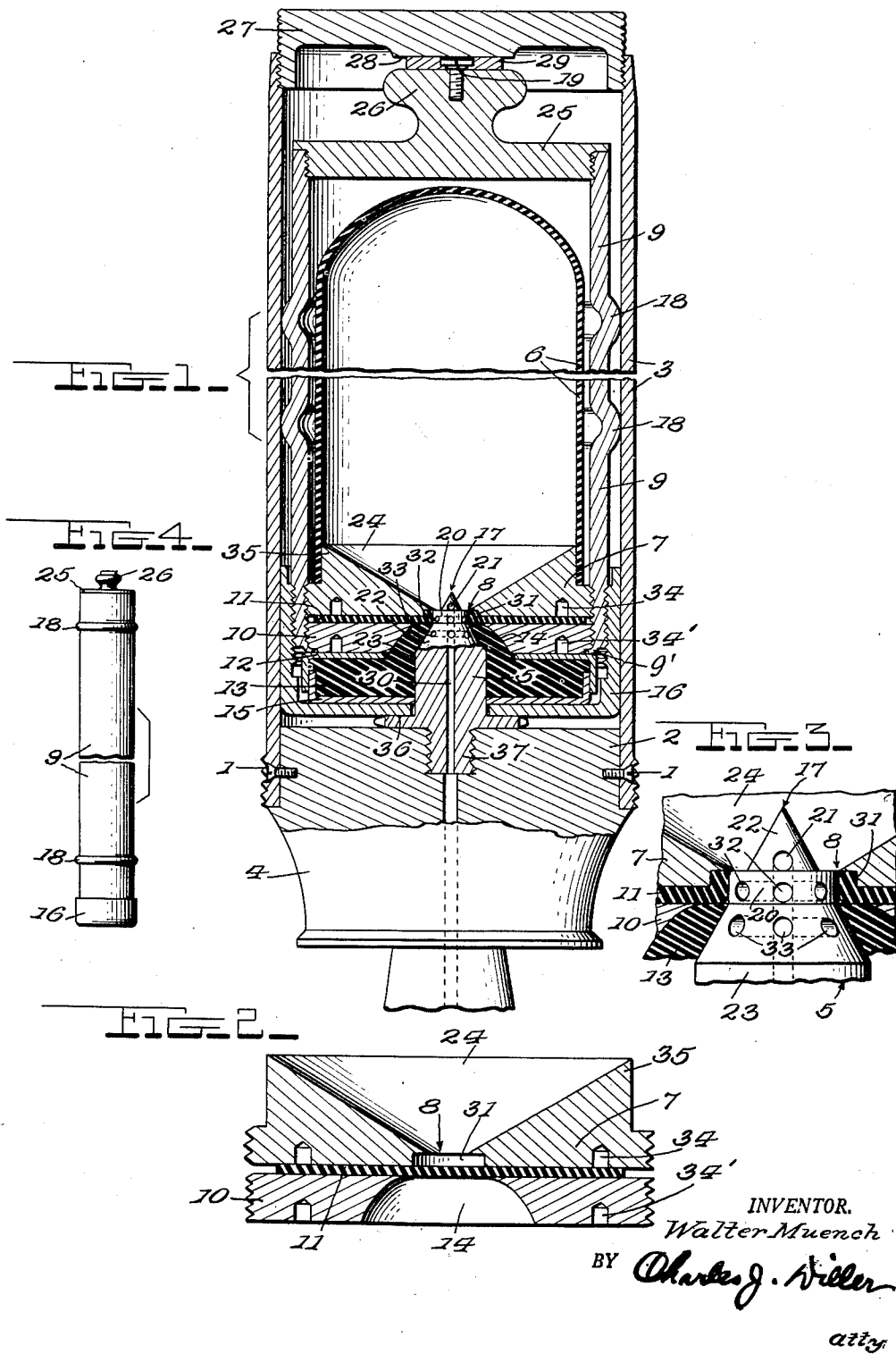


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FOUNTAIN PEN CONSTRUCTION

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FOUNTAIN PEN CONSTRUCTION

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This invention relates to fountain pens in which ink is used as the writing fluid.

