, they may be brought into alignment with the cams on the stationary intermediate member, whereby the follower may descend along the composite cammed surface until it either plunges into the bore in the intermediate member or is seated with a small head portion thereof in the exit end of another bore with smaller diameter in the intermediate member.

Ball point pens or pencils with a retractable cartridge and a plunger to control the retraction and projection of the cartridge are old. A plurality of such writing implements are on the market, each using a different principle, such as simple cam action, frictional engagement, resilient elements to temporarily retain the cartridge of the device in desired position, and many others. I have found that, in spite of the variety of known and commercially used pens and pencils, there exists an urgent need for a device of this character which is fool-proof, reliable, sturdy and inexpensive in its manufacture. With all these objects in mind, I have devised a retractable writing implement using the pushbutton principle wherein said pushbutton, an intermediate member, and a coordinated element at that end of the cartridge which is inside of the implement body, cooperate in an entirely new manner.

My invention consists essentially in the provision of a novel configuration of the working end of the pushbutton and of an intermediate member which alternately serves as a barrier for the end of the cartridge, or as a receptacle therefor, whereby the cartridge either projects from the housing or is retracted thereinto, depending on the movement of the pushbutton.

The pushbutton principle is one of the many solutions successfully used in writing implements. There are other methods for projecting the cartridge from, or retracting it back into the body of the device, such as a continu-

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ously rotatable button at the upper end of the housing, a button which alternately rotates in clockwise and counterclockwise direction to expel or retract the cartridge, such as described and claimed in an application for Letters Patent filed by me on April 16, 1953, under Serial No. 349,153, or a combination of pushbutton and clip wherein the pushbutton serves to project the cartridge end, and the clip is used to retract the same by releasing said pushbutton to enable it to return into its initial position under the action of a spring, and many others. However, while these principles admittedly provide a usable device, their disadvantage is in that they are either too expensive in manufacture, require double operation, or are unreliable and require a certain amount of concentration for their operation. In contrast to all these devices, I provide a pen which may be operated by a single button and the actions to project or retract the working point are identical. A further advantage of my pushbutton-operated device is in that it requires only one finger of one hand for operation and may also be actuated by simply pressing the button against any rigid object, such as the top panel of the office desk or the like.

A still further advantage of my novel construction in such pushbutton-operated writing implements is in that the up and down movement of the cartridge is controlled and no sudden movement of the cartridge is possible, which is important for the reason that, when a ball point pen is used, the sudden shaking of the cartridge may adversely influence and even stop the flow of paste ink therein. The cartridge is compelled to follow the movement of the pushbutton which again follows the movement of the operator's finger, whereby no sudden release or transition from one position of the cartridge into the other extreme position is possible.

According to this invention, there is provided a writing device having either a graphite working point or a ball point which is alternately projected from or retracted into the housing, depending on the successive depressions of a pushbutton at the upper end of the implement. The cartridge which carries said graphite point or ball point at one end, is provided at its other end with a follower member that may either be integral therewith or insertable thereinto. This follower member follows a substantially circular unidirectional path in the body or on the surface of an intermediate member held in the housing of the writing device between the plunger portion of the pushbutton and the follower member, whereby the follower member alternately enters a bore in the intermediate member and causes retraction of the cartridge with its working end into the housing, or is seated in a shallow depression in the surface of the intermediate member to project the working point from the housing during the use of the writing device. There is also provided a guide path for the follower member to lead it from one into the other of its extreme positions. More particularly, the intermediate member is provided with a plurality of cams, each descending to the next adjacent one circumferentially so that the follower may move on the surfaces thereof; and the plunger portion of the pushbutton is provided with cams having complementary surfaces pressing against the follower on the inward movement of the plunger, to move said follower by the diametrically arranged plunger cams along the intermediate member cams. In the path of this unidirectional movement, the intermediate member has a passageway for the retracted

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position of the pen point, and has an abutment to prevent the follower from moving so as to hold it in extended or writing position.

The invention will be further described in connection with the accompanying drawing wherein one preferred embodiment thereof is shown for illustrative purposes, and the scope of the invention will be defined in the appended claims.

