

PATENT SPECIFICATION

DRAWINGS ATTACHED



854313

Date of Application and filing Complete Specification Aug. 3, 1956.

No. 23993/56.

Application made in United States of America on Aug. 30, 1955.

Complete Specification Published Nov. 16, 1960.

Index at acceptance: —Class 146(3), P11M.

International Classification: —B43c.

COMPLETE SPECIFICATION

Improvements in or relating to Writing Instruments

We, DAVID KAHN INC., a corporation organised under the laws of the State of New Jersey, of Grand Avenue at 12th Street, North Bergen, State of New Jersey, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in writing instruments and more particularly to new and improved push-button operated mechanism for projecting the writing point of a writing instrument into an exposed writing position and retracting the writing point into a retracted position within a protecting barrel.

From one aspect the invention provides a writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial position determines the axial position of the cartridge unit, and a spring constantly urging said rotatable member toward said push member, said rotatable member and the interior of said barrel being formed with coacting members comprising at least one lug and a cam, said lug interengaging said cam in different axial positions respectively corresponding to the positions of the cartridge unit depending upon the relative rotational adjustment of the cam and lug, depression of said push member partially rotating said rotatable member to cause relative rotation of the cam and lug, said spring, when said push member is released, forcing said push member into an operative position whereby upon a subsequent depression of said push member, the push member will again cause rotation of the rotatable member.

From another aspect the invention provides a writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial position determined the axial position of the cartridge unit, spring means constantly urging said rotatable member toward said push member, and a cam on the interior of the barrel having at least one longitudinally extending channel, at least two circumferentially spaced teeth offset from said channel and at least one stop surface, said rotatable member having at least one outwardly extending lug, said lug being movable into and slidable along said channels and engageable with the teeth and stop surfaces, said lug being in one axial position when engaging a stop surface and in another axial position when in a channel, depression of said push member removing said lug from said channel and partially rotating said rotatable member so that said spring means can force one of said lugs against a stop surface with a subsequent depression of said push member removing said lug from said stop surface so that the lug can move into and slide along one of said channels, said cam having between said channels a longitudinally extending portion extending to said stop surface, the end of said longitudinally extending portion adjacent said stop surface and the lugs on the rotatable member being so dimensioned that when one of said lugs is in axial alignment with said longitudinally extending portion, said end will prevent axial movement of said lug past said end toward the other end of said longitudinally extending portion, said push member being provided with at least one outwardly extending lug in axial alignment with said longitudinally ex-

[Price 3s. 6d.]

tending portion, said outwardly extending lug on said push member and said end being so dimensioned that said push member lug can move axially past said end toward the other end of said longitudinally extending portion.

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

10 Figure 1 is an elevation of a ball pen assembly constructed in accordance with the invention with the barrel in section and showing the writing point in projected position;

Figure 2 is a section taken on the line 2—2 of Figure 1;

15 Figure 3 is similar to Figure 2 with the pen assembly in retracted position;

Figure 4 is an elevation in section of the upper casing portion of the barrel and showing the cam member;

20 Figure 5 is a section taken on the line 5—5 of Figure 4;

Figure 6 is an elevation of the push member with a portion thereof broken away and in section;

25 Figure 7 is a bottom view of the push member shown in Figure 6;

Figure 8 is an elevation of the rotatable lug member;

30 Figure 9 is a bottom view of the rotatable lug member shown in Figure 8;

Figure 10 is an elevation of the intermediate casing to which the upper and lower casings are secured to form the barrel of the pen assembly;

35 Figure 11 is a diagrammatic developed elevation depicting the projecting operation and showing the cam member with its channels and teeth in dot-and-dash lines, the original position of the lugs on the push member and rotatable lug member in full lines and the intermediate positions in dotted lines;

40 Figure 12 is similar to Figure 11 and depicts the retracting operation, with the final position of the push button and the initial position of the lug on the rotatable lug member being shown in full lines.

