United States Patent

[11] 3,597,100

[72] Inventor **Walter C. Ganz**
New York, N.Y.

[21] Appl. No. **29,890**
[22] Filed **Apr. 20, 1970**
[45] Patented **Aug. 3, 1971**

[73] Assignee **K. C. Pen Co., Inc,**
Brooklyn, N.Y.

Continuation-in-part of application Ser. No. 846,465, Aug. 31, 1969, now abandoned.

[54] **WRITING IMPLEMENT**
12 Claims, 12 Drawing Figs.

[52] **U.S. Cl.** **401/110,** 401/116
[51] **Int. Cl.** **B43k 24/06**
[50] **Field of Search** ..... 401/109-—111, 116, 75—78

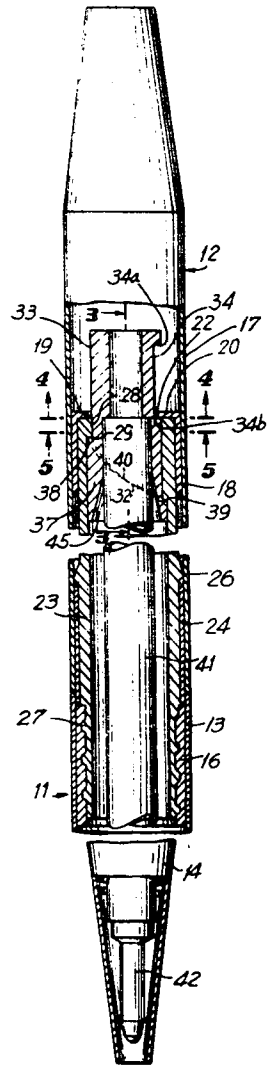
[56] **References Cited**

UNITED STATES PATENTS

2,753,844	7/1956	Bross	401/116
3,205,864	9/1965	Young	401/116 X
3,272,184	9/1966	Crowley	401/116
3,289,637	12/1966	Tessier	401/75
3,292,592	12/1966	Chapman et al.	401/116

Primary Examiner—Lawrence Charles
Attorney—Howard C. Miskin

ABSTRACT: A retractable writing implement comprises a barrel including an integrally threaded upper section, and an upper cap section rotatably supporting an externally threaded coaxial tubular actuator, which releasably engages the barrel threaded section. A cartridge carrier slideably and rotatably registers with the actuator upper portion. An inner arcuate flange affixed to the cap is spaced from the carrier to delineate a shoulder-terminated path along which is movable a finger affixed to the actuator to opposite ends of the path, and a finger projects from the flange into engagement with a vertical groove in the carrier. The carrier and actuator have complementing end-to-end cylindrical cams. Another embodiment restricts relative rotation of the cap and body by interaction of the cooperating cam surfaces.



