

Dec. 11, 1956

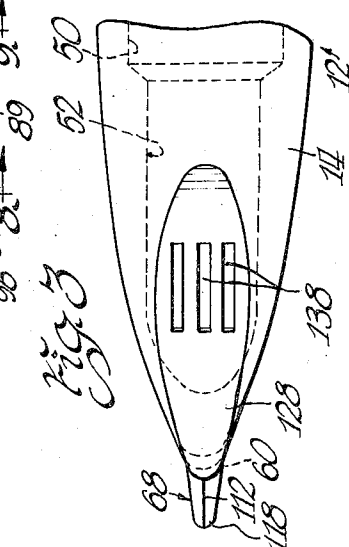
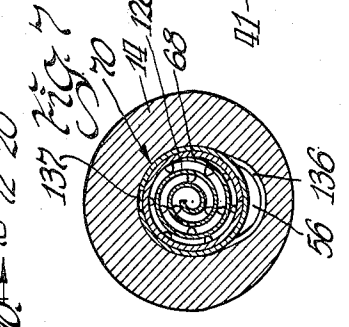
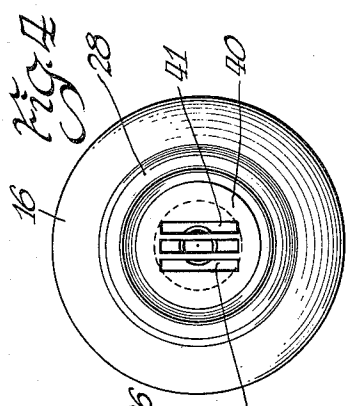
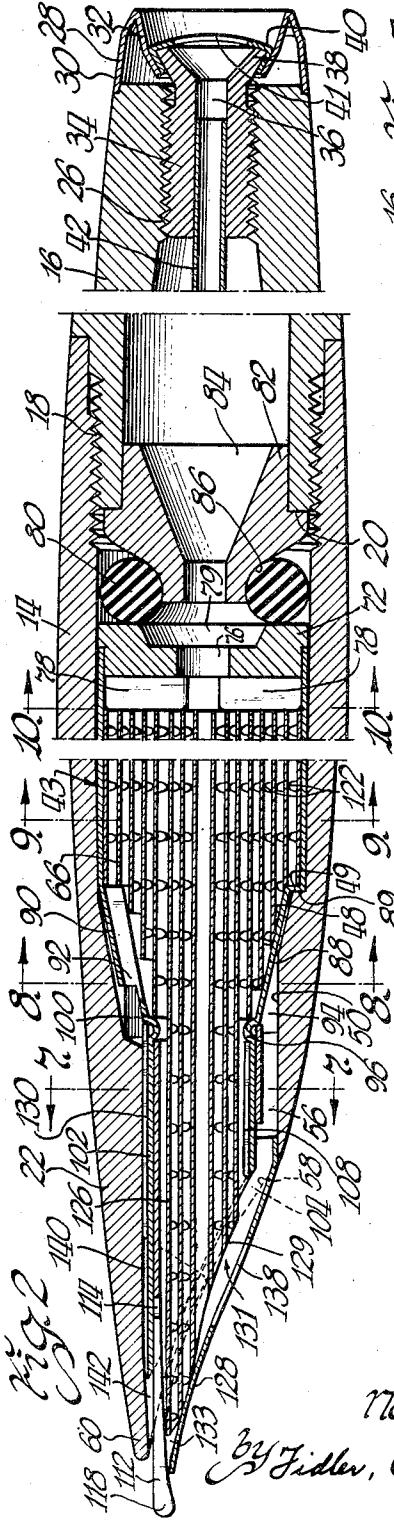
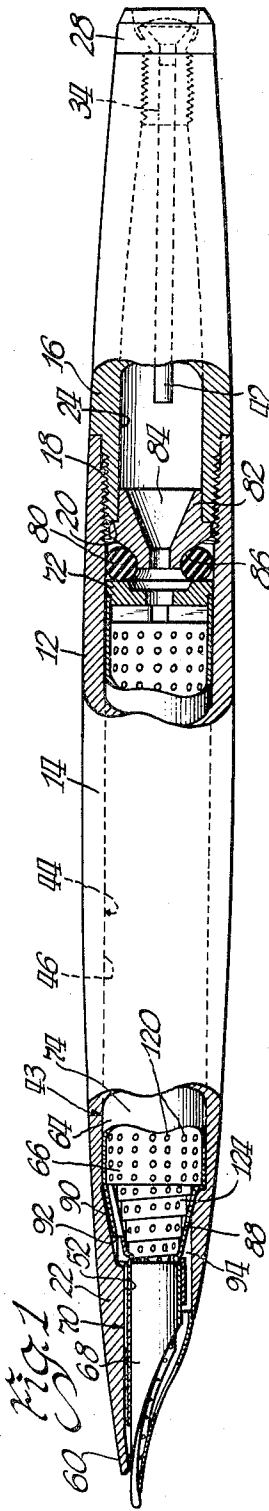
N. K. RHOADES

