

[54] CARTRIDGE PENCIL

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[51] **Int. Cl.**..... B43k 21/14

[58] **Field of Search**..... 401/89, 57

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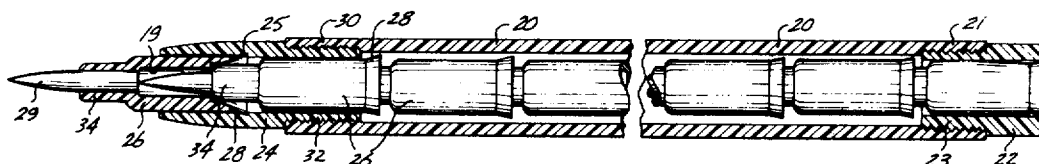
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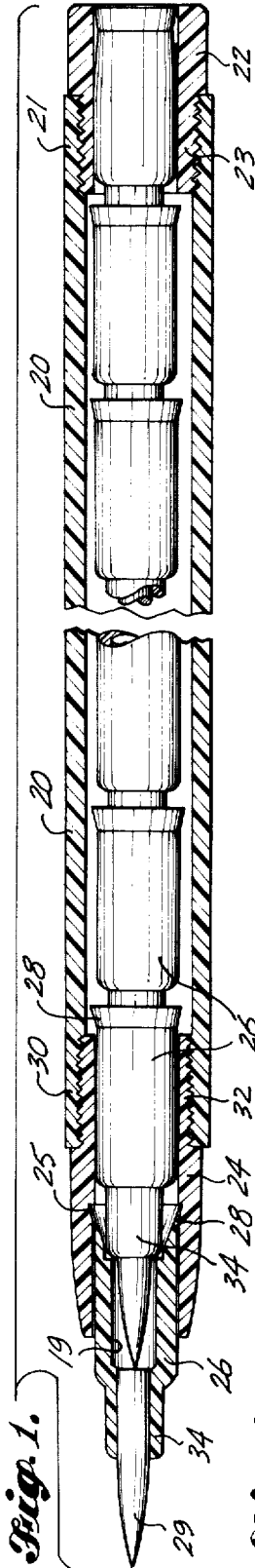
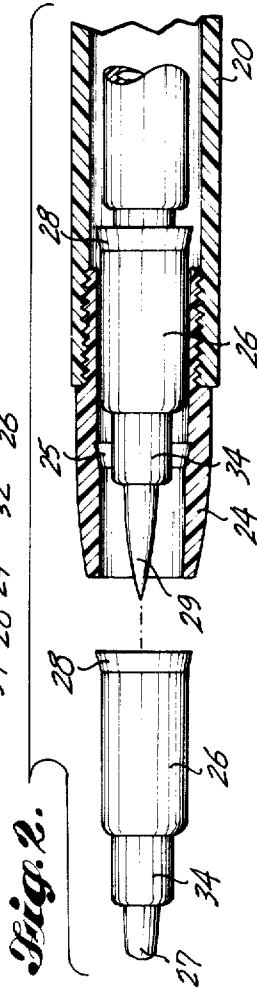
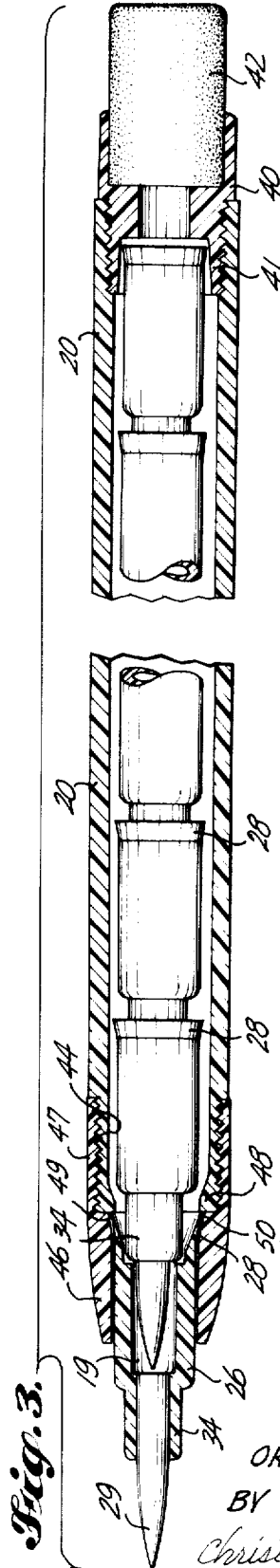
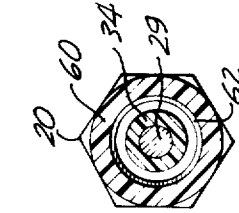
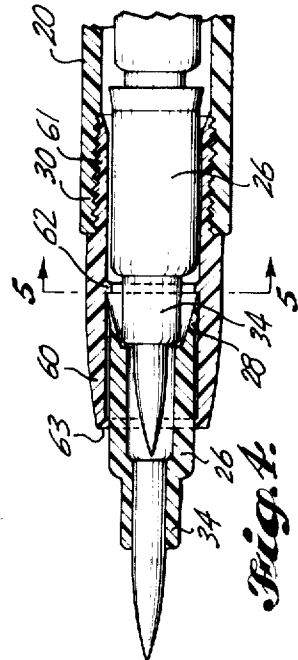
*Primary Examiner*—Lawrence Charles  
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Garrison & Havelka