Patented Aug. 3, 1971 3,597,100

3 Sheets-Sheet 1

FIG. 1



FIG. 2

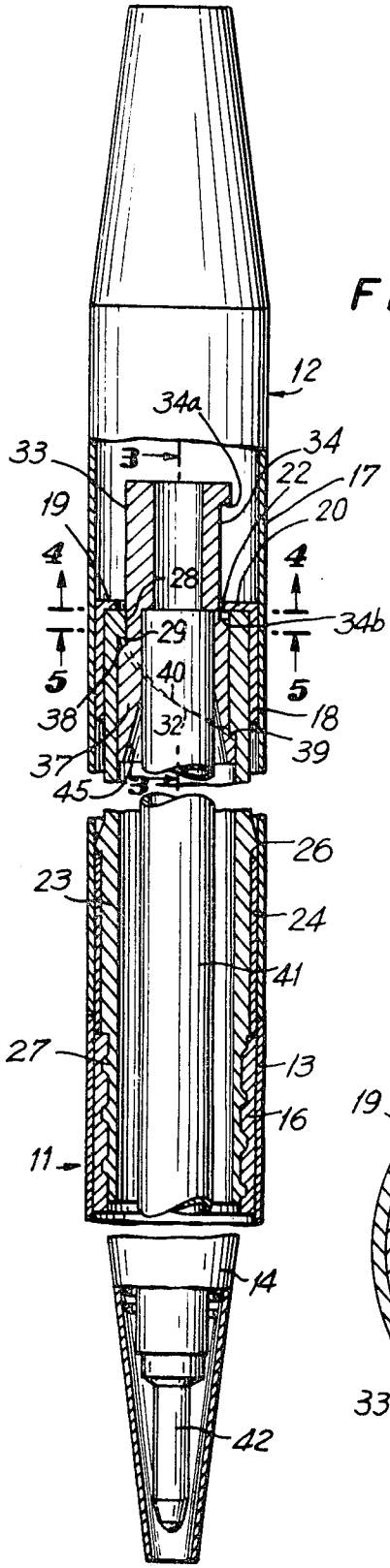


FIG. 3

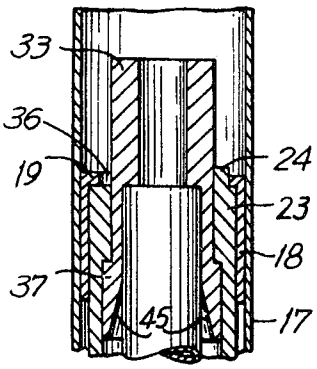


FIG. 4

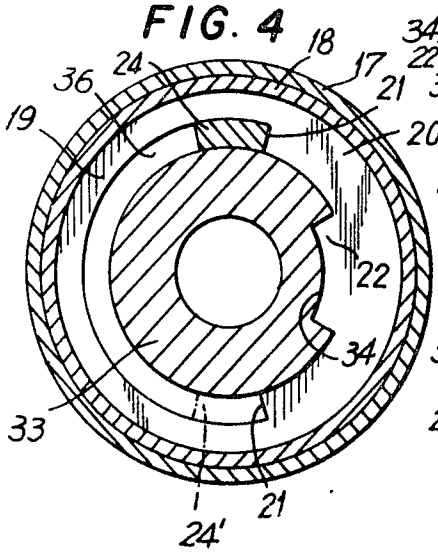
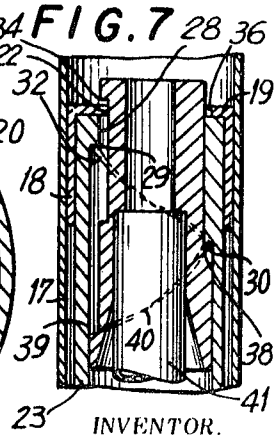


FIG. 7



INVENTOR.
WALTER C. GANZ

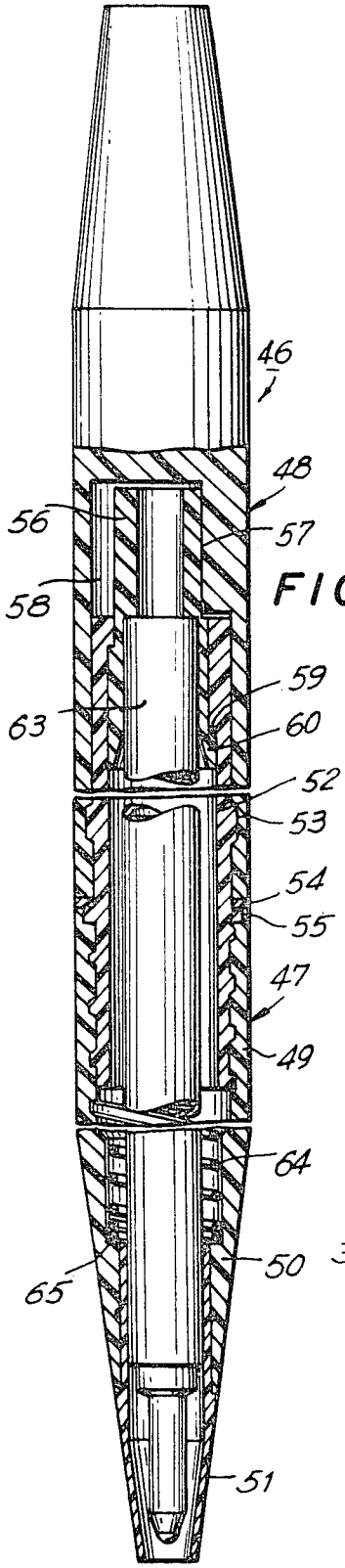
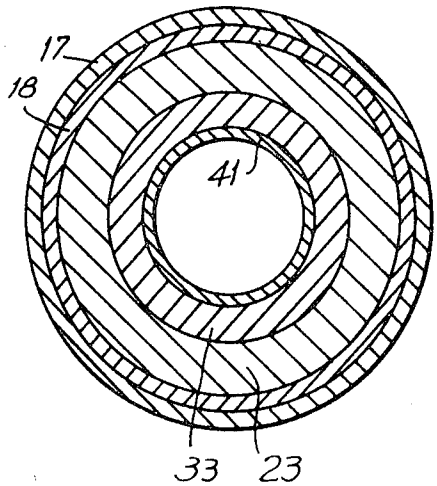