Referring to Fig. 1, which illustrates a ball pen assembly constructed in accordance with the invention, a barrel indicated generally at 10 in the illustrated embodiment includes a forward casing 11, an intermediate casing or holder 12 and a rear casing 13. A clip 14 may be secured to the barrel 10 in any suitable manner. Within the barrel 10 is a cartridge unit 20, which is of conventional type, and includes a reservoir 21, a writing point 22 and outwardly extending abutment means 23. The cartridge unit 20 is mounted for longitudinal sliding reciprocation within the barrel 10 and a spring 24 surrounds the forward end of the reservoir 21 and abuts the abutment means 23 on the one hand and the forward portion of the barrel 10 on the other hand to urge the cartridge unit 20 toward the rear of the barrel into retracted position.

The rear casing 13 of the barrel 10 contains the projecting and retracting mechanism of the invention which includes a push member or button 30, a rotatable lug member 40, and a cam member 50 which is fixed to the rear casing 13 and is preferably integral therewith so that the rear casing 13 and the cam member 50 can be constituted by a single injection moulded piece of plastics material. Further, the push button 30 and the rotatable lug member 40 can also be constituted by injection moulded pieces so that every element of the projecting and retracting mechanism may be simply and economically manufactured to achieve a superior mechanism at greatly reduced cost. As will later more fully appear, the parts of the projecting and retracting mechanism are not only capable of being economically manufactured, but these parts can be easily assembled to constitute the ball pen assembly illustrated in Fig. 1.

Referring to Figs. 4 and 5, the rear casing 13 is tubular and is formed at its rear end with a portion 15 of reduced internal diameter, at its forward end with a portion 16 of enlarged internal diameter, and with an intermediate portion 17 in which the cam member 50 is formed.

As can be seen in Fig. 1, the rotatable lug member 40 fits upon the rear end of the cartridge unit 20 and the forward end of the push button 30 fits upon the rear end 41 of the member 40. In the assembled condition, the rear portion of the push button projects from the rear open end of the rear casing 13, and lugs provided, as will be later described, on both the push button 30 and the rotatable lug member 40 are positioned in channels in the cam member 50 (see Figs. 2 and 3).

Referring more particularly to Figs. 6 and 7, the push button 30 is provided with a rear button portion 31 and a forward toothed portion 32. The toothed portion 32 is provided with radially spaced outwardly extending lugs 33 and the forward ends of the lugs are formed as teeth 34. The points of the teeth 34 are generally centrally positioned with respect to the lugs 33, that is, the forward portion of each tooth is defined by surfaces which are inclined towards each other and inclined relative to the axis of the writing instrument. More particularly, and this can be seen in the side elevation shown in Fig. 6, the points of the teeth 34 provide a toothed forward end for each of the lugs 33. The forward portion 32 of the push button 30 is provided with a cylindrical cavity or recess 35 to enable the rear portion of the rotating lug member 40 to be rotatably received within said portion 32 of the push button.

Referring to Figs. 8 and 9, the forward end of the rotatable lug member 40 is provided with radially spaced outwardly extending lugs 42. At this point and with reference

to Figs. 2 and 3, it should be noted that the lugs 42 on the rotatable lug member 40 have a greater diameter than do the lugs 33 on the push button 30.

5 The cam member 50 is shown in Figs. 4 and 5, from which it will be seen that said member is annular and is formed integral with the interior of the intermediate portion 17 of the rear casing 13, being constituted by a plurality of axially extending teeth 51, deep channels 52 and shallow channels 53. The lugs 42 on the rotatable lug member 40 fit within the deep channels 52 but have too great a diameter to fit within the shallow channels 53. The lugs 33 on the push button 30 have a sufficiently small diameter to fit within both the deep channels 52 and the shallow channels 53. The relative diameters of the lugs and channels can be seen in Figs. 2 and 3. There are two teeth 51 between each two adjacent deep channels 52 and said two teeth are separated by one of the shallow channels 53. It will be observed that both the cam member 50 and the teeth 34 of the push button 30 point forwardly.