2,773,479

FOUNTAIN PEN

Filed March 1, 1952

2 Sheets-Sheet 1



Inventor
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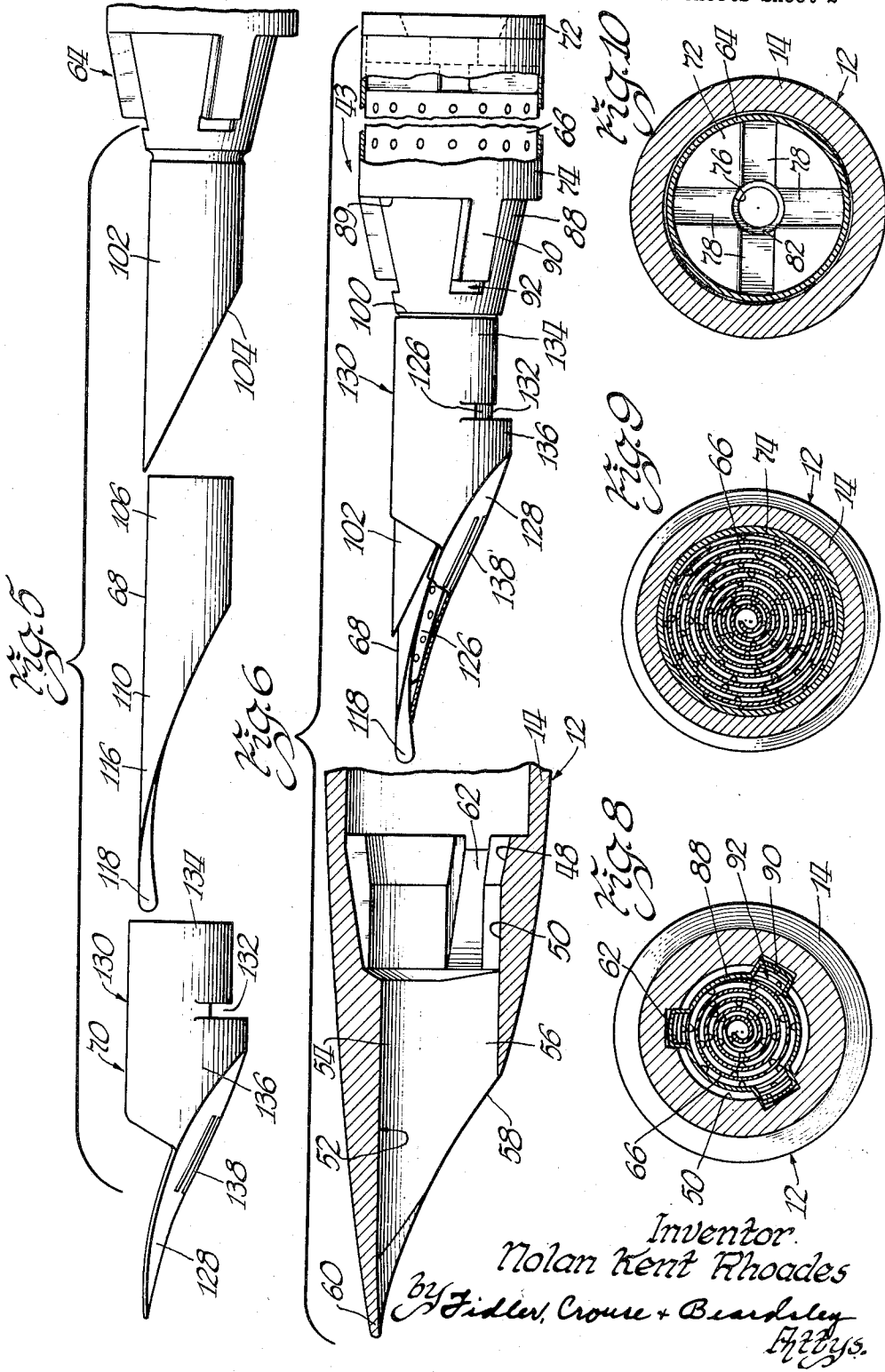
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FOUNTAIN PEN

Nolan Kent Rhoades, Milton, Wis., assignor to The Parker Pen Company, Janesville, Wis., a corporation of Wisconsin

Application March 1, 1952, Serial No. 274,371

11 Claims. (Cl. 120—50)

The present invention relates to fountain pens and more particularly to improvements in capillary pens of the type having a capillary reservoir element effective for filling the pen by capillary action and retaining ink by capillary action except when the ink is drawn out of the pen in a writing operation.

An object of the invention is to provide a novel pen of the foregoing character.

Another object is to provide a pen of the character above referred to of novel construction, including a barrel and a self-contained writing unit for insertion bodily into the barrel and removal therefrom.

Still another object is the provision of a novel writing unit of the type including a capillary reservoir element and a writing nib, together with means for feeding ink from the reservoir element to the nib, all effectively enclosed in the cartridge casing which retains the enclosed elements in an effectively unitary relation enabling the unit to be inserted in the barrel of a pen and removed therefrom with facility.

Another object is the provision of a novel self-contained writing unit having a reservoir element and a casing enclosing the reservoir element effective for protecting the reservoir element in handling the unit and minimizing the tendency to soil the user's hands.

A further object is to provide a fountain pen including a barrel and self-contained writing unit having a capillary reservoir element, in which the barrel and unit have a novel construction providing large area openings enabling rapid filling of the reservoir element by capillary action when the pen is inserted in a body of ink.

Still another object is to provide a pen including a barrel composed of separable sections, and a writing unit in the barrel, having novel means for sealing the joint between the barrel sections against leakage of ink there-through.

A still further object is to provide a fountain pen including a barrel, and a capillary writing unit in the barrel, in which the unit and barrel are vented at their rear ends, and in which novel means is provided for preventing leakage of ink through the vent in the barrel.

Another object is to provide a pen including a barrel and a self-contained writing unit having a writing nib for projection through the forward end of the barrel, in which novel means is provided for maintaining the unit in predetermined angular position about its longitudinal axis relative to the pen barrel.

A further object is to provide a pen including a barrel composed of separable section, and a writing unit in the barrel, having resilient means for sealing the joint between the barrel sections against leakage of ink therethrough, in which the resilient sealing means coacts with other elements of the pen in retaining the writing unit in the desired position relative to the barrel.

