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WRITING INSTRUMENT

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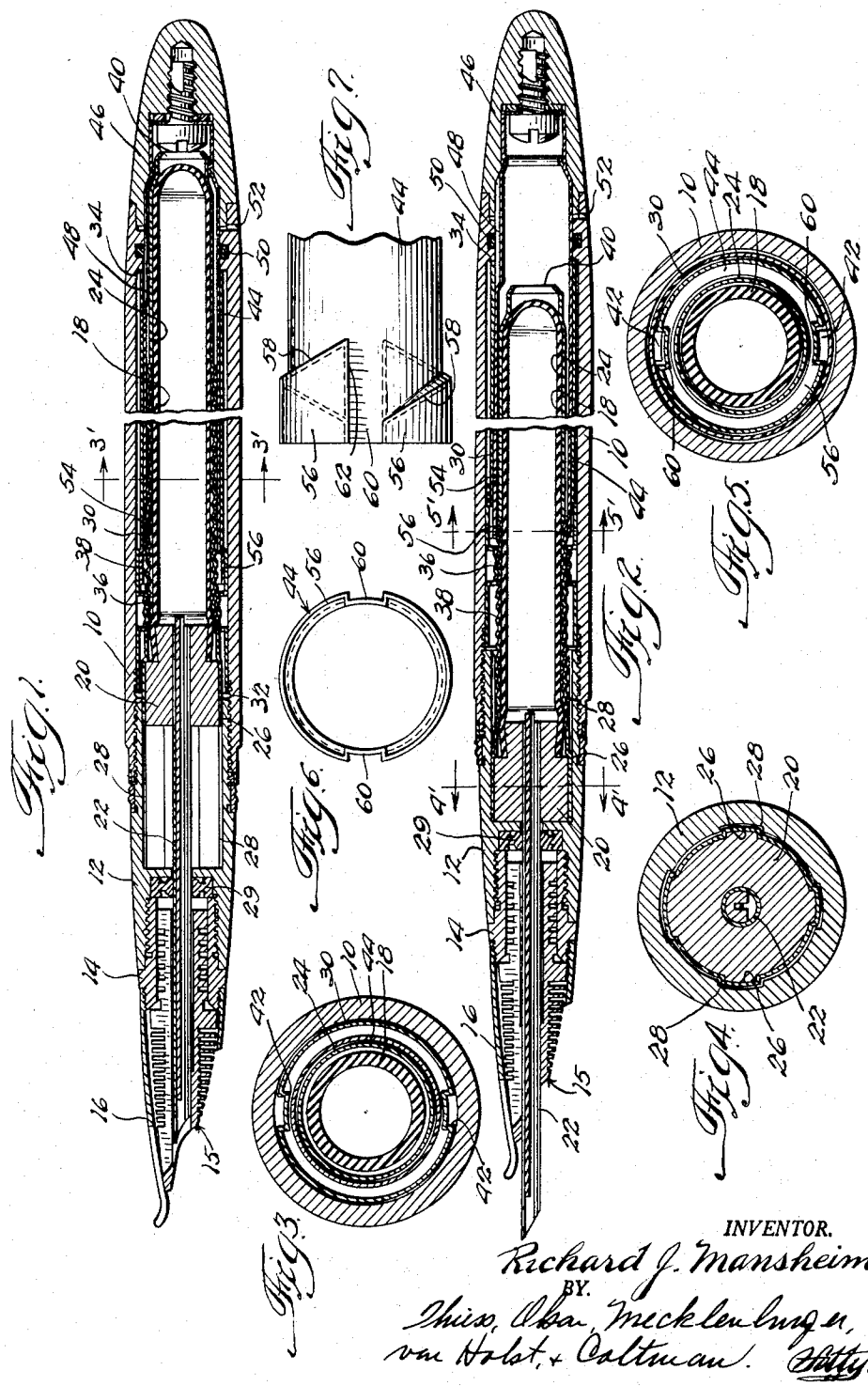

INVENTOR.
Richard J. Mansheim.
BY.
Thiss, Olsen, Mecklenburger, van Holst, & Coltman.
Attys.