FIG. 8

FIG. 5



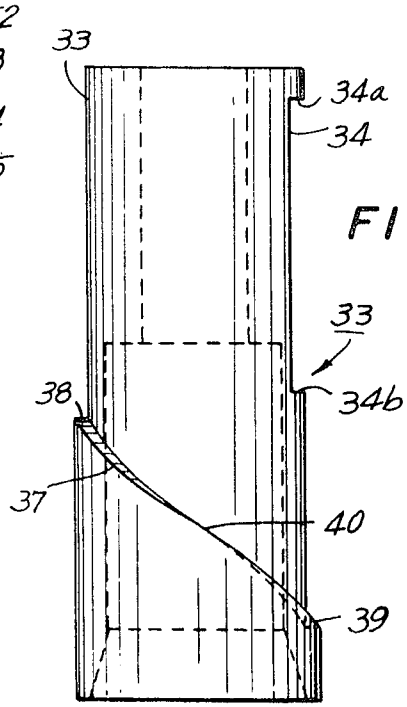
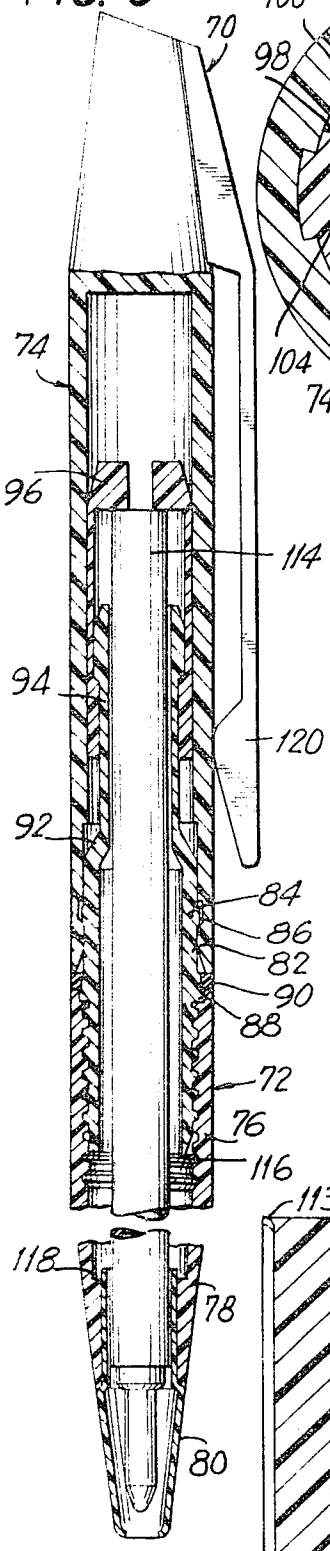