[57] **ABSTRACT**

A cartridge-type pencil is described having a plurality of individual writing cartridges positioned axially within a tubular member and adapted to move axially forward within the bore of the tubular member. The individual cartridge-like writing elements each have a rearwardly positioned skirt element adapted to engage an interior discontinuity positioned adjacent the tip of the tubular member to restrain the forwardmost cartridge from movement back into the barrel.

**4 Claims, 15 Drawing Figures**





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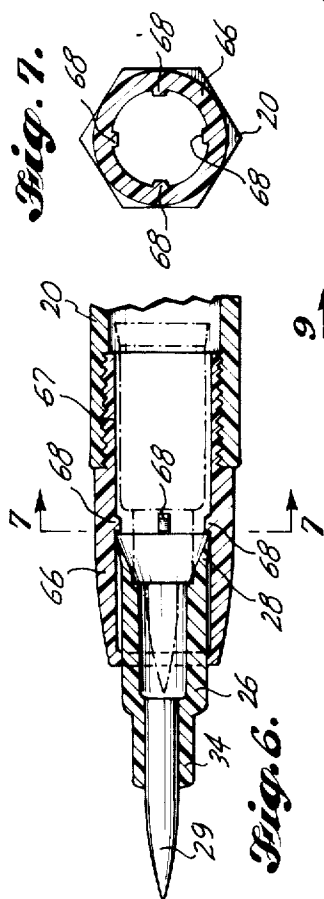