To assemble the ball pen assembly shown in Fig. 1, the cartridge unit 20 with the spring 24 thereon is inserted from the rear into the forward casing 11 and the intermediate holder 12 is placed upon the cartridge unit 20 and secured to the casing 11 by the threaded connection shown in Fig. 1. The intermediate holder 12 is shown in Fig. 10 and is tubular, and comprises an intermediate band 18 and threaded portions 19 and 19¹. The intermediate holder 12 functions to retain the cartridge unit 20 in the forward casing 11 and provides means for supporting the rear casing 13. The intermediate holder 12 also functions as a guide for the cartridge unit 20 and retains this unit centrally positioned within the casings 11 and 13.

After the intermediate holder 12 has been secured to the forward casing 11, the rotatable lug member 40 is seated upon the rear end of the reservoir 21 of the cartridge unit 20 and the push button 30 is seated upon the rear end portion 41 of the rotatable lug member 40, said rear end portion 41 being received within the cavity or recess 35, and the points of the teeth of the push button abutting the rear surfaces of the lugs 32. The rear casing 13 is then placed upon the assembly and pushed forwardly so that by the engagement of the shoulder 15a formed by the reduced diameter and intermediate portions 15, 17 of said rear casing with a shoulder 31a on the push button 30, the lugs 33 on the push button ride along within the channels 52 and 53 in the cam member 50, and the lugs 42 are located as shown in full lines in Fig. 11. The rear casing 13 is then screwed home upon the intermediate holder 12 and the pen assembly is thereupon complete and the push

button operated projecting-retracting mechanism is ready for operation.

Replacement of an exhausted cartridge unit is quite simple because the rear end of the intermediate holder 12 is positioned close to the forward end of the cam member 50, as can be seen in Fig. 1, and as a result, removal of the cartridge does not destroy the alignment or positioning of the push button 30, the rotatable lug member 40 and the cam member 50.

The operation of the device of the invention is illustratively depicted in Figs. 11 and 12. Referring to Fig. 11, this figure diagrammatically presents the projecting sequence. With reference to the dash-and-dot lines, these represent a developed view of the cam member 50 and show the deep channels 52, the shallow channels 53 and the forwardly facing inclined teeth 51. The full lines show the lugs 33 on the push button 30 in their initial retracted position with the lugs 33 seated in the rear of the channels 52 and 53. Also shown in full lines is one of the lugs 42 on the rotating lug member 40, the lug 42 being biased against the tooth 34 of the lug 33 in the deep channel 52.

Figure 11 shows four of the lugs 33 together with the intervening portions 32a of the bottom surface of the forward portion 32 of the push member or button 30. Only one lug 42 is shown since the movement of one lug together with a pair of lugs 33 of the push member adequately illustrates the operation of the mechanism. In Fig. 11 the successive positions of lug 42 are indicated at I, II, III, IIIa and IV, while the corresponding positions of the push button are indicated at I¹, II¹, III¹, IIIa¹ and IV¹. As stated above, the initial retracted positions of the push button and the lug 42 are shown in full lines, and are indicated by numerals I and I¹. The other successive positions of lug 42 are shown in long dash lines and the other subsequent positions of the push member are shown in short dash lines. During the operation illustrated in Figs. 11 and 12, the spring 24 urges lug 42 upwardly, that is, toward the push button 30 and, for purposes of simplicity, spring 24 is not shown in Figs. 11 and 12.