In the drawing:

Fig. 1 is a longitudinal vertical section taken on the line 1—1 of Fig. 2 through a ball point pen embodying my invention, showing the ball point of the cartridge in working position;

Fig. 2 is an enlarged view taken on the line 2—2 of the upper portion of Fig. 1, showing the position of the cartridge as in Fig. 1 in full lines, and its position when the ball point is retracted in dot-dash lines;

Fig. 3 is a further enlarged detail view of the upper end of the device showing the pushbutton depressed by a finger and the position of the upper end of the cartridge during such depression;

Fig. 4 illustrates the position of the upper end of the cartridge when the ball point is retracted;

Fig. 5 is a section on line 5—5 in Fig. 2, showing one mode of insertion and one particular shape of the tubular member surrounding the upper end of the cartridge;

Fig. 6 is an enlarged perspective view of the follower member insertable into the upper end of the cartridge, having a rounded head to follow the lower end of the pushbutton and the cams in the tubular member;

Figure 7 is a vertical section through one portion of the tubular intermediate member surrounding the upper end of the cartridge, taken on line 7—7 in Fig. 8;

Fig. 8 is a fragmentary diagrammatic view taken on line 8—8 in Fig. 7, illustrating the working surface of the tubular member and the two communicating bores alternately receiving the lower end of the pushbutton or the follower member;

Fig. 9 is a side elevational view of the pushbutton;

Fig. 10 is a bottom view of the pushbutton, showing the oppositely inclined cams at the lower end of its plunger portion;

Fig. 11 is a perspective view of the plunger portion of the pushbutton;

Fig. 12 is a diagrammatic view illustrating the different phases and positions of the ball end of the follower member depending on the position of the plunger portion of the pushbutton;

Fig. 13 is a section on line 13—13 in Fig. 12, showing the position of the follower member when the ball point is retracted into the housing;

Fig. 14 is a fragmentary section taken along the line 14—14 of Fig. 12 with the follower member in an intermediate position;

Fig. 15 is a similar view taken along line 15—15 of Fig. 12 with the follower member inside a bore in retracted position;

Fig. 16 is a similar view taken along line 16—16 of Fig. 12 with the plunger in an intermediate position;

Fig. 17 is a similar view taken along line 17—17 of Fig. 12 with the plunger seated in the bore opening corresponding to the cartridge in position for use;

Fig. 18 is a perspective, partly sectional view illustrating the plunger portion of the pushbutton projecting through the intermediate member, and two positions of the follower member in dot-dash lines; and

Fig. 19 is a perspective, partly sectional view illustrating the bottom surface of the intermediate member, the plunger portion of the pushbutton, and three positions of the follower member in dot-dash lines.

Similar characters of reference indicate similar elements throughout the various views illustrated in the drawing.

Referring now in more detail to the illustrated embodiment, and more particularly to Fig. 1, there is shown an elongated housing 20, made preferably of a suitable

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plastic material, the upper end of which is received in a cup 21, which may be made of the same material or of a metal. The fit between housing 20 and cap 21 may be a press-fit, as illustrated in Fig. 1 at 27, but the housing may also be screw-threaded into the cap. An elongated ink paste containing cartridge 22 has a ball point 26 which, in Fig. 1, is shown extending from the lower end of the housing 20 through opening 28, and hence ready for use. While a ball point pen is illustrated in Fig. 1, it is understood that a graphite containing cartridge may be used in its stead.

The cartridge 22 has an enlarged portion or boss 23 which serves as an abutment for the upper end of cylindrical coil spring 24. The lower end of spring 24 abuts against wall 25 in housing 20 and tends to urge the cartridge 22 upwardly and into the housing 20 and cap 21 at all times.

Inside cap 21 is a tubular member 30 having a bore 32 which receives the upper end of cartridge 22. This upper end of the cartridge may be either integral therewith or in the form of a suitably shaped follower element 29, illustrated in more detail in Fig. 6. As illustrated, the element 29 has a substantially cylindrical upper portion 39 above a platform member 40, and a lower portion 41 which fits into the upper end of cartridge 22 and may be provided with longitudinal ribs 42 which prevent said follower from rotation in the cartridge. The rounded head 43 of follower 29 cooperates with the plunger portion 36 of pushbutton 35 and with the stationary intermediate member 30 in a manner which will be described in more detail hereinafter.