Another object is to provide a pen including a barrel having an open forward end, and a self-contained writing unit having a capillary reservoir element in the barrel,

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with the forward end of the reservoir element adjacent the open forward end of the barrel, and novel means included as an element of the self-contained structure of the unit forming an effective closure for the forward end of the reservoir element and for the open forward end of the barrel while enabling the passage of ink therethrough in the operation of filling the pen.

A further object is to provide a fountain pen having a barrel and a novel self-contained writing unit including a capillary reservoir element and a writing nib, and means positioning the unit relative to the barrel and providing capillary ink feed from the reservoir element to the nib and maintaining a capillary film of ink on the outer surface of at least a portion of the writing point of the nib.

Still another object is to provide a pen having a self-contained writing unit including a writing nib, which includes novel means for mounting the nib in the writing unit.

Another object is to provide a pen having a barrel and a self-contained writing unit therein, in which the unit includes a cartridge casing, and a removable writing nib and a removable nib sheath, both frictionally fitted on the cartridge casing, and in which the nib sheath aids in retaining the writing nib in place on the cartridge casing.

Another object is to provide a pen having a self-contained writing unit of novel construction, in which the writing unit includes a writing nib and a nib sheath having an element cooperating with the writing nib so as to form a space of capillary dimension adjacent the under surface of the nib for normally retaining a quantity of ink therein and thereby forming a film of ink on the under surface of the nib.

A further object is to provide a capillary pen having a closure cap at its rear end of novel construction including vent openings for venting the interior of the pen.

Other objects and advantages of the invention will appear from the following description taken in conjunction with the appended drawings, in which:

Fig. 1 is a view of a pen embodying the present invention, showing portions broken away and in section; Fig. 2 is a large scale longitudinal sectional view of the pen;

Fig. 3 is a fragmentary bottom view of a forward portion of the pen;

Fig. 4 is a rear end view of the pen;

Fig. 5 is an exploded view of a portion of the cartridge casing, the nib and the nib sheath;

Fig. 6 is an exploded view of portions of the pen barrel and assembled writing unit;

Fig. 7 is a sectional view taken on line 7—7 of Fig. 2;

Fig. 8 is a sectional view taken on line 8—8 of Fig. 2;

Fig. 9 is a sectional view taken on line 9—9 of Fig. 2;

and

Fig. 10 is a sectional view taken on line 10—10 of Fig. 2.

The pen shown in Fig. 1 is of such size and proportions as to be suitable as a pocket type pen and may have a suitable cap associated therewith for covering the writing point end when the pen is not in use and which may be fitted on the rear end when the pen is used in writing. However, the character of the invention is such that it may be embodied in a pen suitable for a desk set, in which case the rear end of the pen body may be long and tapered as is usual in such type of pens. Whether the pen is of the desk set type or pocket type is not of the essence of the present invention and further reference to this feature is believed unnecessary.

The pen preferably presents an overall tapered appearance having a central portion approaching cylindrical in shape. The pen includes a barrel 12 made up of a front section 14 and a rear section 16 detachably connected

together in a suitable manner such as by threaded portions 18 in an arrangement, for example, in which the reduced forward end portion of the rear section extends into the rear end of the front section, presenting a shoulder 20, with the outer surfaces of the two sections flush. The forward end of the front section 14 includes a tapered reduced dimension shell-like portion 22 having a hood 60 which covers the writing nib except the forwardmost writing point thereof, as will be brought out more fully later. The rear section 16 is provided with a bore 24 which may be tapered if desired, terminating rearwardly in a reduced threaded portion 26 and opening rearwardly through the end of the section. The rear end of the pen is provided with a closure and cover means of novel construction such as to furnish a finished appearance to that end of the pen and provide vent openings for venting the interior of the pen. The closure and cover means takes the form of a cap-like element 28 which is preferably in the form of a tassie crown having an outer peripheral flange 30 seated in a cutout portion of the barrel section so that the outer surfaces and the two elements are substantially flush. The crown is also provided with an inturned flange 32. Suitable means is provided for retaining the crown in position on the end of the pen which in the present instance takes the form of a screw 34 threaded in the bore portion 26 and having a longitudinal vent opening 36 opening therethrough. The outer, head end of the screw is flared at 38, over which a tassie cap 40 is fitted, having a generally forwardly extending inclined flange interposed between the flared portion 38 and the flange 32 whereby the crown is retained in place on the pen barrel. The cap 40 is provided with suitably shaped vent openings 41 for venting the interior of the pen through a vent tube or breather tube 42 frictionally fitted in the bore 36 and extending forwardly a substantial distance in the bore 24. The fit between the tube 42 and bore 36 is such as to prevent leakage of ink through the rear end of the pen, if any should find its way into the bore 24.

The front section of the barrel 12 preferably constitutes the greater portion of the body or barrel of the pen and contains therein a writing unit 43, including the writing nib and associated elements. The front section 14 is provided with a bore 44 opening through both ends thereof. The bore 44 includes a reservoir section 46 constituting a portion of the bore, closely approaching the cylindrical in shape but may have a slightly reduced diameter at its forward end. Leading forwardly from the reservoir section or bore portion 46 is a tapered bore portion 48 of relatively short axial dimension, forming a shoulder 49 between the two bore portions, the portion 48 merging into another bore portion 50, preferably substantially cylindrical and of reduced dimension relative to the portion 46. Forwardly of the portion 50 is a feed section 52 in the form of a bore portion communicating with the portion 50. The upper part of the feed section or bore portion 52 is preferably cylindrical and concentric with the reservoir section 46 but of reduced radius relative thereto and having a lower part 56 substantially elliptical in cross section, terminating downwardly at a point substantially in line with the lower surface of the bore portion 50. The forward end of the barrel is provided with an inclined surface 58, for a purpose to be referred to later.