As can be seen by the full lines, the lug 42 in the retracted position is in the rear portion of the deep channel 52 where it abuts against the tooth 34 of the lug 33. The rear end of the lug 42 is inclined so that the tooth 34 has a tendency to move the lug 42 to the left (which would rotate the rotating lug member 40). This motion of the lug 42 and the resulting rotary motion of the lug member 40 is prevented by the side walls of the deep channel 52 as can be more clearly seen by reference to Fig. 3. When the push button 30 is depressed, the lugs 33 are moved forwardly, one in each of the channels 52 and 53, and the lugs 42 on the rotating lug member 40 are forced forwardly by the lugs 33. The



forward motion of the lug 33 moves the lug 42 forwardly in the channel 52 until the rear end of the lug 42 clears the forward end of the channel 52, which releases the lug 42 for rotational movement. Accordingly, when the lug 33 reaches the end of its forward stroke, the lug 42 has also reached the end of its forward stroke and has been moved slightly to the left so that at least a portion of lug 42 is opposite tooth 51 of the cam member, as indicated by the position identified by the numeral II, the position of the push button being identified by numeral II¹. It is evident from Figs. 2, 3, 6 and 7 that the end of the forward portion 32 of the push button 30 provides a stop surface 32a between the teeth 34, and the lug 42 of the rotating member 40 can never pass beyond this stop surface. Therefore, when the push button 30 is released in Fig. 11, the spring 24 urges the lug 42 rearwardly against the stop surface 32a between the teeth of the push member and as the spring 24 continues acting on lug 42, the rear edge or surface 42a of the lug 42 urges the push member rearwards until the rear end of the lug 42 contacts one of the teeth 51 on the cam member. This point is identified by the numerals III and III¹. Because of the inclination of the forward end of tooth 51, the force of engagement between the opposed lug 42 and tooth 51 rotatably biases lug 42 and said lug 42 then slides towards the left along the inclined face of tooth 51 and contacts the inclined right-hand face 34a of tooth 34 in shallow channel 53, the push button being moved rearwardly to position IIIa¹ and numeral IIIa indicating the position of the lug 42 at this point. The inclination of the interengaging surfaces 34a, 42a translates the bias of the rotatable member into a rearward force against tooth 34, which force urges said tooth rearwards into shallow channel 53 while the lug 42 continues to slide along the inclined face of tooth 51 until it is stopped by the forward side edge portion of the succeeding tooth 51, said edge portion which is indicated by reference numeral 51a, acting as a stop surface offset from but intermediate the length of said channel 53 to prevent further rotation of the lug 42.

The positions of lug 42 and the push member at this point are indicated by the numerals IV and IV¹. It is apparent that the push member is now in an operative position for a subsequent depression, that is, the push member is so positioned that a tooth 34 is immediately behind the lug 42 whereby a subsequent depression of the push member will remove lug 42 from between adjacent teeth 51 and out of engagement with the forward edge portion 51a while rotatably biasing lug 42.

It will thus be appreciated that because of the stop surface 32a defined by the bottom of the forward portion 32 between the teeth

34, means are provided which always maintain the engaging surfaces of the teeth of the push member above the engaging surfaces of the lug of the rotatable member through the depression and the release of the push member.

It will be further appreciated that in position IV, the lug 42 is in line with the shallow channel 53 and thus corresponds to the projected position of the writing point 22. The lug 42 has a length in the radial direction too great to fit within the shallow channel 53, as can be seen in Fig. 2, and hence the writing instrument is locked in the projected position by the forward face of the shallow channel 53 with the rotation of the lug member being prevented by engagement of the lug 42 with the teeth 51.

The retraction sequence is diagrammatically illustrated in Fig. 12, the initial position of lug 42 and the push member being shown in full lines at IV and IV¹, these positions corresponding to the last position shown and described in connection with Fig. 11 and showing the writing instrument in the projected position. In Fig. 12, numerals V, Va, Vb, VI and VII show successive positions of the lug 42 while numerals V¹, Va¹, Vb¹, VI¹ and VII¹ show successive positions of the push button. Depression of the push button 30 moves the lugs 33 forwardly until the lug 42 clears the forward end of the shallow channel 53 and the top surface 51a, at which time the cam action previously described moves the lug 42 to the left, where it occupies the position identified by the numeral V when the push button is at the extreme position in its forward movement. The position of the push button at this point is identified by numeral V¹. Therefore, when the pressure on the push button 30 is relaxed, the spring 24 urges the lug 42 rearwardly toward the opposite tooth 51 until the lug 42 contacts the inclined forward face of said tooth 51, the lug 42 acting against the stop surface 32a on the push member as described in connection with Fig. 11 so that the lug 42 and the push member assume the positions indicated by numerals Va and Va¹. Then, as described in connection with Fig. 11, the lug slides to the left and simultaneously urges the tooth 34 rearwardly, the lug going through the positions indicated by numerals Vb and VI and the push member going through the positions indicated by numerals Vb¹ and VI¹.