The object of my invention is to make a fountain pen which is provided with an insertible ink container that can instantly be removed when empty and be replaced with a new ink container which has been filled with ink at the container factory.

In this connection the new fountain pen is, in its pen-point holding stem provided with a specially-developed flow- and prick-pin, which is required as an essential mechanical part to function with the insertible ink container.

To enable others, skilled in the art, to fully comprehend the underlying features of my invention, drawings depicting a preferred form have been annexed as a part of this disclosure and in these drawings similar reference characters denote corresponding parts throughout the several views, of which:

Fig. 1 is a vertical section of the insertible ink container, connected to the flow- and prick-pin in the pen-point holding stem and positioned inside the pen housing, with the locking-cap on top, in place.

Fig. 2 is a vertical cross section illustrating the filling plug and the sealing disc with the sealing skin or membrane in place between them prior to assembly in the ink container casing.

Fig. 3 is an enlarged fragmentary vertical cross section showing the sealing skin or membrane pierced by the prick pin.

Fig. 4 is a detail side elevation illustrating the ink container removed from the pen casing.

Referring now to the drawing wherein like reference characters denote corresponding parts throughout the several views, 3 designates in its entirety the fountain pen housing that is attached to the pen-point holding stem 4 and in which the newly developed flow- and prick-pin 5 is securely locked by the aid of a thread and a shoulder rest.

After the rubber bag 6 is fastened to the neck 35 of the filling plug 7, the ink is poured into the rubber bag through the center opening 8, shown in Fig. 2 if the threaded filling plug 7 and is then let into the stiff casing 9, whence it is, by the aid of a pin-key which fits holes 34, screwed in as far as it will go on the threads provided for inside the casing 9.

Next the sealing disc 10, with its drum taut sealing skin 11 cemented thereon is, by the aid of a pin key which fits holes 34', screwed into the end opening of casing 9, so that the sealing skin 11 is pressed tight against the top surface of the plug 7.

As soon as this is done, the opening 5 in plug 7 becomes sealed, so that the ink, contained in bag 6 cannot spill out.

As a safeguard against leakage the threads of

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plug 7 and sealing disc 10 should be covered with a suitable fluid cement, which ink cannot dissolve, before they are screwed into place in the threaded end opening of casing 9.

Some time must be allowed for the sealing cement in the threads to dry before the insertible ink container is put in circulation and use.

However, in order to prevent any loosening of the sealing disc 10 in its threads when positioned in the casing 9; which, in effect would mean a relaxing of the pressure applied to the sealing skin 11 against the plug 7, it is suggested, topeen the most extreme end of the casing 9 over a little as indicated at 9' so that unscrewing of the disc 10 is made impossible; either in handling while in the assembly stages or later on in packing and shipping.

An inverted cupped washer 12 is laid on top of the sealing disc 10 and the conical ended soft rubber pad 13 is dropped in position into the hollowed opening 14 of the sealing disc 10.

An all-around close fitting cupped washer 15, which will prevent the rubber pad from spreading at the circumference is now laid on top of the soft rubber pad 13 and finally the threaded cap 16 is screwed onto the outside threads on the end of the casing 9.

The insertible ink container is now completely assembled and can be inserted into the pen housing 3 with its attached pen-point stem 4 and in it the centrally located flow- and prick-pin 5.

The outside diameter of the threaded cap 16 is such that it has a perfect sliding fit inside the housing 3, so that the insertible ink container is located absolutely central inside the housing 3.

In order to steady the descent of the insertible ink container in the housing 3 still more, circular bulges 18 are provided in the walls of the casing 9 at several points throughout its entire length, which will make it absolutely sure that the descent of the ink container in the housing 3 takes place as centrally as possible and for that reason the outside diameter of the bulges 18 must be exactly the same as that of the threaded cap 16.

The bulges 18 can also be arranged to run vertically or spirally on the outside of the casing 9.

It is desirable that the needle point 17 of the flow- and prick pin 5 pierce the sealing skin 11 as exactly in the center as can possibly be obtained.