FIG. 6

INVENTOR.
WALTER C. GANZ

FIG. 9



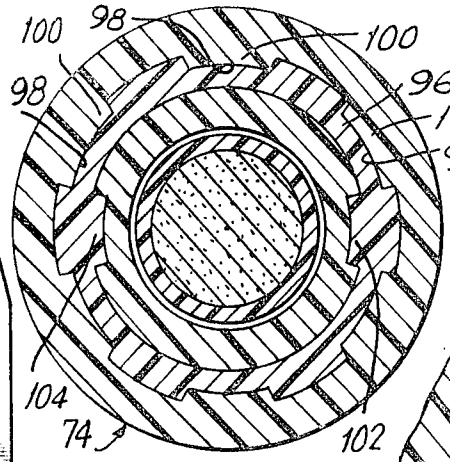


FIG. 11

FIG. 10

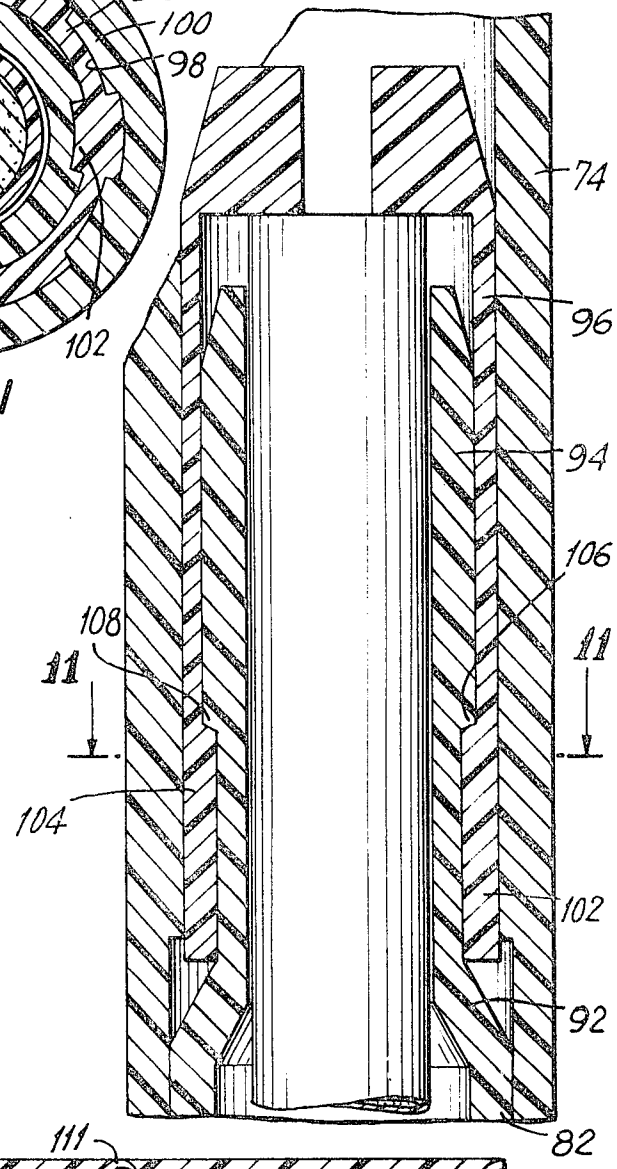
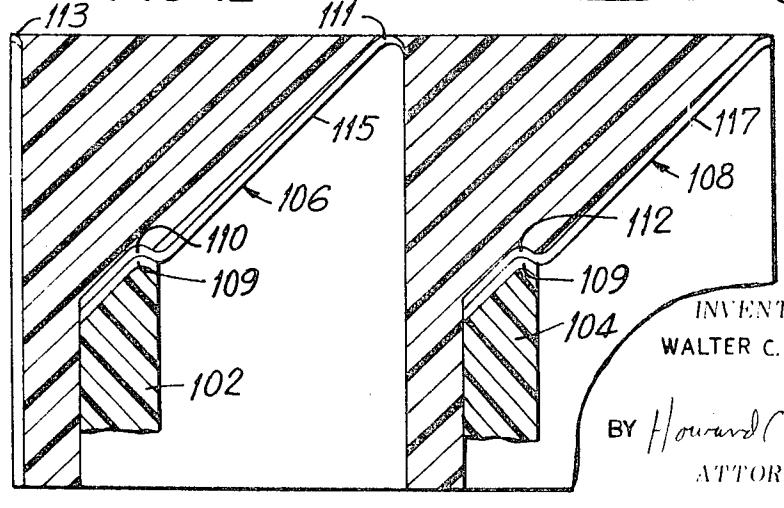


FIG 12



INVENTOR.
WALTER C. GANZ
BY Howard C Miskin
ATTORNEY

WRITING IMPLEMENT

BACKGROUND OF THE INVENTION

The present invention relates generally to improvements in writing instruments and it relates particularly to a replaceable full-size cartridge writing instrument, in which the writing element is advanced and retracted by the relative turning of different sections of the instrument.

Many different types of mechanisms have been employed and proposed to selectively advance and retract a writing element, such as a ballpoint cartridge or the like, out of and into the writing implement barrel. These retracting mechanisms are actuated in many manners. The mode of the operation wherein axially spaced parts of the writing instrument are relatively rotated possess many advantages, but mechanisms of the type have been generally characterized by numerous drawbacks, including not being usable with standard cartridges, complexity, bulkiness and high cost.

SUMMARY OF THE INVENTION

It is a principal object of the present invention to provide an improved writing instrument.

Another object of the present invention is to provide an improved writing instrument with a selectively fast-acting, retractable writing element.

Still another object of the present invention is to provide an improved writing instrument of the retractable type provided with a replaceable standard writing cartridge.

A further object of the present invention is to provide a writing instrument in which the writing element is quickly advanced or retracted with the turning of a section of the instrument.

Still a further object of the present invention is to provide a writing instrument of the above nature, characterized by its inexpensiveness, ruggedness, compactness, ability to accommodate thick cartridges, reliability, and ease and convenience of use and operation.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawings, which illustrate preferred embodiments thereof.

In a sense the present invention contemplates the provision of a retractable writing instrument comprising a barrel member having first threaded section, a cap member, an axially extending tubular actuating member carried by said cap member and rotatable relative thereto, and provided with a second threaded lower section releasably engaging said first threaded section, a cartridge carrier coaxial with and axially movable relative to said actuator member, interengaging track and follower means located on said cap and carrier, rotatably coupling said carrier and cap while permitting relative axial movement thereof, interengaging cam and follower means located on said actuator and carrier for axially moving said carrier upon rotation thereof relative to said actuator member, and means for limiting the rotation of said cap relative to said actuator to a predetermined angle.