The upper reduced portion 34 of intermediate member 30 receives the plunger portion 36 of pushbutton 35 and also the upper portion 39 of follower 29 when the ball point is in its retracted position. A coil spring 38 is inserted between shoulder 33 on stationary member 30 and surface 44 of pushbutton 35 urging the pushbutton outwardly to protrude from the upper end of cap 21 at all times. Head 37 of button 35 is preferably slightly rounded so as not to injure the hand of the operator. The button 35, follower 29, and the intermediate member 30 may be made of a suitable plastic or of metal, and the button may be given various colors to improve the appearance of the device.

Button 35 is illustrated in more detail in Figs. 9, 10 and 11. As seen, it consists of an upper portion 50 which normally protrudes from the upper end of cap 21 through aperture 46, and has rounded head 37. Flange 45 serves to retain the pushbutton 35 within the cap 21 by engaging with its surface 51 the walls of opening 46 in said cap, and said flange 45 further engages with its lower surface 44 the upper end of coil spring 38 which tends to push said button upwardly and outwardly of the cap. The lower portion 36 of button 35 consists of two longitudinally joined rod-like members 52 and 53, the diameter of member 52 being somewhat smaller than the diameter of member 53 for the reasons to be set forth hereinafter. It is essential that the diameter of member 53 be at least equal to the diameter of portion 39 of follower 29, since after every second depression of button 35, the retracting of said rod 53 provides space for the upper end 39 of the follower member 29, whereby cartridge 22 with its ball point 26 is retracted into the housing by the action of coil spring 24. The lower end of plunger 36, i. e. the lower ends of members 52 and 53, are suitably shaped by the provision of respective concave inclinations 54 (on rod 52) and 55 (on rod 53), inclined in opposite directions to form two cams, and both inclined surfaces are separated by a ridge 56.

The intermediate member 30 consists of a lower tubular portion 31 and an upper portion 34 of reduced diameter, the shoulder 33 between the two portions 31 and 34 serving as the lower abutment for the coil spring 38. Portion 31 encloses elongated cavity 32 receiving the upper end of the cartridge 22 with element 29. This

lower portion 31 of intermediate member 30 is optional and is preferred for the reason that it guides the follower 29 into one of the bores in wall 57. This tubular sleeve 31 also helps to retain member 30 in proper position with respect to and inside cap 21. As may be seen in Figs. 2 and 5, one portion of the periphery of tubular sleeve 31 has a flat portion 49 to permit insertion of member 30 along rivets 48 securing the clip 47 to the outer side of cap 21. While Fig. 5 shows one possible section of member 30, it is obvious that it may be fully circular along its periphery to provide a stronger fit with the inner wall of cap 21.

The upper wall 57 limiting the cavity 32 in portion 31 of member 30 is provided with two elongated vertical bores 58 and 59 which communicate forming a slot 60. The larger of the two bores 59 receives the rod 53 of plunger 36, and the smaller bore 58 the rod 52. This larger bore 59 also receives the upper end 39 of element 29 upon alternate depressions of button 35, whereas the bore 52 has a diameter smaller than that of portion 39 of element 29 and thus provides with its walls a support for the head 43 thereof, but prevents the entry of follower portion 39 therein, whereby the ball point 26 at the end of cartridge 22 remains projecting and ready for use. The shape of the plunger and slot also prevents rotation, one with respect to the other.

The slot 60 in wall 57 of intermediate member 30 are surrounded by two oppositely inclined concave surfaces forming cams 61 and 62 which serve as transitory paths for the head 43 of follower 29, as will be explained in more detail in connection with Figs. 12-17.

In Fig. 12, there is shown the lower end of plunger 36 with inclined surfaces forming cams 54, 55, both inclined in direction of arrows *a, a, a, a*. Ridge 56 connecting both rods 52 and 53 and separating the oppositely inclined cams 54 and 55 is received in slot 60 passing through the portion 34 of member 30. Cam 62 between bores 58 and 59 (descending as viewed in the direction of arrows *a, a, a, a* in Fig. 12), and cam 61 between bores 59 and 58 have their inclinations also in the direction of said arrows.