**Fig. 6.**

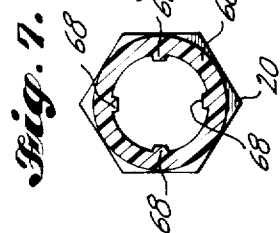


**Fig. 7.**

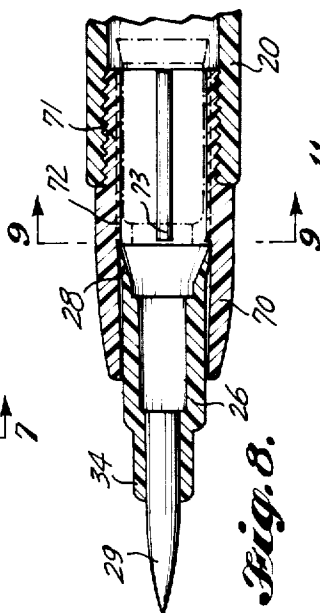


**Fig. 8.**

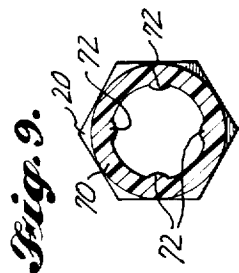


**Fig. 9.**



**Fig. 10.**

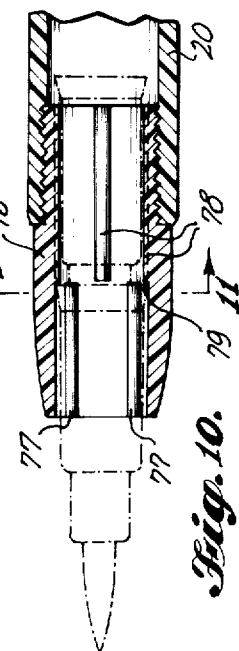


**Fig. 11.**

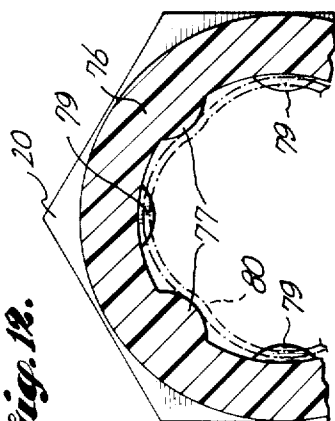


**Fig. 12.**

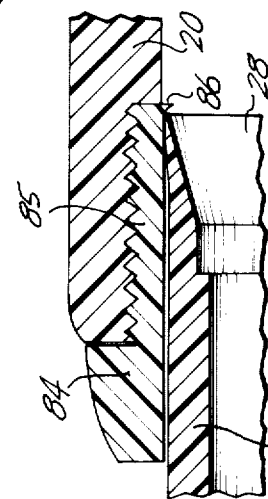


**Fig. 13.**

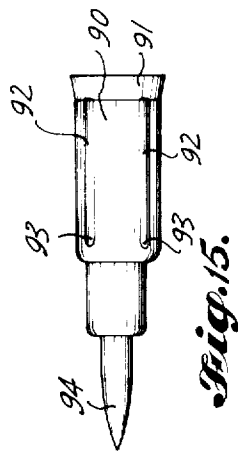


**Fig. 14.**

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## CARTRIDGE PENCIL

## BACKGROUND OF THE INVENTION

The present invention relates to new and useful improvements in writing implements and more particularly to a writing instrument which has a plurality of cartridge-like writing elements disposed longitudinally within a barrel which cartridges may be readily interchanged serially to provide a new cartridge in an exposed position for writing.

## PRIOR ART

Pencils having a column of cartridges carrying pre-sharpened leads are known. Heretofore the cartridges of these pencils have been structurally supported only at the rearwardmost cartridge requiring that forces upon the tip of the exposed lead be transmitted along the entire column of cartridges. A poor fit between cartridges frequently permits substantial motion of the exposed writing tip, giving a soft support to the writing lead. Undue attention must be focused upon the fit between cartridges. Furthermore, loss of one cartridge renders the pencil useless.

## OBJECTS OF THE INVENTION

It is an object of this invention to provide an inexpensive multiple cartridge-type pencil.

One additional object of this invention is to provide a cartridge type pencil having a support means engaging for forwardmost cartridge to prevent movement thereof under writing pressure.

Another object of this invention is to provide a multiple cartridge writing implement which does not require the full complement of cartridges for writing.

A further object of this invention is to provide a cartridge-type pencil which does not require a close tolerance fit between cartridges for proper operations.