According to one form of the improved writing instrument the cartridge carrier projects through the top opening into the actuating member and an arcuate flange of less than 360° projects inwardly from and is rotatable with the cap member and delineates with the carrier outer wall an arcuate passegeway terminating in stop-defining end shoulders. A finger projects upwardly from the actuator into said passageway, so that the cap may turn independently of the actuator for the length of the passageway, and thereafter turns the actuator to loosen or tighten it together with the cap to the barrel depending on the direction of rotation. A finger is directed inwardly from the arcuate flange into engagement with a vertical groove in the cartridge carrier to effect concurrent rotation of the cap and carrier while permitting independent axial movement of the carrier. The carrier and actuator have complementary end-to-end cylindrical cams formed therein, so that relative rotation of the actuator and carrier, as effected by the turning of the cap relative to the barrel, effects the advance or retraction of the carrier and any writing cartridge engaged thereby.

The improved writing instrument is rugged, inexpensive, compact and reliable, is simple and convenient to operate and use, and can accommodate thick and heavy cartridges.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a perspective view of a preferred embodiment of the present invention;

FIG. **2** is an enlarged fragmentary sectional view taken along line **2–2** in FIG. **1** with the cartridge illustrated in a retracted condition;

FIG. **3** is a sectional view taken along line **3–3** in FIG. **2**;

FIG. **4** is an enlarged sectional view taken along line **4–4** in FIG. **2**;

FIG. **5** is an enlarged section view taken along line **5–5** in FIG. **2**;

FIG. **6** is an enlarged front elevational view of the retractable cartridge carrier;

FIG. **7** is a view similar to FIG. **3** illustrated in a carrier advanced condition;

FIG. **8** is a view similar to FIG. **2** of another embodiment of the present invention;

FIG. **9** is a view similar to FIG. **2** of another embodiment of the present invention;

FIG. **10** is an enlarged sectional view taken along the centerline of FIG. **9**;

FIG. **11** is a sectional view taken along line **11–11** in FIG. **10**; and

FIG. **12** is a layout of the curve path of the follower of the cartridge in writing position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, and particularly FIGS. **1** to **7** thereof, which illustrate a preferred embodiment of the present invention, the reference numeral **10** generally designates the improved twistable writing instrument in the form of a replaceable cartridge ballpoint pen, which includes a lower tubular barrel member **11** and a relatively rotatable upper tubular cap **12** having a closed top. The barrel member **11** includes an open-ended cylindrical metal shell **13** having a downwardly converging conical wall **14** defining an open-ended tip. An internally threaded tubular core **16** preferably formed of a synthetic plastic, telescopes and is affixed in some convenient manner to shell **13**, such as press-fit, bonding or the like, and terminates shortly below the top edge of shell **13**.

Cap **12** comprises a tubular metal section **17** coaxially positioned end to end with shell **13** and of the same diameter as and rotatable relative to shell **13**. A sleeve **18** nests in and is affixed in some convenient manner, such as press-fit or bonding, to the upper part of tubular section **17**, and is provided along its upper edge with an inwardly directed integrally formed peripheral flange **19**. Coplanar with and directed inwardly from flange **19** is an arcuate flange **20** extending for about 160° and terminating at opposite ends in stop-defining radial shoulders **21**. Projecting radially inwardly from flange **20** and coplanar therewith is a medially positioned arcuate guide finger or key **22**.

A tubular actuator member **23** is coaxially rotatably housed in cap **12** and projects upwardly into sleeve **18** and downwardly beyond the bottom edge thereof, and is advantageously formed of a synthetic plastic. The upper end face of actuator **23** slidably abuts the under face of flange **19** and as best shown in FIGS. **3** and **4**, is provided with an integrally formed upwardly directed finger **24** of a radial dimension approximately that of shoulders **21** and movable with the relative rotation of actuator **23** along an arcuate path into alternative engagement shoulders **21**. It should be noted that the upward movement of actuator **23** in cap **12** is prevented by flange **19**, and the downward movement thereof is prevented by a sleeve **25** telescoping and affixed to tubular section **17** and projecting

below the bottom edge thereof and rotatably engaging the face of actuator **23** when cap **12** is rotated. A peripheral lip **26** is directed outwardly from actuator **23** and abuts the upper edge of sleeve **25**.

The bottom section **27** of actuator **23** is of reduced outside diameter, and its upper edge is delineated by a shoulder which normally abuts the top edge of core **16** when pen **10** is assembled, section **27** being externally threaded and releasably engaging internally threaded core **16**. When assembled, ends of cap **12** and barrel shell **13** are slightly spaced from each other.