The pen construction is such as to provide openings of relatively large cross-sectional area for rapid filling of the pen by capillary action. The pen is also provided with means for retaining a writing unit in adjusted angular position about the axis of the pen body. Both of these features are incorporated in a single feature of construction of the pen barrel and writing unit. For this purpose the pen barrel is provided with a plurality of, preferably three, notches or grooves 62 in the bore portions 48 and 50, extending longitudinally through those two portions and preferably equidistantly spaced

circumferentially of the barrel. These notches or grooves are adapted to receive complementary shaped and positioned projections on the cartridge casing of the writing unit when the writing unit is in position in the pen barrel. As will be explained more fully the notches and projections retain the unit in the desired position, and are provided with openings for passage of ink into the interior of the cartridge casing of the unit.

The writing unit 43 may take the form of an ink cartridge with a writing nib unitarily associated therewith. The unit includes as its various elements of composition, a casing 64, ink reservoir element 66, nib 68, nib sheath 70 and cartridge plug 72. The casing 64, which is formed from material having suitable characteristics, preferably of silver, is of tubular form shaped by any suitable operation and includes a rear portion 74 substantially cylindrical and adapted to snugly engage the bore portion 46 at least at the forward end thereof, it being remembered that the bore portion is preferably of slightly reduced diameter at its forward end. The rear end of the cartridge casing, originally open, is provided with a plug 72 which may have a reduced diameter portion frictionally fitted in the rear end of the cartridge casing and adapted to bear against the rear end of the ink reservoir element 66 for retaining the latter in place in the casing. The plug 72 is provided with a central aperture 76 and transverse passages 78 in its inner surface establishing vent passages extending the full radial dimension of the reservoir element and leading from the rear end of the reservoir element to the aperture 76. The outer surface of the plug has a recess or concave conformation 79 facilitating flow of ink from the rear portion of the pen into the reservoir element if any ink should find its way into that portion. The writing unit 43 is retained bodily forwardly in the desired position by means of a resilient toroidal sealing ring 80 and ring seat 82. The ring seat 82 has bearing engagement with the shoulder 20 on the forward end of the rear casing section 16 and is preferably provided with a reduced diameter portion frictionally fitted in the bore 24, having such fit therewith as to prevent the flow of ink therepast. The ring seat 82 also has a central bore 84 forming a part of the vent passage from the ink reservoir element rearwardly. The bore 84 may converge forwardly for facilitating the drainage of any ink that may form in the bore 24 back to the reservoir chamber when the pen is held writing end down as in a writing position. On the forward end of the ring seat or plug 82 is a seating surface 86 of generally conical shape and having at least a portion arcuate in cross section engageable with the ring 80, the arrangement being that when the seat or plug 82 is forced relatively forwardly the desired extent, the resilient ring 80 will be forced outwardly into resilient sealing engagement with the casing section 14, and it will also be brought into sealing engagement with the plug 72. Any ink in the forward portion of the pen that may find its way rearwardly is prevented from leaking through the threaded connection 18 by the sealing effect of the ring. The ring 80 also is effective in yieldably transmitting the desired force in positioning the writing unit 43 forwardly in response to the relative position of the barrel sections, the force being transmitted from the rear barrel section 16.

The portion of the cartridge casing 64 forwardly of the main portion 74 is provided with a reduced portion 88 which for convenience in manufacture may be of tapered form, preferably of such dimension as to snugly engage the surface of the tapered bore portion 48 although extending into the bore portion 50. A shoulder 89 is formed between the portions 74 and 88. As mentioned above, the cartridge casing of the writing unit has projections cooperable with the notches or grooves 62 for maintaining the desired angular relation between the writing unit and barrel. These projections are formed in the tapered portion 88 and take the form of outwardly ex-

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tending channel-like formations 90, preferably complementary in cross section to the notches or grooves 62. The inner spaces of the projections 90 are preferably of considerably greater dimension than the capillary spaces in the reservoir element and of such size as to permit free flow of ink therethrough. In forming the projections 90 the material of the cartridge casing is sheared or cut, forming forwardly directed openings 92 in the projections which communicate with the spaces in the notches or grooves 62 for permitting ready passage of ink from the spaces into the interior of the cartridge casing. Also preferably the projections 90 terminate forwardly short of the forward end of the bore portion 50, and since the forward end of the tapered portion 88 is of lesser diameter than the bore portion 50, there is provided an annular space 94 surrounding the cartridge casing and communicating with the passages through the channel-like projections 90. The annular space or passage 94 is of greater dimension than the capillary spaces in the reservoir element.

Just forwardly of the tapered portion 88 the cartridge casing is provided with a circumferential, inwardly depressed rib 96 forming an inwardly extending abutment or shoulder engageable by the rear end of the nib 68, and forming an exterior circumferential shoulder 100 engageable by the rear end of the nib sheath 70. The cartridge casing terminates forwardly in a reduced diameter portion 102 extending into the bore portion 52, when the pen is assembled, and having an inclined forward end 104 following generally the inclined forward end 58 of the pen barrel. The forward tubular portion 102 is adapted for receiving and supporting the nib and nib sheath in the assembled writing unit, the nib sheath aiding, in conjunction with the surface of the bore portion 52, in positioning the forward end of the writing unit, and the nib, relative to the pen barrel.