## SUMMARY OF THE INVENTION

This invention provides a writing implement which has a plurality of writing cartridges, each having a flared skirt portion on one end thereof. The cartridges are positioned within the interior of a hollow, substantially cylindrical tubular member. The forward end of the tubular member has an interior discontinuity which is adapted to engage the skirt portion of the forwardmost writing cartridge to prevent it from sliding back into the barrel of the writing instrument under writing pressure. The interior discontinuity is so constructed as to permit the individual writing cartridges to be forced axially forward through the barrel of the writing instrument to expose the writing tip of each individual cartridge serially. The forwardmost cartridge passes by the discontinuity and is then prevented from reentry into the barrel by the engagement between the discontinuity and the skirt. The discontinuity is formed by any one of a number of manufacturing techniques resulting in various embodiments of the invention. An interference fit between the writing cartridges and the bore of the forward portion of the tubular member is provided so that the writing cartridges do not fall out of the forward end of the writing implement. The rearward end of the writing implement may also have a diameter resulting in an interference fit between the cartridges and the interior wall of the tubular member. A removable plug such as an eraser or the like may be placed in the rearwardmost portion of the tubular member is desired.

These and other aspects, objects and attributes of this invention can be readily seen from an examination of the following description of several of the preferred embodiments wherein reference is made to the attached drawings.

## THE DRAWINGS

FIG. 1 is an axial sectional view of one embodiment of the device of this invention showing the plurality of writing cartridges positioned within the bore of the writing instrument.

FIG. 2 is a partial axial cross-sectional view of the device shown in FIG. 1 having the forwardmost writing implement cartridge removed therefrom.

FIG. 3 is a partial axial cross-sectional view of a second embodiment of this invention.

FIG. 4 is a partial axial cross-sectional view of a third embodiment of this invention.

FIG. 5 is a cross-sectional view of the device shown in FIG. 4 taken along lines 5—5 of FIG. 4. FIG. 6 is a partial axial cross-sectional view of a fourth embodiment of this invention.

FIG. 7 is a cross-sectional view of the device shown in FIG. 6 taken along lines 7—7 of FIG. 6.

FIG. 8 is a partial axial cross-sectional view of a fifth embodiment of this invention.

FIG. 9 is a cross-sectional view of the apparatus shown in FIG. 8 taken along lines 9—9 of FIG. 8.

FIG. 10 shows a partial axial cross-sectional view of a sixth embodiment of this invention.

FIG. 11 shows a cross-sectional view of the apparatus shown in FIG. 10 taken along lines 11—11 of FIG. 10.

FIG. 12 is an enlarged segment of the device shown in FIG. 11.

FIG. 13 is a partial axial cross-sectional view of a seventh embodiment of this invention.

FIG. 14 is an enlarged fragmentary cross-sectional view of the tip section of the apparatus shown in FIG. 13.

FIG. 15 shows a ribbed modification of the individual writing cartridges suitable for use in several of the embodiments of this invention.

Referring more particularly to the drawings wherein like numerals indicate like parts, there is seen in FIGS. 1 and 2 a writing implement having a barrel 20 with a rearwardly positioned female threaded portion 21. A rear sleeve 22 having a male threaded portion 23 is adapted to be inserted into the female threaded portion 21 of barrel 20. The rear sleeve 22 has an inside diameter sufficient to permit passage of the cartridges 26, but small enough in diameter to provide an interference fit along the length thereof with the flared skirt portion 28 of the cartridge 26. A plurality of the cartridges 26 are shown positioned within the interior of barrel 20 nestled together with the tip portion 29 of one cartridge fitting into the cavity 19 of the immediately adjacent forwardly positioned cartridge. At the front end of the barrel, a front sleeve 24 having a male threaded portion 32 is positioned with the male threaded portion adapted to be inserted into the female threaded portion 30 of barrel 20. The front sleeve 24 has an inside diameter sufficient to permit passage of the cartridge 26 in an interference fit and has a slot 25 cut into the interior of the front sleeve. The slot 25 engages the deformable skirt 28 of the cartridge 26 preventing cartridge 26 from sliding back into the barrel 20 of the writing instrument. The face of slot 25 which engages skirt 28