It is pointed out that positions VI and VI¹ correspond to positions IV and IV¹ of Fig. 11. However, since channel 52 is a deep channel, lug 42 can slide in this channel and, therefore, it moves rearwardly and forces lug 33 to the rear end of the channel. This represents the retracted position of the writing point and is identified by the numerals VII and VII¹. This retracted position is identi-

cal with the initial position identified by numerals I and I¹ in Fig. 11.

Thus, it is evident that at least one of the engaging surfaces of the teeth of the push member and the rotatable member is so inclined that the force of engagement between the teeth of the push member and the engaging surface of the rotatable member caused by the spring, rotatably biases the rotatable member when the push member is depressed. In addition, another of the engaging surfaces of the teeth of the push member and the rotatable member is so inclined that the force of engagement between the teeth of the push member and the engaging surface of the rotatable member caused by the spring, rearwardly biases the push member to the operative position when the push member is released.

As will be evident, the rotatable lug member 40 carries a plurality of lugs 42, one for each of the deep channels 52 and the action in each of the deep channels 52 is identical. It will also be evident that when one sequence of projection and retraction has been completed, the sequence of operations can be repeated endlessly with the lugs 42 moving from channel to channel as the rotatable lug member 40 rotates within the rear casing 13.

It will be observed that there is nothing that can normally become jammed in the projecting and retracting mechanism of the invention, but if this should occur it would at most require that the writing instrument be vigorously shaken. It will also be observed that the projecting and retracting action is a positive one in that, so long as the lugs 42 clear the forward ends of the teeth 51 or the bottom of the deep channels 52, projection or retraction will be effected irrespective of the extent to which the button 30 is depressed.

The small number of parts, the ease of producing these parts and the ease of assembling them has already been stressed. It is also desired to point out that the construction of the invention employs a conventional cartridge, and when this becomes exhausted, it is easily withdrawn and replaced by a fresh one.

This ease of replacement will be appreciated when it is understood that all that need be done is to remove the casing 11 and withdraw the used cartridge unit from the intermediate holder 12. A new cartridge is then slid into the holder, the spring 24 is removed from the old cartridge and placed on the fresh one and the casing 11 is screwed back onto the holder 12. When these simple steps are completed and without any precautions, the cartridge is replaced and the projecting-retracting mechanism is ready for operation. This is a decided advantage over prior constructions employing an endless cam, which normally required that the cartridge unit be specially constructed or fixed to one of the

operating mechanisms so that replacement of the cartridge required the availability of a special cartridge, the unnecessary supply of an operating part which was not defective, and the application of special skill.

While the present invention has been disclosed in connection with the projecting and retracting of a ball point writing instrument, it is applicable to other kinds of writing instruments including those provided with a writing nib or pen point and those which, as disclosed in U.S. Patents Nos. 1,889,550 and 2,140,653, employ a pencil or similar writing medium, the length of which is maintained constant by adjustment of a chuck which holds the lead.

In one form of the present invention and as illustrated in the drawings, the spring 24 is the only spring employed, this being in contradistinction to many writing instrument prior constructions where two springs are employed. This spring is desirably in the lower portion of the holder or barrel.

The operating mechanism of the present structure relies upon only three operating parts, namely, the push button 30, the rotatable lug member 40, and the cam member 50.