The operation of my writing implement is as follows:

As best seen in Fig. 1, the ball point 26 at the lower end of cartridge 22 is in writing position, i. e., it protrudes from housing 20 when the head 43 of element 29 rests against the lower end of smaller bore 58 in wall 57 of member 30. As stated above, this bore is of a smaller diameter than the portion 39 of follower 29 and thus permits only a portion of rounded head 43 to enter therein and be seated therein until pressed downwardly by the cam 54 at the lower end of rod 52 forming part of plunger portion 36 of pushbutton 35. When a change in the position of the ball point is desired, i. e., its retraction into the housing 20, button 35 is depressed and its cam 54, after sufficient depression against the force of spring 38, forms a continuation of cam 62 which is inclined in the same direction, thereby permitting the head 43 of element 29 to slide along surfaces of cams 54 and 62 until it reaches the edge 63 surrounding cam 55 at the lower end of plunger rod 53. By releasing button 35, and consequent retraction of plunger rod 53 with its edge 63, head 43 is free to slide into the bore 59 whose diameter is somewhat larger than the diameter of portion 39 of said follower 29 and, upon further and complete release of button 35, the whole portion 39 enters into bore 59 following the direction of force of spring 24, whereby the ball point 26 is retracted into housing 20.

If the reverse operation is desired, i. e., the returning of ball point into its working position, button 35 is depressed again until the cam 55 at the end of rod 53 levels with cam 61 in wall 57 and, since both cams have surfaces inclined in the same direction, head 43 slides therealong until it abuts edge 64 surrounding the inclined cam 54 at the lower end of rod 52. Upon a short retraction of button 35 due to the action of spring 38, ridge 64

retreats into bore 58 and permits the head 43 of follower 29 to enter bore 58 thereby providing sufficient support for the cartridge 22 while retaining ball point 26 outside housing 20. The upper portion 39 of follower 29 cannot enter the bore 58 and rests with its head against its walls until the next depression of pushbutton 35 and its plunger portion into bores 58 and 59. This constitutes a holding means for limiting movement of the follower. The above described cycle may then be repeated ad infinitum, the whole cartridge moving along the periphery of an imaginary cone having its tip at the opening 28 in the lower end of housing 20, and its base on surface 57 of member 30. Element 29 always follows the direction of arrows *a, a, a, a*, its rotation in the other direction being prevented by ridges 63 and 64 at the lower end of plunger 36. The spring 38, unless actually compressed by the user's finger, as seen in Fig. 3, always urges button 35 outwardly and upwardly, and thus the cartridge necessarily must occupy one of the extreme positions, to wit: it must either be retracted into the housing or have its ball point protrude through opening 28, no intermediate positions being possible without depressing button 35, since the cams 54, 55, 61, 62 do not provide a stable support for the head 43, such support being provided only in the bores 58 (for writing position) and 59 (for retracted position of the ball point 26).

Fig. 13 shows the cartridge in retracted position and the portion 39 of follower 29 inside the bore 59 in member 30. The platform 40 limits the upward movement of element 29.

Fig. 14, which is a section taken on line 14-14 in Fig. 12, shows the head in its first idle position, i. e. at the time when it abuts against ridge 63 of rod 53. Fig. 15 shows the portion 39 inside the bore 59 upon an additional depression of button 35 and subsequent release thereof, whereby the head 43 slides over ridge 63 and rests in bore 59 together with portion 39. Fig. 16 shows the second idle position of the head 43 wherein it rests against ridge 64 on cam 61. A further depression and subsequent release of button 35 brings the head 43 into the position shown in Fig. 17 wherein the head rests at the exit end of bore 58 and the ball point is in extracted position.

Figs. 18 and 19 show various positions of the cooperating members 29 and 36 with respect to the stationary intermediate member 30 without limiting the combination to any particular use, such as in a writing implement or the like. In Fig. 18 the intermediate member 30 is shown without tubular portion 31 for better illustration, and two positions (e) and (f) of the follower member 29 are indicated in dot-dash lines. Position (e) indicates the head 43 of follower 29 seated on the surface of cam 62 ready to slide towards bore 59. Position (f) indicates the head 43 of follower 29 seated in the entrance to bore 58 after sliding from cam 61. Fig. 19 shows three positions of the follower in dot-dash lines, to wit: position (g) shows follower 29 retracted into bore 59, position (b) shows follower 29 in cam 61 ready to slide to bore 58, and position (c) shows head 43 of follower 29 seated in bore 58.