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WRITING INSTRUMENT

Richard J. Mansheim, Fort Madison, Iowa, assignor to W. A. Sheaffer Pen Company, Fort Madison, Iowa, a corporation of Delaware

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7 Claims. (Cl. 120—47)

This invention relates to a writing instrument and has for an object the provision of an instrument having a filling tube which may be extended forwardly of the writing nib to permit filling of the reservoir.

In the copending application of Lynn P. Martin, Serial No. 256,897, filed November 17, 1951, now Patent No. 2,769,427, and assigned to the same assignee as this application, there is disclosed a writing implement having a cartridge unit including a pneumatically collapsible writing fluid reservoir and a filling tube, said unit being longitudinally reciprocable within the barrel of the instrument whereby the filling tube is extended to a position forwardly of the writing nib in order to facilitate filling. As disclosed in that application, such an arrangement permits filling of the fluid reservoir without immersing the writing point directly into the body of fluid from which the implement is filled, thus eliminating the necessity of wiping or blotting the writing point or nib after the filling operation has been completed. This invention has for an object the provision of a mechanism for reciprocating a cartridge unit including a reservoir and a filling tube within the barrel of the instrument so that the forward end of the filling tube may be moved between extended and retracted positions.

A further object of this invention is the provision of a writing implement having a pneumatically collapsible reservoir of the type generally disclosed in Lynn P. Martin Patent No. 2,610,612, dated September 16, 1952, and including a filling tube which is reciprocable as a unit by relatively rotating different elements of the implement.

A still further object of this invention is the provision of an implement having a reciprocable cartridge unit including a filling tube and a pneumatically collapsible reservoir in which the plunger for collapsing the reservoir constitutes a part of the means for reciprocating the cartridge unit to filling tube extended and retracted positions.

An additional object of this invention is the provision of a means for directly driving the cartridge unit to its extended and retracted positions by the relative rotation of the plunger with respect to the barrel irrespective of whether the plunger is in extended, retracted or an intermediate position.

Further and additional objects will appear from the following description, the accompanying drawings and the appended claims.

In accordance with one embodiment of this invention, there is provided a writing implement comprising a barrel, a writing nib and a longitudinally reciprocable cartridge unit held against rotation within the barrel, said unit including a pneumatically collapsible writing fluid reservoir and a forwardly extending filling tube. A rotatable sleeve held against longitudinal reciprocation is

positioned within the barrel and includes threaded means which cooperate with threaded means on the cartridge unit in order to reciprocate the unit upon the rotation of the sleeve with respect to the barrel. There is also provided a reservoir-collapsing plunger mounted for rotation and longitudinal reciprocation within the barrel between the unit and the sleeve, this plunger including a cap on the rearward portion of the barrel. Holding means are provided on the plunger for engaging and rotating the sleeve upon rotation of the plunger whereby, when the cap and plunger are manually rotated with respect to the barrel, the cartridge unit is reciprocated to filling tube extended and retracted positions. Preferably a releasable detent or locking means is provided on the unit and the plunger which cooperate to hold the unit and the plunger against axial separation when each is in retracted position within the barrel.

For a more complete understanding of this invention reference will now be made to the drawing, in which

Fig. 1 comprises a broken longitudinal sectional view of a writing instrument constructed in accordance with one embodiment of this invention with the filling tube and plunger in the retracted positions, said instrument being shown conditioned for writing;

Fig. 2 is similar to Fig. 1 except that it shows the filling tube in the extended position but the plunger in the retracted position;

Fig. 3 is an enlarged sectional view taken along the line 3'—3' of Fig. 1;

Fig. 4 is an enlarged sectional view taken along the line 4'—4' of Fig. 2;

Fig. 5 is an enlarged sectional view taken along the line 5'—5' of Fig. 2;

Fig. 6 is an enlarged face view of the forward end of the plunger tube; and

Fig. 7 is an enlarged detail elevational view of the forward end of the plunger tube.