It is desired to point out that the injection moulding of the operating parts of the herein set forth projecting-retracting mechanism from plastic materials ensures that these parts are produced with smooth surfaces so desirable for proper functioning of said parts, and moreover, these operating parts can be produced within a close tolerance which is highly advantageous. Any plastic material may be used which will produce an operating part having the proper hardness and smoothness, including the acrylic plastics produced from acrylate and methacrylate resins. The parts produced from acrylic resins are characterized by smoothness of surface and rigidity.

Polyethylene plastics may also be used to produce the operating parts of the present invention, the polyethylene plastics being easy to process by injection moulding.

The operating parts of the herein set forth structure may be moulded from polystyrenes, said parts being characterized by close tolerances. A modified form of polystyrene which may be used for the operating parts of the present invention is that known as "Kralastic" which is a Regd. Trade-Mark identifying the polystyrene marketed by the Naugatuck Chemical Division of the United States Rubber Company, Naugatuck, Connecticut.

Desirably, the operating parts of the present invention are made from cellulose acetate butyrate moulding compositions. These compositions comprise a major portion of cellulose acetate butyrate together with plasticizers therefor. Moulding compositions of cellulose acetate butyrate lend themselves well to fabrication of the operating parts of the

present construction by injection moulding, extrusion or compression moulding.

Nylon may be used for the operating parts of the present invention. Nylon may be defined as a thermoplastic long-chain super polyamide produced by polymerization from the basic raw materials such as benzene, air and water and characterized by molecular orientation along the long axis of cold-drawing. The polymeric amides marketed under the name "Nylon" are unique in that they have good flow properties and, therefore, may be easily moulded by either injection or compression moulding or the equivalent thereof.

WHAT WE CLAIM IS:—

1. A writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial position determines the axial position of the cartridge unit, and a spring constantly urging said rotatable member toward said push member, said rotatable member and the interior of the barrel being formed with co-acting members comprising at least one lug and cam, said lug interengaging said cam in different axial positions respectively corresponding to the positions of the cartridge unit depending upon the relative rotational adjustment of the cam and lug, depression of said push member partially rotating said rotatable member to cause relative rotation of the cam and lug, said spring, when said push member is released, forcing said push member into an operative position whereby upon a subsequent depression of said push member, the push member will again cause rotation of the rotatable member.

2. A writing instrument according to Claim 1 wherein said cam has at least one longitudinally extending channel, at least two circumferentially spaced teeth offset from said channel and at least one stop surface, and said lugs are movable into and slidable along said channels and engageable with the teeth and stop surfaces, depression of said push member removing said lugs from said channels so that said spring can force one of said lugs against a stop surface, a subsequent depression of said push member removing said lug from said stop surface so that the lug can move into and slide along one of said channels.

3. A writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial

position determines the axial position of the cartridge unit, spring means constantly urging said rotatable member toward said push member, and a cam on the interior of the barrel having at least one longitudinally extending channel, at least two circumferentially spaced teeth offset from said channel and at least one stop surface, said rotatable member having at least one outwardly extending lug, said lug being movable into and slidable along said channels and engageable with the teeth and stop surfaces, said lug being in one axial position when engaging a stop surface and in another axial position when in a channel, depression of said push member removing said lug from said channel and partially rotating said rotatable member so that said spring means can force one of said lugs against a stop surface with a subsequent depression of said push member removing said lug from said stop surface so that the lug can move into and slide along one of said channels, said cam having between said channels a longitudinally extending portion extending to said stop surface, the end of said longitudinally extending portion adjacent said stop surfaces and the lugs on the rotatable member being so diminished that when one of said lugs is in axial alignment with said longitudinally extending portion, said end will prevent axial movement of said lug past said end toward the other end of said longitudinally extending portion, said push member being provided with at least one outwardly extending lug in axial alignment with said longitudinally extending portion, said outwardly extending lug on said push member and said end being so dimensioned that said push member lug can move axially past said end toward the other end of said longitudinally extending portion.