It may be seen from the above description that a reliable device has been provided which will work without any defects as long as the two springs retain their resiliency. The removal of an empty cartridge or the insertion of a new cartridge is a very simple and short operation. The invention is also applicable to other uses. The mechanical unit of a plunger with cams, of an intermediate member with cams, and of a follower member adapted to assume different positions, as shown without reference to any specific use in Figs. 18 and 19, has uses other than in a writing implement.

While I have described one preferred embodiment of my invention, I wish it to be understood that changes and modifications may be made by men skilled in the art

within the scope of the invention as defined in the appended claims.

I claim:

1. In a writing implement having an elongated housing, a cartridge in said housing, said cartridge having a working point at one extremity thereof projectable from and retractable into one end of said housing, a resilient member urging said cartridge in a direction to retract said working point thereof into said housing, the combination of a follower member at the other extremity of said cartridge in said housing, said follower member having a portion supported in said other extremity of said cartridge and another portion with a rounded head forming a follower, a pushbutton having a first portion normally projecting from the other end of said housing and a second portion forming a plunger comprising two longitudinally joined rod-like elements of different diameters, said elements having oppositely inclined cams at the free extremities thereof, a spring member in said housing urging said first portion of said pushbutton to project from said housing at all times, and an intermediate member between said second plunger portion of said pushbutton and said follower, said intermediate member having an axial slot with an enlarged and a reduced portion for receiving the rod-like elements of said plunger portion of said pushbutton, the enlarged portion of said slot accommodating said follower upon retracting of said plunger portion of said pushbutton, the reduced portion of said slot providing a seat for said follower, and said intermediate member having guide paths inclined toward each portion of said slot whereby upon successive depressions of said pushbutton, said follower is moved in a unidirectional encircling path and alternately enters said enlarged portion of said slot by the action of said resilient member to retract said working point into said housing, and is seated against said reduced portion of said slot to project said working point of said cartridge from said housing.

2. The combination of claim 1, wherein said follower member is integral with said other extremity of said cartridge.

3. The combination of claim 1, wherein said intermediate member has a tubular portion surrounding said follower and said other extremity of said cartridge.

4. As a novel element in a pushbutton-actuated writing implement having an elongated housing with openings at both ends thereof, a cartridge with a working point at one extremity thereof alternately projectable from and retractable into one end of said housing, and a pushbutton in said housing having one portion thereof projectable through the other end of said housing and the other portion of said pushbutton forming a plunger, said plunger consisting of two longitudinally joined rod-like elements of different diameters: an intermediate member between the other extremity of said cartridge and said plunger portion of said pushbutton, said intermediate member comprising a body portion non-rotatably inserted into said housing, said body portion having a substantially axially disposed slot of a configuration corresponding to that and adapted to receive said plunger portion of said pushbutton, said slot having an enlarged portion to receive the first, larger diameter of said rod-like elements of said plunger portion of said pushbutton, said enlarged portion having a diameter substantially equal to that of said other end of said cartridge, and said slot having a reduced portion to receive the second, smaller diameter of said rod-like elements, said body portion having the surface thereof confronting said cartridge formed with oppositely inclined guide paths inclined in the direction of each portion of said slot forming cams unidirectionally and substantially circularly leading from said enlarged portion of said slot to said reduced portion of said slot, and from said reduced portion back to said enlarged portion thereof, said enlarged portion of said slot alternately accommodating the other extremity of said cartridge and said first rod-like element, and said

reduced portion of said slot alternately receiving said second rod-like element and seating said other extremity of said cartridge upon successive depressions of said plunger portion of said pushbutton into said slot.