lies on a plane which is substantially perpendicular to the axis of barrel 20. This configuration provides the support to the individual cartridges 26 at the position where it is needed most, that is, at the forwardmost cartridge, eliminating the need to transmit the forces caused by use of the writing instrument back up through the long column of interchangeable cartridge members. In FIG. 2 a portion of the apparatus shown in FIG. 1 is presented with the forwardmost cartridge being removed from the front tip end of the writing instrument. The cartridge 26 having the used lead 27 is taken from its position at the front of the column of cartridges 26 and inserted into the rear sleeve 22 forcing the entire column of cartridges forward so that the next cartridge in line is positioned with the lead 29 exposed for writing purposes. As the column of cartridges is moved forward within the barrel 20 the deformable skirt 28 of the cartridge being exposed comes into contact with the rearwardmost portion of the front sleeve 24. As the cartridge is forced further by pressure upon the rearwardmost cartridge, the deformable skirt 28 is caused to constrict in diameter and pass into the interior of the front sleeve 24. Further forward motion of the writing cartridges causes the deformable skirt to slip into slot 25 and expand, thus preventing the cartridge 26 from sliding back into the interior of the writing instrument barrel 20. At this point, the writing instrument is again ready for use with a new, perfectly pointed lead tip 29 exposed for use.

In FIG. 3 a second embodiment of this invention is shown in which the front sleeve 46 has a female threaded portion 47 adapted to engage the male threaded portion 44 of barrel 20. A barrel bore constriction 48 is provided in this embodiment to engage the deformable skirt 28 of the cartridge 26. A chamfered surface 50 is provided in the front sleeve 45 so that the front barrel face 49 formed by the barrel bore constriction 48 is exposed and may be engaged by the deformable skirt 28. The bearing surface thus exposed engages the skirt and prevents the forwardmost cartridge from being forced back into the interior of barrel 20. FIG. 3 also shows the use of a different embodiment of the rear sleeve member. In this figure, rear sleeve 40 utilizes a male threaded portion 41 to engage the interior of barrel 20 and is provided with an eraser member 42. To cycle the writing cartridges 26 through the barrel of the writing instrument, it is necessary in this embodiment to unscrew the rear sleeve member 40, insert the used cartridge and force the entire column of cartridges forward so that a new cartridge having a perfectly formed lead tip 19 is again exposed for use. The eraser holding rear sleeve 40 may then be re-inserted into the barrel 20. This embodiment could, of course, utilize an interference fit between the rear sleeve 40 and barrel 20 if desired.

A third embodiment of this invention is shown in FIGS. 4 and 5 wherein an annular inside rib 62 is disposed within the front sleeve 60 in a position to engage the deformable skirt 28 of cartridge 26. Front sleeve 60, having the annular inside rib 62 is equipped with a male threaded portion 61 adapted to engage the female threaded portion 30 of barrel 20. The mode of operation of this particular embodiment of the invention is much like those described above in that the cartridges are cycled for use by removing the spent cartridge from the front tip end of front sleeve 60 and inserting it into the rearwardmost portion of the barrel 20 thus forcing

the next cartridge into writing position. The deformable skirt 28 is forced past the annular rib 62 and permitted to expand to securely engage the front side of annular ring 62, preventing the cartridge from being forced back into the barrel 20. An annular tip rib 63 is provided to give the exposed cartridge 26 circumferential support.

A fourth embodiment of this invention is shown in FIGS. 6 and 7 in which a front sleeve 66 is shown equipped with interior beads 68 provided for engagement with the deformable skirt portion 28 of cartridge 26. In this embodiment, a plurality of interior beads 68 are positioned about the interior of front sleeve 66 and are adapted to engage the skirt 28 once it has been forced past the beads 68. This particular embodiment requires less force to move the cartridges past the locking mechanism, in this case the bead 68, since only a portion of the skirt 28 of the cartridge needs to be deformed to pass the beads 68. The front face of bead 68 upon engaging the deformable skirt 28 provides a sufficient amount of support to prevent the cartridge from slipping back into the barrel 20 of the writing instrument.