4. A writing instrument according to Claim 3 wherein said channels are radially deep and wherein said longitudinally extending portion is a radially shallow channel, the lugs of said rotatable member not fitting within said shallow channel, the lug on the push member being slidable in said shallow channel.

5. A writing instrument according to Claim 4 wherein said push member is provided with a plurality of outwardly extending lugs, at least one of said push member lugs extending into a shallow channel and another of said push member lugs extending into one of said deep channels.

6. A writing instrument according to Claim 5 wherein the rotatable member is provided with one outwardly extending lug for every deep channel and said push member is provided with one outwardly extending lug for every channel in the cam.

7. A writing instrument according to any one of Claims 2 to 6 wherein depression of said push member positions one of said lugs on the rotatable member opposite one of the

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dimensioned

present construction by injection moulding, extrusion or compression moulding.

Nylon may be used for the operating parts of the present invention. Nylon may be defined as a thermoplastic long-chain super polyamide produced by polymerization from the basic raw materials such as benzene, air and water and characterized by molecular orientation along the long axis of cold-drawing. The polymeric amides marketed under the name "Nylon" are unique in that they have good flow properties and, therefore, may be easily moulded by either injection or compression moulding or the equivalent thereof.

WHAT WE CLAIM IS:—

1. A writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial position determines the axial position of the cartridge unit, and a spring constantly urging said rotatable member toward said push member, said rotatable member and the interior of the barrel being formed with co-acting members comprising at least one lug and cam, said lug interengaging said cam in different axial positions respectively corresponding to the positions of the cartridge unit depending upon the relative rotational adjustment of the cam and lug, depression of said push member partially rotating said rotatable member to cause relative rotation of the cam and lug, said spring, when said push member is released, forcing said push member into an operative position whereby upon a subsequent depression of said push member, the push member will again cause rotation of the rotatable member.

2. A writing instrument according to Claim 1 wherein said cam has at least one longitudinally extending channel, at least two circumferentially spaced teeth offset from said channel and at least one stop surface, and said lugs are movable into and slidable along said channels and engageable with the teeth and stop surfaces, depression of said push member removing said lugs from said channels so that said spring can force one of said lugs against a stop surface, a subsequent depression of said push member removing said lug from said stop surface so that the lug can move into and slide along one of said channels.

3. A writing instrument comprising a barrel having a cartridge unit slidably mounted therein, said cartridge unit having a writing point at its forward end adapted to be projected and retracted through the forward end of the barrel, a push member slidably and non-rotatably mounted in said barrel, an axially displaceable and rotatable member whose axial

position determines the axial position of the cartridge unit, spring means constantly urging said rotatable member toward said push member, and a cam on the interior of the barrel having at least one longitudinally extending channel, at least two circumferentially spaced teeth offset from said channel and at least one stop surface, said rotatable member having at least one outwardly extending lug, said lug being movable into and slidable along said channels and engageable with the teeth and stop surfaces, said lug being in one axial position when engaging a stop surface and in another axial position when in a channel, depression of said push member removing said lug from said channel and partially rotating said rotatable member so that said spring means can force one of said lugs against a stop surface with a subsequent depression of said push member removing said lug from said stop surface so that the lug can move into and slide along one of said channels, said cam having between said channels a longitudinally extending portion extending to said stop surface, the end of said longitudinally extending portion adjacent said stop surfaces and the lugs on the rotatable member being so diminished that when one of said lugs is in axial alignment with said longitudinally extending portion, said end will prevent axial movement of said lug past said end toward the other end of said longitudinally extending portion, said push member being provided with at least one outwardly extending lug in axial alignment with said longitudinally extending portion, said outwardly extending lug on said push member and said end being so dimensioned that said push member lug can move axially past said end toward the other end of said longitudinally extending portion.