5. In a writing implement of the character described, the combination with a housing and a writing cartridge having a working point, of a pushbutton, an intermediate member, a follower and a resilient member, said follower being integral with one end of the cartridge opposite the working point thereof, and said follower having a rounded head to unidirectionally follow the contour of one extremity of said pushbutton and of said intermediate member, said pushbutton having a depressible portion at its other extremity thereof normally extending from said implement by the action of said resilient member, and a plunger portion comprising two substantially rod-like longitudinally joined members of different diameters, to define said one extremity at their free ends, said free ends of said rod-like members having oppositely inclined cams to cooperate with said rounded head of said follower, and said intermediate member comprising a body portion held against rotational movement in said implement between said follower member and said plunger portion of said pushbutton and having an axially disposed slot in said body portion with a configuration to receive said plunger portion of said pushbutton, the larger-diameter portion of said slot receiving said follower upon alternate depressions of said plunger, the reduced-diameter portion of said bore seating said follower upon every alternate depressions of said plunger, and said one extremity of said intermediate member having two oppositely inclined cams inclined towards each of the portions of said slot to form a substantially encircling path for said follower during successive depressions of said pushbutton, whereby, upon each consecutive depression of said pushbutton and movement of said plunger portion thereof along said slot, said plunger portion cams said follower member whereby said follower member unidirectionally travels from its position inside said slot portion with larger diameter along one of said cams on said intermediate member against said slot portion with smaller diameter, and along the other of said cams in said intermediate member back into said slot portion with larger diameter, thereby alternately projecting the working point of the cartridge from said implement, and retracting said working point into said implement.

6. In a writing implement having a housing with openings at both ends thereof, a cartridge in said housing, said cartridge having a working point at one extremity thereof projectable from and retractable into one end of said housing, a spring urging said cartridge into said housing at all times, a pushbutton at the other end of said housing, and a resilient member urging said pushbutton outwardly and through the other end of said housing at all times, the combination of a follower member having a rounded head at the other extremity of said cartridge, an intermediate member in said housing between said pushbutton and said follower member, and a plunger portion at the lower end of said pushbutton, said plunger portion of said pushbutton comprising two longitudinally joined rod-like members of different diameters, the lower ends of said rod-like members having concave oppositely inclined surfaces forming two cams, said intermediate member having a body portion held against rotational and axial movement in said housing, an axial slot of a configuration to receive said plunger portion of said pushbutton, the larger portion of said slot being of a diameter to accommodate the rounded head of said follower member, and two oppositely inclined surfaces at its lower end between the larger and the reduced portion of said slot, said oppositely inclined surfaces forming two cams, and said rounded head of said follower member having a diameter larger than the smaller portion of said slot, each one of said two cams

on said intermediate member and a respective one of said two cams on said plunger portion forming a pair of combined cams for the travel of said rounded head of said follower, each of said pair being inclined towards a respective portion of said slot, whereby said follower, normally received in said larger portion of said bore travels, upon first depression and subsequent release of said pushbutton, is cammed out of said larger portion of said slot and, along one of said cams on said intermediate member to be seated against the reduced portion of said bore and to project said writing point from said housing, and upon the second depression of said pushbutton said follower is moved from said reduced portion of said bore along the second of said cams on said intermediate member and, upon release of said pushbutton, into said larger portion of said bore to retract said working point into said housing thereby following a quadruple, unidirectional cam path.

7. In a pen, the combination of a housing, a pen cartridge, one end of which is pivotable and slidable in the housing, a follower at the end of the cartridge for moving the same, a reciprocating plunger, and a stationary intermediate member, said reciprocating plunger having an end formed with two concave cams inclined in the opposite directions and a ridge therebetween, said stationary intermediate member having a slot having two end portions of different widths for the reciprocation of said plunger and two circumferentially disposed concave cams each of the surfaces of which descends unidirectionally towards a respective one end portion of said slots, and said follower being engaged and reciprocated by said cams of said intermediate member on the inward reciprocation of said plunger, one end of said slot being of greater width for freely receiving said follower, and the other end of said slot having a narrow width for limited movement therein, whereby, upon consecutive inward reciprocations of said plunger, said follower is alternately cammed into retracted position in the larger end of said slot and seated against the slot portion of smaller width.

8. As a novel element in a writing implement of the pushbutton type, a pushbutton having an elongated body, a depressible portion at one extremity of said pushbutton, stop means on said pushbutton for limiting the movement of said pushbutton in said writing implement, and a plunger at the other extremity of said pushbutton, said plunger comprising two substantially longitudinally joined rod-like elements of different diameters and each of said rod-like elements having a concave cam at its free end, said cams being inclined in opposite directions and being separated by a ridge therebetween.