FIGS. 8 and 9 show a device similar to that shown in FIGS. 6 and 7, however, in this embodiment the skirt engaging element comprises several partial longitudinal ribs disposed within the front sleeve 70 which are adapted to engage the deformable skirt 28 of the cartridge 26. In this embodiment, the ribs 72 extend along approximately one-half of the length of the front sleeve 70. The ribs 72 cause the skirt 28 to deform whenever the cartridge 26 is being forced past the rib into its operative position at the front tip of the writing instrument. As soon as the skirt 28 has passed the end of the end 73 of rib 72, it springs outwardly and engages the front side of the end 73 of rib 72. The cartridge 26 cannot then be forced back into the barrel 20 of the writing instrument.

FIGS. 10, 11 and 12 show another embodiment somewhat similar to that shown in FIGS. 8 and 9 in which longitudinal ribs extend along the full length of the front sleeve 76. Ribs 78 are located behind ribs 77 so that a discontinuity occurs at a position in which the deformable skirt 28 can engage the forward portion of the rearwardly located ribs 78.

The cross-sectional view shown in FIG. 11 and enlarged in FIG. 12 show the outline 80 of the deformable skirt 28 being deformed by the forward ribs 77 and resting against the front surface 79 of the rearward ribs 78. This embodiment has the advantage of providing equalized support around the surface of the cartridges 26 at any location within the front sleeve 76 without bearing unduly upon the surface of the cartridges. Interchanging of the cartridges may be easily accomplished, yet proper support is supplied to the cartridges to prevent them from wobbling during use.

One additional embodiment of this invention is shown in FIGS. 13 and 14 in which the front sleeve 84 is shown having a molding bead 86 at the rearward section thereof. The front sleeve 84 with the molding bead 86 has a male threaded portion 85 which may be readily inserted into the corresponding female portion of the writing instrument barrel 20. The molding bead 86 performs the same function as the other skirt engaging elements described in the previous embodiments and may be readily formed by a minor alteration in the mold structure. This molding bead 86 serves to engage

the skirt 28 of cartridge 26 as it is forced forward by pressure on the rearwardmost cartridge.

The individual cartridges may be provided with ribbing along their length as shown in FIG. 15 for use with the embodiments of this invention shown in FIGS. 6 through 12. The ribs 92 on the ribbed cartridge 90 shown in FIG. 15 serve to provide support to the cartridge along the interior wall of the front sleeve of any one of the embodiments shown in FIGS. 6 through 12. The leading edge 93 of ribs 92 is shown with a sharpened profile so that in the event that it impinges upon bead 68 or ribs 73 or 78, the cartridge will turn a sufficient amount to permit passage of the cartridge without further interference between the ribs 92 and the protruding beads or ribs positioned on the interior of the front sleeves.

As will be apparent, the particular advantages of the construction of the various embodiments illustrated and described above are best availed of when the writing implement involved utilizes interfitting cartridges equipped with pre-sharpened leads. Due to the support means utilized which engage the forwardmost cartridge, the particular fit and engagement between the cartridges is of greatly lessened importance than in the prior art devices.

From the foregoing description it can be observed that the pre-sharpened leads 29 of the frontmost cartridge 26 positioned within the writing instrument will be normally exposed at the front end of the front sleeve described in the various embodiments. When this lead has become blunt or broken, the frontmost cartridge can be readily removed by pulling it out of the front end of the front sleeve. This cartridge may then be inserted into the recess 19 of the rearwardmost positioned cartridge and pushed into the rear sleeve a sufficient amount so that the skirt 28 of the newly exposed frontmost cartridge engages the discontinuity within the inside of the front sleeve. With the cartridges moved to their new position, each time having the deformable skirt 28 engage the force-bearing surface of the discontinuity positioned within the interior of the front sleeve, a new writing cartridge will be positioned for use. No conventional sharpening operation is thus required.