Integrally formed on the upper inner face of actuator **23** is a cylindrical cam **28**, which includes an upper valley or depressed portion **29** and an opposite lower rise portion **30**, the cam rise and valley portions **30** and **29** being interconnected by opposite outwardly converging end runs **32**.

A tubular chuck or cartridge carrier **33** is coaxial with and projects through the upper end of actuator **23** and is axially movable and rotatable relative thereto. A vertical groove or keyway **34** terminating in top **34***a* and bottom **34***b* stop shoulders is formed in the upper outer face of carrier **33** and slideably engages finger **22**, whereby to limit the vertical movement of carrier **33** and effect the rotation thereof with the rotation of cap **12** relative to barrel **11**. In effect finger **22** of cap **12** and groove **34** of carrier **33** form a track and follower construction for rotatably coupling the cap and carrier while permitting relative axial movement. As seen best in FIG. **4**, the outer upper face of carrier **33** delineates with the inner edge of flange **19** an arcuate passageway **36** terminated by shoulders **21** and slidably engaged by finger **24**.

A cylindrical cam **37** is integrally formed on the inner lower face of carrier **33**, and rotatably and slideably engages the inside face of actuator **23** below cam **28**. The cam surface of cam **37** complements that of cam **28**, so that the cam surfaces may be brought into mating engagement. Cam **37** includes a rise portion **38**, an opposite valley or depressed portion **39**, and interconnecting upwardly converging inclined side runs **40**. Thus, in the instrument assembled condition when cam rise portions **30** and **38** are in registry, as illustrated in FIG. **7**, carrier **33** is in its lowered advanced position and finger **24** abuts one shoulder **21**, and when cams **28** and **37** are in mating condition with their rise portions registering with opposing valley portions, as illustrated in FIGS. **2** to **5**, carrier **33** is raised to its retracted position, and finger **24** abuts an opposite shoulder **21**.

The lower inside face **45** of carrier **33** is conical to facilitate the insertion of the inner end of a writing cartridge **41**. Carrier **33** is generally tubular in its lower end to accommodate a cartridge **41** and retains the cartridge by friction. The carrier is open at its upper end to allow air to pass through to the cartridge. Cartridge **41** is of conventional construction and includes an outer writing tip **42**. A helical compression spring **43** is entrapped in the known manner in the barrel and urges the cartridge upwardly, towards the cap, and as shown in FIG. **2**, between barrel tip portion **14** and a shoulder on cartridge **41**, to resiliently urge cartridge **41** and carrier **33** upwardly toward their retracted positions.

Considering now the operation of the improved writing instrument **10** when the cartridge **41** and carrier **33** are in their retracted positions cams **28** and **37** are in mating relationship and finger **24** engages upper shoulder **21** as viewed in FIG. **4**. To advance carrier **33** and cartridge **41**, cap **12** is rotated clockwise about 180° relative to barrel **11**, as viewed from the bottom thereof, whereby finger **22** rotates carrier **33** relative to actuator **23**, which is held stationary by barrel **11**, so that relative rotary movement of cams **28** and **37** is effected to bring rise portions **30** and **38** of cams **28** and **37** respectively, into engagement, whereby to advance carrier **33** and cartridge **41** against the influence of the retraction spring **43**. When carrier **33** is in its advanced position, finger **24** is engaged by the opposite shoulder **21**, illustrated in shadow in FIG. **4** and indicated at **24'**. By opposite rotation of cap **12** the carrier and cartridge may be retracted. Full longitudinal movement of the cartridge **41** is obtained with 180° of rotation of cap **12**.

In order to replace cartridge **41**, cap **12** is twisted clockwise relative to barrel **11** as viewed from the bottom, until the lower shoulder **21** (as viewed in FIG. **4**) engages finger **24** and further turning is continued, so that the rotation of actuator **23** relative to core **16** is effected until actuator **23** is unscrewed and separated from barrel **11**. Upper stop **34***a* on carrier **33** prevents carrier **33** from separating from actuator **23** when cartridge **41** is removed. The spent cartridge carried by carrier **33** is then pulled from carrier **33** and replaced by a fresh cartridge, and cap **12** assembled with barrel **11** by applying it to barrel **11** and turning it in an opposite direction.

As seen, during operation the rotation of cap **12** is insufficient to unscrew the barrel, since the larger twist force occurs during retraction, which tightens the cap on the barrel, i.e., counterclockwise as viewed from the bottom.