9. As a novel element in a writing implement having an elongated housing with openings at both ends thereof, a cartridge with a working point at one extremity thereof alternately projectable from and retractable into one end of said housing, a follower at the other extremity of said cartridge, and an intermediate member in said housing facing with one surface thereof said follower, said intermediate member having a substantially axial slot consisting of two communicating portions of different diameters and a pair of concave cams on its surface facing said follower and leading, respectively, substantially circularly from the larger-diameter portion of said slot to the smaller-diameter portion of said slot, and from the smaller-diameter portion to the larger-diameter portion thereof, said enlarged portion of said slot having a diameter substantially equal to that of said follower for reception thereof; a pushbutton in said housing having one extremity thereof projectable through the other end of said housing, said pushbutton having stop means permitting partial projection thereof through said other end of said housing only, and a resilient member between said stop means and said intermediate member normally urging said pushbutton to project from said housing

at all times, said pushbutton having a plunger portion at the other extremity thereof comprising two rod-like longitudinally joined elements of a contour corresponding to that of said slot in said intermediate member and reciprocating therein, each of said rod-like elements being provided with a concave cam at the free end thereof, said cams being oppositely inclined to form a unidirectional cam path for the travel of said follower, whereby, upon reciprocation of said plunger to cam said follower, said follower alternately enters the enlarged portion of said slot to retract said working point of said cartridge into said housing and seats said follower against the reduced portion of said slot to project said working point of said cartridge from said housing.

10. In a structure to change the direction of motion, the combination of a follower, an intermediate member and a plunger, said intermediate member being positioned between said follower and said plunger in said structure and having a slot comprising a pair of communicating axial bores of different diameters and unidirectionally inclined cams on its side facing said follower, each of said cams being inclined in the direction of a respective one of said bores forming a substantially circular path from the larger of said bores to the smaller of said bores and from the smaller of said bores to the larger of said bores for said follower, and said plunger comprising two substantially longitudinally joined portions of a configuration to enter said slot in said intermediate member, said portions of said plunger having ends facing said intermediate member, said ends having oppositely inclined cams forming upon depression of said plunger through said intermediate member a continuous unidirectional cam path with said two cams on said intermediate member for the travel of said follower, said follower being of a contour intermediate that of said bores to enter the larger of said communicating bores in said intermediate member only, whereby the reciprocating movement of said plunger cams said follower into a substantial rotational movement, said rotational movement alternately directing said follower into reciprocating movement into and out of said larger bore in said intermediate member and into abutment with said smaller bore.

11. In a writing implement having an elongated housing, a cartridge retained in said housing and movable into projected and retracted positions, a spring normally biasing the cartridge into retracted position, and a plunger having an outer portion projectable through said housing and an inner plunger portion within the housing, the provision of: a pair of longitudinally joined rod-like elements of different diameters constituting the inner portion of the plunger; a stationary member within the housing, said stationary member having a slot including a portion of smaller diameter and a portion of larger diameter to slidably and non-rotatably receive said rod-like elements; a follower tip carried by the inner end of the cartridge and adapted to enter the slot portion of larger diameter and not fully enter the slot portion of smaller diameter, said stationary member having a surface facing said follower tip and formed with guide paths which are oppositely inclined and form a unidirectional cam path for said follower tip leading from one slot portion to the other in succession, each of the rod-like elements having an inclined cam face at its end, said cam faces being oppositely inclined, said cam faces sequentially contacting the follower tip to move the same upon one of said inclined guide paths when the plunger is depressed.

12. A mechanism for selectively projecting and retracting a writing tip of a cartridge movably positioned in a housing of a writing implement, said cartridge having a follower tip at its inner end and being normally biased into retracted position, comprising: an actuating plunger having an inner portion composed of a pair of longitudinally joined elements, one element being of greater cross section than the other; a stationary member within the

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housing, said stationary member having a slot including a portion of smaller cross section and a portion of larger cross section to slidably and non-rotatably receive said rod-like elements; a follower tip carried by the inner end of the cartridge and adapted to enter the slot portion of larger cross section and not fully enter the slot portion of smaller cross section, said stationary member having a surface facing said follower tip and formed with guide paths which are oppositely inclined and form a unidirectional cam path for said follower tip leading from one slot portion to the other in succession; each of the rod-like elements having an inclined cam face at its end, said cam faces being oppositely inclined, said cam faces se-

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quentially contacting the follower tip to move the same upon one of said inclined guide paths when the plunger is depressed.

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