With more particular reference to the drawings, the writing implement there shown comprises a barrel **10** including a gripping section **12** threadedly secured to the forward end thereof. Forwardly of the gripping section **12** is secured a nib holder **14** on which is mounted a writing nib **16** and in the axial bore of which is mounted a feed bar **15** in the usual manner. A cartridge unit is mounted for longitudinal reciprocation within the barrel **10**. This cartridge unit includes a flexible sac reservoir **18**, a plug support **20** for the reservoir, a forwardly extending filling tube **22** and a protector tube **24** for the collapsible reservoir. The cartridge unit, as above indicated, is reciprocable within the barrel **10** between the positions shown, respectively, in Figs. 1 and 2, and the unit is held against rotation within the barrel by means of deformations **26** formed in the forward end of the protector tube **24** and the plug **20** which ride within corresponding grooves **28** provided on the inner surface of the gripping section **12**, as most clearly shown in Fig. 4. A gasket **29** is secured between the nib holder **14** and the gripping section **12** having a central opening through which the tube **22** is reciprocated and providing a seal to prevent leakage of writing fluid from the feed bar rearwardly into the barrel.

An axial sleeve **30** is mounted for rotation within the barrel **10** and is held against longitudinal movement therein by means of the rearward end **32** of the gripping section **12** and a shoulder **34** formed on the inner rear surface of the barrel **10**. This rotatable sleeve **30** is provided at its forward end with threads **36** which engage threads **38** formed on the forward end of the protector tube **24**, it

being noted that the protector tube is vented by an opening 40 in its rearward end to permit the pneumatic collapsing of the sac 18, as will be hereinafter more fully described. The sleeve 30 is also provided with a pair of longitudinally extending, diametrically opposed, inwardly extending deformations or ridges 42 which cooperate with elements hereinafter to be described to permit the rotation of the sleeve 30 and consequent reciprocation of the cartridge unit.

A plunger including a tubular member 44 having an unvented rear end and including a cap member 46 extending from the rearward end of the barrel 10 is provided for pneumatically collapsing the sac reservoir 18 and for reciprocating the cartridge unit to the filling tube extended and retracted positions. A plunger of this general type is disclosed in the above referred to Martin Patent No. 2,610,612, and reference is made to the disclosure in that patent for a full understanding of the mode of operation of the plunger tube for effecting the collapsing and permitting the subsequent expanding of the flexible sac to fill the reservoir with writing fluid. Thus the tubular member 44 is provided with a groove 48 in its rearward end which spans a packing gland 50 within the barrel whereby the interior of the barrel is freely vented to the atmosphere through a vent 52 when the plunger tube is in the position shown in the drawings. Also the plunger tube 44 is provided with an aperture 54 in the forward end thereof for also venting the interior of the barrel when the plunger is pulled or extended to its most rearward position, a condition which is not shown in the drawings.

It will be noted that the plunger tube 44 is positioned between the protector tube 24 and the sleeve 30. As best shown in Figs. 6 and 7, the forward end of the plunger tube 44 is deformed to provide a pair of half threads 56 having cam surfaces 58 which, when the plunger tube is in its forwardmost position, will, upon rotation of the plunger tube, engage the forward ends of the ridges 42 on the sleeve 30, thereby holding the plunger and the barrel against axial separation. The half threads 56 are discontinuous and cooperate to form diametrically opposed channels or deformations 60 on the forward end of the plunger tube 44. These channels 60 embrace the opposed ridges 42 of the sleeve 30 when the plunger tube is rotated to disengage the cam surfaces 58 from the forward ends of the ridges 42, thus permitting axial reciprocation of the plunger with respect to the sleeve and barrel 10.