The nib 68 is removably carried by and frictionally retained in the cartridge casing, enabling ready removal and replacement thereof. The nib, which may be of any of a number of desired and known forms of nib, and formed of suitable material, includes a rear body 106 generally tubular but with a split 108 in its lower portion to enable slight expansion and contraction of the body for the desired friction engagement with the portion 102 of the cartridge casing. The nib also includes a forward tapered portion 110 having the usual slit 112 and pierce 114 forming a pair of nib sections 116, the forward ends of both of which constitute a tapered writing point 118. As mentioned above, the body 106 of the nib and a portion of the tapered part of the nib are enclosed and surrounded in the tubular portion 102 of the cartridge casing and the nib surrounds a portion of the ink reservoir element 66 as will be explained presently.

The ink reservoir element 66 is of capillary nature and may be of any of a number of desired forms, but I have found that excellent results have been obtained by the use of a reservoir element of the character disclosed and claimed in Bartell Patent 2,522,555, issued September 19, 1950, to which reference may be had for complete details thereof. However, a brief description of the reservoir element will be given here. The reservoir element is made up of a sheet of suitable material, such as silver or plastic, rolled or wrapped into spiral form, forming capillary ink storage spaces between adjacent convolutions of the rolled sheet. It is desirable that means be provided for spacing the convolutions apart, and it is also desirable that apertures be provided in the convolutions for forming passages interconnecting adjacent, radially spaced ink storage spaces. The preferred manner of forming the spacing means and apertures, as disclosed and claimed in the Bartell patent, is to form apertures in the sheet before it is rolled by a suitable operation, such as piercing or punching, in which the material displaced in forming the apertures forms irregular legs or portions extending substantially perpendicularly to the sheet. After

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the sheet is rolled in spiral or convolute form, the legs or portions form projections for spacing the convolutions apart. The apertures are shown at 120 and the projections at 122, the latter being shown diagrammatically.

The apertures afford communication between adjacent ink storage spaces which are effectively radially spaced although they actually constitute a single spiral or convolute space. Both ends of the reservoir element are of course open and the rear end is vented through the passages at the rear end of the pen mentioned above, namely passages 78, aperture 76, bore 84, tube 42, vent opening 36 and openings 41. The radial arrangement of the passages 78 enables rapid and effective venting of the reservoir element because of the direct communication between the passages and the reservoir element throughout the full transverse extent of the latter. Furthermore, the plug engages the reservoir element from the outer portion of the latter to closely adjacent the center whereby substantially all of the convolutions of the reservoir element are engaged directly by the plug and restrained thereby against displacement.

As mentioned above, the venting arrangement hereinbefore described is effective for permitting venting without leakage of ink from the rear end of the pen should any pass rearwardly out of the reservoir element. Because of the capillary nature of the element, normally no ink will pass rearwardly out of the reservoir element. However, it is possible that droplets may be shaken or jarred from the reservoir element into the bore 24 and in the latter event the tube 42 prevents leakage of such ink out through the rear end of the pen, while at the same time the tube is effective for cooperation in venting the reservoir element. Also, any such ink that may be jarred or shaken out is prevented from leakage through the threaded joint 18 by means of the resilient sealing ring 80 which engages the surface 86 of the plug 72.

The ink reservoir element 66 has a main rear portion of such dimension as to snugly fit the inner surface of the rear portion 74 of the cartridge casing and is shaped at its forward end to conform with the tapered portion 88 and shoulder element 89, the shaping being accomplished, for example, by cutting portions of the outer convolutions away after the sheet is rolled to form the reservoir element. Extending forwardly from the tapered portion 124 is a feed portion 126 of reduced diameter relative to the remaining portion of the reservoir element. Such a construction of reservoir element including a feed portion is disclosed and claimed in the copending application of Floyd E. Bartell, Serial No. 186,415, filed September 23, 1950, now Patent Number 2,648,309, to which reference may be had for the full details thereof. Briefly the feed portion 126, which in itself also acts as a reservoir, may form an integral extension of the inner convolutions of the main part of the reservoir element or it may be an extension of a core member separate from the outer convolutions of the reservoir element and about which the outer convolutions are rolled. In either case the feed portion 126 is of such dimension as to fit snugly in the tubular body portion of the nib 68 so as to form a capillary space with the nib surrounding the feed portion. The feed portion projects forwardly beyond the rear end of the nib slit so as to enable capillary feed of ink from the feed portion directly to the slit. The forward end of the feed portion is inclined roughly approximating the inclined surfaces 58 and 104 where it approaches the front cover element 128 of the nib sheath. Preferably the forwardmost, pointed end of the feed portion engages the cover element 128 at a position adjacent the nib, while the under portion of the inclined surface is cut back at 129 for forming a passage 131 of substantial dimension between itself and the cover element for the free flow of ink therethrough in the operation of filling the pen, as will be brought out more fully later.

The nib sheath, best shown in Figs. 5 and 6, formed

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of suitable material and which may be formed by any suitable operation, includes a rear portion 130, generally tubular in shape, having a cutout 132 in the lower part thereof dividing it into a substantially cylindrical rear part 134 and a part 136 forwardly thereof depressed downwardly from the rear part 134. Preferably the rear portion 130 is slotted along the top at 137 (Fig. 7) enabling the sheath to be contracted and expanded slightly for the desired friction engagement with other elements of the pen. The slot 137 together with the tubular portion 102 and hood portion 60 forms a capillary passage communicating with the passage 94 at one end, and with the spaces 140 and 142 at its other end. The rear portion 130 frictionally engages the portion 102 of the cartridge casing with the cylindrical part 134 having such engagement entirely around the portion 102. The forward part 136 also preferably engages the lower surface of the bore portion 56 maintaining the assemblage in relatively raised and centered position whereby the upper part of the surface of the entire rear portion 130 snugly engages the upper surface 54 of the bore portion 52. Thus, by virtue of the relation between the parts as described, the forward end of the assembled writing unit is maintained in the desired coaxial position relative to the pen barrel.