Referring now to FIG. **8** of the drawing, which illustrates another embodiment of the present invention basically similar to that first described, the reference numeral **46** designates the improved writing instrument, which includes a tubular barrel **47** and a relatively rotatable coaxial cap **48**, both formed of a synthetic organic plastic. Barrel **47** includes an upper cylindrical section **49** whose upper portion is internally threaded, and a lower conical tip portion **50** provided with a tubular, coaxial metal tip member **51** in the known manner.

A tubular actuator **52** formed of a synthetic plastic has its upper portion telescoping cap **48**, and includes an integrally formed peripheral lip **53** engaging a corresponding groove in the inner face of cap **48** to permit the rotation of actuator **53**, while preventing its axial movement relative to cap **48**. The lower part of actuator **52** is externally threaded and releasably engages barrel threaded section **49**. The ends of barrel **47** and cap **48** are separated to permit relative rotation by a lip **55** on actuator **52** engaging a shoulder in the end of barrel **47**. Disposed between the facing ends of barrel **47** and cap **48** is a ring **54**.

A tubular cartridge carrier **56**, similar in construction to carrier **33** earlier described, projects into the upper end of actuator **52**, and is provided with a vertical groove in its upper outer wall, which is engaged by longitudinally extending inwardly radially projecting finger **57** integrally formed with cap **48**, so as to effect the rotation of carrier **56** with cap **48**, while permitting the axial movement thereof. The upper peripheral face of carrier **56** is spaced from the confronting face of cap **48** to define an arcuate passageway **58** corresponding to passageway **36** and extending for somewhat more than 180°, and terminating in end shoulders integrally formed with the inner face of barrel **48**. A finger (not shown) corresponding to finger **24** is integrally formed with the actuator **52** and projects upwardly into circular sliding engagement with passageway **58**. Complementary cylindrical cams **59** and **60** are located on the confronting faces of and integrally formed with the actuator **52** and carrier **56**, respectively, the shapes, relationships and cooperation of cams **59** and **60** being substantially the same as those of cams **28** and **37** previously described.

A replaceable writing cartridge **63** coaxially registers with barrel **47** and cap **48**, and its upper end is releasably engaged by the lower axial bore of carrier **56**. A helical compression spring **64** is entrapped between a peripheral shoulder **65** formed on the inner face of barrel tip section **50** and a shoulder on cartridge **63** to resiliently urge cartridge **63** and carrier **56** upwardly. A clip (not shown) may be attached to the cap in any convenient manner.

The use and operation of writing instrument **46** is similar to that of writing instrument **10**, earlier described.

A further embodiment of the present invention is shown in FIGS. **9—11**, which is basically similar to the above-described embodiments. Reference numeral **70** designates the improved writing instrument which includes a tubular barrel **72**, and a relatively rotatable coaxial cap **74**, both formed of a synthetic organic plastic. Barrel **72** includes an upper cylindrical section **76**, whose upper portion is internally threaded, and a lower conical tip portion **78** provided with a tubular coaxial metal tip member **80** in the known manner.

A tubular actuator **82**, formed of a synthetic plastic, has its upper portion in telescopic relation with cap **74**, and includes an integrally formed peripheral lip **84** engaging a corresponding groove **86** in the inner face of cap **74**, to permit the rotation of actuator **82**, while preventing its axial movement relative to cap **74**. The lower part of actuator **82** is externally threaded and releasably engages barrel threaded section **76**. The ends of barrel **72** and cap **74** are separated to permit relative rotation, by a lip **88** on actuator **82** engaging a shoulder in the end of barrel **72**. Disposed between the facing ends of barrel **72** and cap **74** is a ring **90**. Tubular actuator **82** has an inwardly directed tapered portion **92** disposed above lip **84** and then continues interiorly in cap **74**, in a generally cylindrical configuration, as at **94**.

A generally tubular cartridge carrier **96** is axially movably mounted within cap **74** and has its outer wall provided with a series of axially extending grooves **98** which mate with axially extending ridges or fingers **100** on the surface of the inner wall of cap **74** to form a spline arrangement, as best seen in FIG. **11**. The spline arrangement formed with projections **100** and grooves **98** effect the rotation of carrier **96** with the cap **74** while permitting the relative axial movement thereof. The spline arrangement forms the track and follower effect discussed above with respect to the earlier described embodiments. Cartridge carrier **96** has a pair of fingers **102** and **104** which extend inwardly from the inner wall of carrier **96** as seen best in FIG. **11**. Fingers **102** and **104** are spaced substantially 180° apart and extend upwardly from the bottom edge of carrier **96** a predetermined distance. The upper ends of fingers **102** and **104** act as followers with and engage complementary shaped cylindrical cam surfaces **106** and **108**, which are located on the outer cylindrical surface of portion **94** of actuator **82**. Cams **106** and **108** include a rise portion **110** and **112** respectively, and an opposite valley or depressed portion **111** and **113** and interconnecting upwardly converging inclined side run **115** and **117** respectively. As seen best in FIG. **12**, the toes **109** on the ends of fingers **102** and **104** respectively are shaped to engage the slight depressions or valleys surfaces and **112** in cam surfaces **106** and **108**. The respectively corresponding followers provide stops for writing and retraction positions, and restrict rotation of actuator **82** and carrier **96**, to about 120°.