It will be understood that the filling tube 22, the nib holder 14 and the feed bar 15 have much the same structure and cooperate in much the same manner as disclosed in the above referred to Martin Patent No. 2,769,427, and accordingly it is not believed to be necessary here to discuss these structures and their function in any greater detail.

In the operation of the implement, assume that the implement is conditioned for writing and that the various parts are in the position shown in Fig. 1 with both the cartridge unit and the plunger in the fully retracted positions within the barrel 10, and with the plunger tube 44 locked against axial separation from the sleeve 30 and the barrel 10 by virtue of the cap 46 being twisted about a quarter turn in order to force the camming surfaces 58 on the forward end of the plunger tube against the forward ends of the ridges 42. In order to fill the implement, the cap member is turned to disengage the cam surfaces 58 from the forward ends of the ridges 42. Continued turning of the cap for about a quarter turn causes the longitudinal faces 62 of the half threads 56 to engage the sides of the ridges 42, and continued turning of the cap 46 causes rotation of the sleeve 30. Because of the fact that the sleeve 30 is threadedly engaged with the protector tube 24 on the cartridge unit and because of the fact that the cartridge unit is held against rotation within the barrel, the unit is then reciprocated upon continued rotation of the cap 46 until the unit reaches the forwardmost position shown in Fig. 2. At this point the filling tube is fully extended and the implement is conditioned for filling. The cap 46 and the tubular member 44 constituting the plunger may be manually pulled rearwardly since the ridges 42 on the sleeve 30 ride in the grooves 60 between the half threads 56 on the forward ends of the tubular member 44. When the plunger has thus been pulled to its fully extended position (a condition not shown in the drawings), the forward end of the filling tube 22 is then inserted into a body of writing fluid and the plunger is manually pushed forward to the position shown in Fig. 2. As will be understood from a consideration of Martin Patent No. 2,610,612, the fluid reservoir is thereby caused to collapse and then expand when the venting channel 48 spans the packing gland 50 whereby writing fluid is drawn into the reservoir through the filling tube 22. The reservoir 18 is then full. Thereafter the cap 46 is given about a quarter turn and the cam surfaces 58 abutting against the forward ends of the ridges 42 hold the cap against axial separation with respect to the barrel. The cap 46 is further turned to retract the filling tube and the implement is then ready for use.

A feature of this construction is that the cartridge unit is positively driven when the cap 46 is rotated and it is not necessary to rely upon the action of springs. Furthermore, the filling tube may be reciprocated by turning the cap whether the plunger is in its fully extended, fully retracted or an intermediate position since the grooves 60 and the ridges 42 constituting a sort of a clutch mechanism are engageable in all of these positions of the plunger tube. A further feature of the structure is that if for any reason the filling tube should become stuck so that it is not possible to reciprocate the cartridge unit, the holding means constituting the cam surfaces 58 and the forward ends of the ridges 42, after having become disengaged, will permit the extension and retraction of the plunger tube irrespective of the position of the filling tube 22 and the cartridge unit with respect to the barrel.

While a particular embodiment of this invention is shown above, it will be understood, of course, that the invention is not to be limited thereto, since many modifications may be made, and it is contemplated, therefore, by the appended claims, to cover any such modifications as fall within the true spirit and scope of this invention.

I claim:

1. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a collapsible writing fluid reservoir and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel, threaded means cooperating between said unit and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said unit and said sleeve, and holding means connecting said plunger means and said sleeve in axially slidable relationship whereby said plunger means is independently axially reciprocable and rotation of said plunger means produces rotation of said sleeve.

2. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a collapsible writing fluid reservoir and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel, threaded means cooperat-

ing between said unit and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said unit and said sleeve, locking means including cooperating portions of said plunger means and said sleeve to selectively maintain said plunger in the retracted position against axial movement relative to said sleeve, and holding means connecting said plunger means and said sleeve in axially slidable relationship whereby said plunger means is independently axially reciprocable and rotation of said plunger means produces rotation of said sleeve.

3. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a collapsible writing fluid reservoir, a protector tube surrounding said reservoir, and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel, threaded means cooperating between said protector tube and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said protector tube and said sleeve, locking means including cooperating portions of said plunger means and said sleeve to selectively maintain said plunger in the retracted position against axial movement relative to said sleeve, and holding means connecting said plunger means and said sleeve in axially slidable relationship whereby said plunger means is independently axially reciprocable and rotation of said plunger means produces rotation of said sleeve.

4. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a collapsible writing fluid reservoir, a protector tube surrounding said reservoir, and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel and having a longitudinally extending radial deformation therein, threaded means cooperating between said protector tube and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means including a rearwardly extending cap member mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said protector tube and said sleeve, locking means including the forward end of said deformation and a corresponding radially extending deformation on said plunger to selectively maintain said plunger in the retracted position against axial movement relative to said sleeve, and holding means including said longitudinally extending deformation and a corresponding and cooperating radial deformation at the forward end of said plunger means whereby said plunger means is independently longitudinally reciprocable within said sleeve and rotation of said plunger means produces corresponding rotation of said sleeve in the extended, retracted, or an intermediate plunger means position.

5. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a collapsible writing fluid reservoir, a protector tube surrounding said reservoir, and a forwardly extending filling tube in fluid communication with said

reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel and having a longitudinally extending radial deformation therein, threaded means cooperating between said protector tube and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means including a rearwardly extending cap member mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said protector tube and said sleeve, locking means including the forward end of said deformation and a corresponding radial deformation on said plunger, said corresponding radial deformation being a discontinuous helix engageable with the forward end of said deformation to selectively maintain said plunger in the retracted position against axial movement relative to said sleeve, and holding means including said longitudinally extending deformation and a corresponding and cooperating radial deformation at the forward end of said plunger means whereby said plunger means is independently longitudinally reciprocable within said sleeve and rotation of said plunger means produces corresponding rotation of said sleeve in the extended, retracted, or an intermediate plunger means position.

6. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a pneumatically collapsible writing fluid reservoir and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel, threaded means cooperating between said unit and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said unit and said sleeve, seal means between said plunger and said barrel whereby a normally sealed pressure chamber is defined, said plunger means including portions defining vents to vent said chamber to the atmosphere whenever said plunger is in the retracted or the extended positions, and holding means connecting said plunger means and said sleeve in axially slidable relationship whereby said plunger means is independently axially reciprocable and rotation of said plunger means produces rotation of said sleeve.

7. A writing implement comprising a barrel, a writing nib disposed at the forward end of said barrel, a cartridge unit longitudinally reciprocable between a forward filling position and a rearward writing position, said cartridge unit including a pneumatically collapsible writing fluid reservoir, a protector tube surrounding said reservoir, and a forwardly extending filling tube in fluid communication with said reservoir, said cartridge unit being held against rotation within said barrel and said filling tube being in fluid communication with said writing nib in said rearward position, a rotatable sleeve held against longitudinal reciprocation within said barrel and having a longitudinally extending radial deformation therein, threaded means cooperating between said protector tube and said sleeve for reciprocating the unit upon rotation of the sleeve, plunger means including a rearwardly extending cap member mounted for rotation and longitudinal reciprocation between extended and retracted positions within said barrel between said protector tube and said sleeve, seal means between said plunger and said barrel whereby a normally sealed pressure chamber is defined, said plunger means including portions defining vents to vent said chamber to the atmosphere whenever said plunger is in the retracted or the extended positions,

locking means including the forward end of said deformation and a corresponding radial deformation on said plunger, said corresponding radial deformation being a discontinuous helix engageable with the forward end of said deformation to selectively maintain said plunger in the retracted position against axial movement relative to said sleeve, and holding means including said longitudinally extending deformation and a corresponding and cooperating radial deformation at the forward end of said plunger means whereby said plunger means is independently longitudinally reciprocable within said sleeve and rotation of said plunger means produces corresponding rotation of said sleeve in the extended, retracted, or an intermediate plunger means position.

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