The nib sheath includes the front cover element 128 above mentioned, which is shaped and inclined so as to conform generally to the inclined disposition of the adjacent elements and to substantially close the forward end of the pen barrel. The cover element is disposed generally on the lower part of the nib sheath extending forwardly from the tubular portion 130, the latter being of such short length as to accomplish the purpose. The cover element 128 is provided with a plurality of slots or openings 138 for the passage of ink therethrough. The nib sheath is fitted over the portion 102 of the cartridge casing to the position in which its rear end engages the shoulder 100, and in this position of the sheath, the feed portion 126 of the reservoir element is disposed relative to the cover element 128 as described above. Also, in such position of the sheath, the writing point 118 of the nib extends forwardly beyond the cover element. The cover element substantially closes the forward end of the pen, except for the openings 138 and the portion of the barrel bore adjacent the writing point of the nib. The forward end portion of the cover element 128 is tapered (Fig. 3), conforming generally with the tapered shape of the writing point of the nib, and extends forwardly to a position closely adjacent the extreme forward end of the writing point. This forward end portion of the cover element forms a space 133 with the under surface of the nib, which is of capillary dimension and effective for maintaining a quantity of ink therein which is drawn from the feed portion of the reservoir element by capillary action, so long as ink remains in the pen. Such quantity of ink aids in readily supplying ink to the nib slit so that the pen will write immediately after a period of non-use. The rear portion 130 of the nib sheath (Figs. 1 and 2) terminates forwardly short of the hood portion 60 of the pen barrel and similarly terminates short of the portion 102 of the cartridge casing, whereby a capillary space 140 is provided surrounding a part of the portion 102, the space 140 merging into the space 142, also of capillary dimension, directly between the hood portion 60 and the nib. The nib sheath, and particularly the cover element 128 thereof, aids in retaining the nib in proper position in the pen. The friction engagement of the nib with the cartridge casing normally retains the nib in its intended position, and the nib sheath acts as a positive stop for preventing dislodgement of the nib.

It is desired that substantially the entire nib be covered while eliminating obstructing portions of the pen below the nib so that the pen may be held at a convenient angle in writing. For this purpose, the forward end of the barrel is provided with the inclined surface 58 referred to above. Such inclined surface forms the hood portion

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60 on the shell portion 22, also referred to above. The hood portion 60 is preferably slightly depressed by a suitable forming operation so that the inner surface thereof is inclined downwardly slightly from the upper surface of the bore portion 52.

The preferred manner of assembling the various elements is represented in Figs. 5 and 6, but it will be understood however that the particular order represented need not be followed in order to properly assemble the pen. Preferably the cartridge casing 64 and nib are first aligned and the nib inserted in the portion 102 of the casing with the rear end of the nib body abutting the shoulder formed by the rib 96 and with the point of the portion 102 overlying and in register with the tapered forward portion of the nib. Thereafter the nib sheath 70 is inserted over the portion 102 to the position wherein the rear cylindrical portion 130 engages the shoulder 100. In this position the writing point 118 of the nib projects forwardly beyond the cover element 128. As the next step, the ink reservoir element 66 is inserted in the rear end of the cartridge casing with the feed portion extending into the tubular body of the nib. The plug 72 may then be inserted for retaining the ink reservoir element in position. Thereafter the assembled writing unit may be inserted in the front barrel section 14, as represented in Fig. 6, the sealing ring 80 is inserted and finally the rear barrel section with the seat 82 in place therein is threaded into the front barrel section.

As noted above, the projections 90 are complementary in cross section to the shape of the notches or grooves 62 in which they are fitted whereby the writing unit is prevented from rotation about its longitudinal axis when it is properly inserted in the barrel and thus maintained in the desired angular position.

For the purpose of filling the pen, the forward end of the pen may be inserted in a body of ink to a position for example wherein the level of the ink is approximately at or above the position of the section line 8-8 of Fig. 2. Ink then flows through the slots 138 directly into the feed portion 126 of the reservoir element and continues by capillary action upwardly into the remaining portion of the reservoir element. Ink also is enabled to pass freely through the slots and through the space 131 as well as through the lower portion of the part 136 of the nib sheath, then through the lower portion 56 of the bore 52 and into the annular passage 94, all of which latter passages are of considerably greater dimension than the capillary spaces in the reservoir element. From the passage 94 the ink is enabled to flow freely into and through the passages in the projections 90, rapidly filling the ink reservoir element. The passages in the projections 90 communicate directly with all of those spaces in the reservoir element that are disposed radially outwardly of the feed portion 126.

In the writing out operation ink from the feed portion 126 of the ink reservoir element passes by capillary action into the space between the feed portion and the nib, which is of capillary dimension, and from this space the ink flows into the pierce 114 and nib slit 112. Ink also finds its way into the spaces 140 and 142, providing a film over a portion of the nib and a portion of the nib slit maintaining the ink in the slit in fluid condition so that ink will immediately flow out in a writing operation after having not been used for a considerable period of time. Ink also feeds to the space 133, as referred to above.

The pen of the present invention is readily adaptable to replacement of the writing unit or any of the elements thereof. For example, the writing unit can be removed from the barrel readily by separating the barrel sections and removing the unit from the front section. The writing unit is a self-contained arrangement and upon removal of the unit any of the elements thereof can readily be removed or replaced. For example, the nib sheath can quickly be removed and replaced and similarly the nib can be removed or replaced. By simply removing the plug 72 the ink reservoir element can readily be removed

or replaced. The cartridge casing provides protection for the reservoir element which is necessarily of fragile nature because the sheet making up the element is necessarily thin so as to provide maximum total ink storage space relative to the overall dimensions of the element. The casing is rigid and can be handled without fear of damage to the writing unit or any of its parts in normal handling thereof.