A replaceable writing cartridge **114** coaxially registers with a barrel **72** and cap **74** and its upper end is releasably engaged by the upper axial bore of portion **94** of actuator **82**. A helical compression spring **116** is entrapped between a peripheral shoulder **118** formed on the inner face of barrel tip section **78** and a shoulder on cartridge **114** to resiliently urge cartridge **114** and carrier **96** upwardly. A clip **120** is attached to the cap in a conventional manner.

In order to replace cartridge **114**, cap **74** is twisted clockwise relative to barrel **72** in a manner described above with respect to the earlier embodiment. Cartridge **114** is frictionally held by the upper portion **94** of actuator **82**. Finger **84** cooperating with groove **86** holds actuator **82** in position in cap **74** when cap **74** is fully unthreaded from barrel **72** and carrier **96** is held within cap **74** by actuator **82**.

In general, the use and operation of writing instrument **70** is similar to that of writing instrument **10**, earlier described.

While standard length cartridges may be used they may be of various widths. Also the instrument shown in FIGS. **2—7** and the cams may be die-cast as desired.

While preferred embodiments have been described above, it would be understood that many variations thereof will be readily apparent to those skilled in the art without departing from the spirit thereof, therefore, it is intended that the foregoing description be considered illustrative only, and the scope of the invention be determined by the appended claims.

What I claim is:

1. A retractable writing instrument, comprising a barrel member, a cap member, an axially extending tubular actuating member carried by said cap member and rotatable relative thereto, and releasably engaging said barrel member, a cartridge carrier coaxial with and axially movable relative to said actuator member, interengaging track and follower means located on said cap member and carrier rotatably coupling said carrier and cap while permitting relative axial movement thereof, an interengaging cam and follower means located on said actuator and carrier for axially moving said carrier upon rotation thereof relative to said actuator member.

2. The writing instrument according to claim **1**, further including means for limiting the rotation of said cap relative to said actuator to a predetermined angle.

3. The writing instrument according to claim **2**, wherein said carrier projects into said actuator member and said cam and follower means comprise end-to-end cylindrical cams formed on the confronting faces of said carrier and actuating member.

4. The writing instrument according to claim **3**, wherein said cams have complementing cam surfaces which mate when said carrier is in a retracted position, each of said cams having opposite raised and depressed sections.

5. The writing instrument according to claim **2**, including a writing cartridge coaxial with said barrel and having an inner end releasably engaged by said carrier, and spring means urging said cartridge and carrier toward a retracted position.

6. The writing instrument according to claim **1**, wherein said track and follower means is defined by at least one longitudinal groove formed in the outer face of said carrier and a finger rotatable with and projecting radially inwardly from said cap into engagement with said longitudinal groove.

7. The writing instrument according to claim **2**, wherein said means for limiting the rotation of said cap relative to said actuator comprises a finger projecting longitudinally from said actuator and rotatable therewith along an arcuate path, and a pair of circumferentially spaced stops located in said path and affixed to said cap.

8. The writing instrument according to claim **2**, wherein said cap rotation limiting means comprises an arcuate flange projecting inwardly from said cap member towards said carrier and extending for less than 360°, and a finger projecting longitudinally from actuator along said carrier and movable into alternative abutment with opposite ends of said flange.

9. The writing instrument according to claim **8**, wherein said track and follower means comprises a longitudinal groove formed in the outer face of said carrier and a finger projecting radially inwardly from said flange into sliding engagement with said groove.

10. The writing instrument according to claim **6**, wherein said flange and finger are integrally formed with said cap.

11. The writing instrument according to claim **1**, wherein said means for releaseably engaging said barrel and said actuating members is mating screw threads.

12. The writing instrument according to claim **2**, wherein said actuating member has a portion spaced from said cap, and said carrier is positioned within said space between said cap and said actuating member.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,597,100 Dated August 11, 1971

Inventor(s) WALTER C. GANZ

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Specification:

Column 4, line 29 - Change "rotation of actuator 53," to --rotation of actuator 52,--

Column 5, line 39 0 Change "depressions or valleys surfaces and" to --depressions or valleys 110 and--

Signed and sealed this 9th day of May 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334