4. A writing instrument according to Claim 3 wherein said channels are radially deep and wherein said longitudinally extending portion is a radially shallow channel, the lugs of said rotatable member not fitting within said shallow channel, the lug on the push member being slidable in said shallow channel.

5. A writing instrument according to Claim 4 wherein said push member is provided with a plurality of outwardly extending lugs, at least one of said push member lugs extending into a shallow channel and another of said push member lugs extending into one of said deep channels.

6. A writing instrument according to Claim 5 wherein the rotatable member is provided with one outwardly extending lug for every deep channel and said push member is provided with one outwardly extending lug for every channel in the cam.

7. A writing instrument according to any one of Claims 2 to 6 wherein depression of said push member positions one of said lugs on the rotatable member opposite one of the

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- teeth of the cam and said spring or spring means forces said opposed tooth and lug into engagement, at least one of the engaging surfaces being so inclined that the force of engagement between them rotatably biases said rotatable member to position one of said lugs in one of said channels or against a stop surface.
- 5 8. A writing instrument according to any one of the preceding claims including means cooperating with said spring or spring means to move said push member, when the latter is released, to the operative position.
- 10 9. A writing instrument according to any one of the preceding claims wherein at least the rotatable member or the push member is provided with means which cooperate with said spring or spring means to move said push member, when the latter is released, to the operative position.
- 15 10. A writing instrument according to Claim 7 wherein means are provided for translating said rotatable bias into a force to return the push member to the operative position.
- 20 11. A writing instrument according to any one of Claims 2, 3, 4, 5, 6, 7 or 10 wherein the teeth of the cam are inclined to rotate the rotatable member in the same direction as the rotatable member is rotated by the push-member.
- 25 12. A writing instrument according to any one of the preceding claims wherein the rotatable member and the push member have surfaces which are in engagement when the push member is released, at least one of the latter engaging surfaces being inclined so that the force of engagement between said surfaces caused by said spring or spring means moves said push member to the operative position when said push member is released.
- 30 13. A writing instrument according to any one of the preceding claims wherein said push member has teeth directed toward the rotatable member, said spring or spring means forcing said rotatable member into engagement with said push member teeth when the push member is depressed, at least one of the engaging surfaces of the rotatable member and the teeth of the push member being inclined so that the force of engagement rotatably biases said rotatable member.
- 35 14. A writing instrument according to Claims 3 and 13 wherein the teeth of the push member engage with and act upon the lug or lugs of the rotatable member to rotatably bias said member.
- 40 15. A writing instrument according to Claim 14 wherein the ends of the lug or lugs of said rotatable member which face the push member and are engaged by the teeth of the push member are formed to constitute surfaces inclined with respect to the axis of the writing instrument.
- 45 16. A writing instrument according to any one of Claims 13, 14 or 15 wherein the teeth of the push member are generally pointed, the points of the teeth being defined by surfaces inclined toward each other and inclined relative to the axis of the writing instrument.
- 50 17. A writing instrument according to any one of the preceding claims wherein the writing instrument contains only one spring.
- 55 18. A writing instrument according to any one of the preceding claims wherein the push member extends rearwardly out of the rear end of the barrel, and the rotatable member is positioned forwardly of the push member.
- 60 19. A writing instrument according to any one of the preceding claims wherein said rotatable member is constituted by a cylinder having a cylindrical recess in the forward end thereof, the forward end of said cylinder being provided with a plurality of circumferentially spaced apart, outwardly extending lugs.
- 65 20. A writing instrument according to any one of the preceding claims wherein said cam is an annular cam.
- 70 21. A writing instrument according to any one of the preceding claims wherein the cam comprises longitudinally extending channels separated by pairs of teeth, said teeth defining therebetween a stop surface positioned offset from but intermediate the length of said channels.
- 75 22. A writing instrument substantially as herein described and as illustrated in the accompanying drawings.
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Reference has been directed in pursuance of Section 9, subsection (1) of the Patents Act, 1949, to Patent No. 748,897.