I claim as my invention:

1. A writing implement comprising:

- a tubular member having a front end and a rear end and having an interior discontinuity positioned adjacent the front end thereof; and
- a plurality of writing cartridges slidably positioned axially within said tubular member, each cartridge having a protruding writing point at the forward end thereof and a discontinuity-engaging resiliently flexible skirt positioned to engage said interior discontinuity and to frictionally engage the interior of the tubular member whenever said cartridge is in the forward end of said tubular member with the writing point thereof positioned for use, said skirt preventing rearward movement of said cartridge back into said barrel under writing pressure but permitting forward motion of said cartridges so that the frontmost cartridge may be removed and inserted into said rear end of said tubular member causing said plurality of writing cartridges to slide axially forward toward said front end exposing the writing tip of the next of said plurality of writing cartridges for use with said skirt thereof engaging

said discontinuity preventing rearward movement of said next cartridge, said discontinuity comprising an annular slot positioned in the interior wall of said tubular member, said slot having one face thereof positioned on a plane substantially perpendicular to the axis of said tubular member acting as the forcebearing surface receiving axial thrust forces from said skirt.

2. A writing element comprising:

- a tubular member having a front end and a rear end and having an interior discontinuity positioned adjacent the front end thereof; and
- a plurality of writing cartridges slidably positioned axially within said tubular member, each cartridge having a protruding writing point at the forward end thereof and a discontinuity-engaging resiliently flexible skirt positioned to engage said interior discontinuity and to frictionally engage the interior of the tubular member whenever said cartridge is in the forward end of said tubular member with the writing point thereof positioned for use, said skirt preventing rearward movement of said cartridge back into said barrel under writing pressure but permitting forward motion of said cartridges so that the frontmost cartridge may be removed and inserted into said rear end of said tubular member causing said plurality of writing cartridges to slide axially forward toward said front end exposing the writing tip of the next of said plurality of writing cartridges for use with said skirt thereof engaging said discontinuity preventing rearward movement of said cartridge, said discontinuity comprising an annular inside rib having an inside diameter greater than the diameter of said cartridges but less than the diameter of said flexible skirt.

3. A writing implement comprising:

- a tubular member having a front end and a rear end and having an interior discontinuity positioned adjacent the front end thereof; and
- a plurality of writing cartridges slidably positioned axially within said tubular member, each cartridge having a protruding writing point at the forward end thereof and a discontinuity-engaging resiliently flexible skirt positioned to engage said interior discontinuity and to frictionally engage the interior of the tubular member whenever said cartridge is in the forward end of said tubular member with the writing point thereof positioned for use, said skirt preventing rearward movement of said cartridge back into said barrel under writing pressure but permitting forward motion of said cartridges so that the frontmost cartridge may be removed and inserted into said rear end of said tubular member causing said plurality of writing cartridges to slide axially forward toward said front end exposing the writing tip of the next of said plurality of writing cartridges for use with said skirt thereof engaging said discontinuity preventing rearward movement of said next cartridge, said tubular member comprising a substantially tubular barrel and a removable front sleeve element, said discontinuity being formed at the junction between said barrel and said sleeve element, the barrel having a reduced diameter section at the forward end thereof forming said discontinuity.

4. A writing instrument comprising:

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a tubular member having a front end and a rear end and having an interior discontinuity positioned adjacent the front end thereof; and  
a plurality of writing cartridges slidably positioned axially within said tubular member, each cartridge having a protruding writing point at the forward end thereof and a discontinuity-engaging resiliently flexible skirt positioned to engage said interior discontinuity and to frictionally engage the interior of the tubular member whenever said cartridge is in the forward end of said tubular member with the writing point thereof positioned for use, said skirt preventing rearward movement of said cartridge back into said barrel under writing pressure but permitting forward motion of said cartridges so

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that the frontmost cartridge may be removed and inserted into said rear end of said tubular member causing said plurality of writing cartridges to slide axially forward toward said front end exposing the writing tip of the next of said plurality of writing cartridges for use with said skirt thereof engaging said discontinuity preventing rearward movement of said next cartridge, said tubular member comprising a substantially tubular barrel and a removable front sleeve element, said discontinuity being formed at the junction between said barrel and said sleeve element, said sleeve element having a chamfered interior rear sleeve surface forming said discontinuity.

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