I claim:

1. In a fountain pen, a barrel having a bore opening through its forward end, a self-contained writing unit removably mounted in the barrel comprising a cartridge casing having a reduced dimension, forwardly opening, tubular and cylindrical portion at its forward end, a writing nib removably mounted in and carried solely by said casing having a body with a cylindrical portion frictionally and releasably engaging the inner surface of said tubular portion and a slitted writing point projecting forwardly beyond the barrel, an ink reservoir element in said casing having a portion projecting into said tubular portion and into the body of the nib in direct engagement with the nib and in ink feeding relation with the nib slit, and a sheath removably mounted on and carried solely by the casing and engaging said nib for retaining said nib in supported relation to said casing, said sheath having a tubular and cylindrical part frictionally and releasably engaging the outer surface of said tubular portion of the casing and having a cover element over the forward exposed end surface of the reservoir element and substantially closing the forward end of the barrel, said cover element having an opening establishing communication from the exterior to the reservoir element.

2. In a fountain pen, a barrel made up of separable front and rear sections, said front section having a bore opening through its forward end and a hood portion disposed upwardly relative to a writing position, a self-contained writing unit removably mounted in the front section, comprising a rigid cartridge casing vented at its rear end, a writing nib carried by the casing, and a capillary filler-and-reservoir element in the casing in ink feeding relation with said nib, said barrel and casing having interengaging locking conformations enabling free relative longitudinal movement therebetween and restraining relative rotational movement, the locking conformations being relatively located for positioning the nib in an upper position in registry with said hood portion, and ring-shape resilient means interposed between the rear end of said writing unit and the rear barrel section effective for transmitting yieldable thrust from said rear barrel section to said writing unit for retaining the latter in position forwardly in the front section, said rear barrel section having a conical seating surface engageable with said ring-shape resilient means operative to spread the latter radially outwardly into sealing engagement with said barrel for sealing the joint between the barrel sections against the escape of ink from the interior of the pen.

3. In a fountain pen, a barrel having a bore opening through its forward end, the bore including a rear relatively large portion and a forward reduced portion having an upper part relative to a writing position substantially concentric with the rear large portion and a lower part having a radial dimension greater than the upper part, a self-contained writing unit removably mounted in the barrel including a cartridge casing having a reduced tubular portion at its forward end extending into the reduced portion of the bore, a writing nib mounted in said tubular portion, a reservoir element in said casing having a reduced feed portion at its forward end extending into said tubular portion of the casing in ink feeding relation with the writing nib, and a sheath having a rear part surrounding said reduced portion of the casing and engaging the surface of the reduced bore portion effective for retaining the forward reduced portion of the casing in said upper part of said reduced bore portion and defining in the lower part a passage between the tubular portion and the barrel, said bore being so shaped as to form an an-

nular passage surrounding the casing communicating with the rear end of the first passage, and said casing having openings therethrough communicating with said annular passage.

4. In a fountain pen, a barrel having a bore opening through its forward end, the bore including a rear relatively large portion and a forward reduced portion, and a self-contained writing unit removably mounted in the bore including a rigid cartridge casing having a reduced tubular portion extending into the reduced portion of the bore, a writing nib supported by said tubular portion, a capillary reservoir element in said casing having a portion in ink feeding relation with said nib, said casing having radially extending channel shape projections rearwardly of said tubular portion engaging in complementally shaped grooves in the barrel operative for preventing rotation of the writing unit in the barrel, said casing having openings into said projections forming passages communicating with said reservoir element, and the bore of the barrel being so shaped as to form a passage from the exterior communicating with the first passages in bypassing relation to said tubular portion of the casing.

5. In a fountain pen, a barrel having a bore including a relatively large rear portion and a reduced forward portion opening through the forward end of the barrel, the forward end of the barrel having an inclined surface forming a pointed hood portion disposed upwardly relative to a writing position, a self-contained writing unit removably mounted in the barrel comprising a cartridge casing including a forward tubular portion extending into said reduced bore portion, the forward end of said tubular portion being inclined forming a pointed portion terminating adjacent to but rearwardly of the forward end of the hood portion, a writing nib supported by said casing and having a tubular body frictionally and releasably engaging the inner surface of said tubular portion and having a tapered and slitted writing point extending forwardly beyond and in register with said hood portion, and a sheath supported by the casing and having a tubular rear part frictionally and releasably engaging the outer surface of said tubular portion of the casing, the forward end of said rear part of the sheath terminating rearwardly of the forward end of said tubular portion of the casing and engaging the surface of the bore to space the tubular portion from the wall of said bore to form a capillary space between said hood portion and underlying portions of said tubular portion and nib, the casing having openings therethrough communicating with said passage, and the sheath having a cover element over the forward end of the reservoir element and substantially closing the forward end of the barrel except for openings for the passage of ink therethrough and enabling the writing point to project forwardly therebeyond.

6. A self-contained writing unit for a fountain pen, comprising a casing having a forwardly opening forward tubular portion, a writing nib removably mounted in said tubular portion having a tapered writing point projecting forwardly therebeyond, a capillary ink reservoir element having radially spaced ink storage spaces in said casing and having a portion in ink feeding relation with said nib, a sheath removably mounted on said tubular portion having a cover element over the forward end of said reservoir element with apertures enabling passage of ink into the reservoir element, and a plug fitted in the rear end of the casing for retaining the reservoir element in position in the casing, said plug having a central aperture and transverse passages in its inner surface establishing communication between the aperture and all of said ink storage spaces, and having a recess in its outer surface surrounding said aperture.

7. A self-contained writing unit for a fountain pen, comprising a rigid casing having a relatively large rear reservoir portion and a forwardly opening reduced tubular feed portion at its forward end, the casing having a circumferential shoulder on each of its inner and outer

surfaces adjacent the rear end of said feed portion, a writing nib supported by the casing and having a tubular body frictionally engaging the inner surface of said feed portion with its rear end engageable with the inner shoulder on the casing and a tapered writing point projecting forwardly beyond the casing, a capillary ink reservoir element in the casing having a portion in ink feeding relation with said nib, and a sheath supported by the casing having a tubular rear part frictionally and releasably engaging the outer surface of said feed portion with its rear end engageable with the outer shoulder on the casing and having a portion engaging said nib for securing said nib on said casing and a cover element over the forward end of the reservoir element.

8. A self-contained writing unit for a fountain pen, comprising a rigid casing including a rear relatively large reservoir portion, a forwardly opening reduced feed portion forwardly thereof and a tapered portion between the other two portions, the casing having circumferentially spaced longitudinal channel-like projections extending radially outwardly from said tapered portion, the forward ends of said projections having openings therethrough, the casing having a circumferential shoulder on each of its inner and outer surfaces adjacent the rear end of said feed portion, a writing nib supported by the casing and having a tubular body frictionally engaging the inner surface of said feed portion with its rear end engageable with the inner shoulder on the casing and a tapered writing point projecting forwardly beyond the casing, a capillary ink reservoir element in said casing having portions respectively dimensioned to snugly fit corresponding portions of the casing, the reservoir element being open at its ends including forwardly exposed surfaces intermediate its ends formed by varying transverse dimensions, said reservoir element having ink feeding relation with said nib, the passages in said projections establishing communication from the exterior of the casing directly to the spaces in the reservoir element opening through said forwardly exposed surfaces and disposed radially outwardly beyond the smallest dimension portion of the reservoir element, and a sheath supported by the casing and having a tubular rear part frictionally and releasably engaging the outer surface of said feed portion with its rear end engageable with the outer shoulder on the casing and having a cover element over the forward end of the reservoir element.

9. In a fountain pen, a jointed barrel including detachable front and rear sections having a bore opening through its forward end and a vent opening at its rear end, a writing unit including a capillary ink reservoir element removably mounted in the front barrel section, said writing unit being vented at its forward end and having a central vent aperture in its rear end, ring-shape resilient sealing means engageable with the rear end of the writing unit in surrounding relation to said vent aperture effective for sealing the joint between said barrel sections and for transmitting yieldable thrust from the rear barrel section to the writing unit for retaining the latter forwardly in position in the front section, the barrel rearwardly thereof defining a chamber, and the chamber having a central forward opening substantially aligned with the rear vent aperture in the writing unit, and a vent tube mounted in said vent opening in the rear end of the barrel effective for preventing the escape of ink therepast and ex-

tending forwardly in said chamber a substantial distance beyond said vent opening.

10. In a fountain pen, a barrel having a bore opening through its forward end, and a self-contained writing unit removably mounted in the barrel, said unit comprising a cartridge casing having a forward open end adjacent the forward end of the barrel, a writing nib having a slitted writing point projecting forwardly of the barrel, a capillary reservoir element in said cartridge casing in ink feeding relation with said nib and terminating forwardly adjacent the forward end of the barrel, and a nib sheath having a cover element substantially closing the forward end of the barrel and disposed over the forward end of the reservoir element, said reservoir element having at least a portion of its forward end spaced from said cover element forming a first passage therebetween for free flow of ink through said cover element, and the cover element having openings communicating with said passage, said barrel forming a second passage between itself and the cartridge casing and communicating with said first passage for free flow of ink from the first passage rearwardly, and the cartridge casing having openings for free flow of ink therethrough communicating with the rear end of said second passage.

11. A capillary fountain pen comprising a barrel having a bore therein opening at its forward end formed with a rearward reservoir section and a forward reduced feed section, the wall of said bore adjacent the juncture of said sections being formed with a plurality of circumferentially spaced, longitudinally extending grooves, and a self-contained reservoir and feed unit disposed in said barrel and including a casing having a rearward reservoir section and a forward, reduced feed section, said casing having a plurality of circumferentially spaced, longitudinally extending channel-like projections extending radially therefrom adjacent the juncture of said reservoir and feed sections and seated in said grooves in said barrel, the barrel and unit forming a space communicating with said grooves and having a free-flow passage leading from said space to the exterior of the barrel, said projections having openings providing communication between the interior of said casing and the interior of said barrel at said space, and a capillary filler-and-reservoir element in said casing having a reservoir portion in said reservoir section of said casing and a feed portion in said feed section, both formed with interconnected capillary ink storage spaces, at least certain of the spaces in said reservoir portion communicating with the interior of said casing adjacent said openings.

References Cited in the file of this patent

UNITED STATES PATENTS

1,315,373	Luck	Sept. 9, 1919
2,128,456	Dusenbury	Aug. 30, 1938
2,336,028	Nichol	Dec. 7, 1943
2,403,703	Back	July 9, 1946
2,522,554	Zodtner	Sept. 19, 1950
2,581,740	Wing	Jan. 8, 1952
2,648,309	Bartell	Aug. 11, 1953
2,670,711	Wittnebert	Mar. 2, 1954

FOREIGN PATENTS

642,437	Great Britain	Sept. 6, 1950
976,216	France	Oct. 25, 1950