When the needle point 17 pierces the drawn taut sealing skin 11, the conical enlargement from the prick-point on down, will, as it enters higher into the ink reservoir, also enlarge the sealing skin hole, until finally the periphery of the circular step collar 20 of the flow- and prick-pin 5, pushes, what is left of the sealing skin, tightly into the recess 31, provided for this purpose in plug 7, so that the free flow of the ink cannot be hindered to run into the side hole 21 and from

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there towards the pen point through the center hole 30 inside the flow- and prick-pin 5. Leakage drain holes are provided in equidistantly spaced relation about the prick pin, one row 32 of such holes being provided in the collar 22 and another row 33 of such holes being provided in the conical section 22.

The thick rubber pad 13 presses tightly against the conical section 22 and the straight shank sides 23 of the flow- and prick-pin 5, so that any leakage of the ink is out of the question.

The threaded end cap 16 adjusts the pressure of the soft rubber pad 13. It is set in the factory and is sealed.

The conical surface 24 in the filling plug 7 permits the ink to flow to the last drop on the flat of step collar 20, which flat surface is slightly tapered toward the entrance to the side hole 21, so that the ink must flow towards the hole 21 and this hole again is slightly tapered towards the center hole 30 inside the flow- and prick-pin 5.

Naturally, like all thin fluids, the ink will flow quickly towards the lowest point, so that, when no more ink is coming to the fountain pen point to even put a dot over an "i," it can readily be assumed, that the insertible ink container has been completely emptied of the ink it contained.

Although fibre and plastics material can be used for the casing 9, it is however preferably made from thin metal tubing, which is threaded at one end for the plug 7 and disc 10 as well as the end cap 16 and is threaded also at the opposite end for the shoulder cap 25, which is provided with an extended knob 26 that serves as a handle to pull the empty ink container out of the pen housing 3.

Over this pull handle cap is provided an auxiliary knurled cap 27 which screws into the upper open end of the pen housing 3 to hold the insertible ink container securely seated in its socket of the rubber pad 13 and lock its position by the applied pressure of the flat surface 28 onto the swivel washer 29 which is fastened to the top of the pull knob 26 by the shoulder screw 19.

The empty ink container is best removed by laying the pen flat on a table in such a position that the hand can grip the pull knob conveniently with two fingers and holding the pen on the table with the other hand, a slight, short jerk on the pull knob will remove the empty ink container easily.

Insertion of a new ink container may be accomplished with facility by resting the pull knob end on a table and, with the ink container held in an upright position by one hand, using the other hand to slide the pen housing over the ink container until the housing is about two-thirds over the ink container.

The hand that holds the ink container can now let go of it and grip instead, with a few fingers, the housing, and, together with a few fingers of the other hand, give a short jerk downward, until it is felt it cannot go in any farther.

Now the knurled locking cap 27 is screwed onto the housing over the pull handle knob 26 and the pen is ready for use.

It will be apparent by reference to Figure 1 that the prick pin 5 has a flange enlargement just above the threaded lower end portion 37 thereof which presents a flat upper surface 36 serving as an end stop for the inserted ink container.

In regard to the drawn taut sealing skin 11, connected to disc 10, it should be explained, that a chosen flat surface of disc 17 is coated with

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cement and on this cement coated disc surface is laid an oversize piece of highly stretchable flawless thin rubber sheet.

The disc 10, being held in a fixture which is fastened securely to a bench in a work shop, is now immovable and while in this state the oversize thin piece of rubber sheet lying on the cement coated disc surface, is now by mechanical means especially designed for this purpose, stretched uniformly in all directions and with somewhat of a side-pull over the edges of disc 10 to a predetermined stop.

Now a clamping device is fastened on top of this highly stretched piece of thin rubber sheet lying on the cement coated surface of disc 10 and is at last laid aside for drying for a predetermined period.

When completely dry, the clamp is removed and the overhanging rubber sheet trimmed off, so that the threads on the periphery of disc 10 are free and clear to enter the threaded end of casing 9.

This taut stretched rubber skin 11 on disc 10, will, when pierced by the point 19 of the flow- and prick-pin 5, recede with a snap to the very edges of the opening 8 in plug 7 in such a manner that only a very small circular ridge remains of the rubber around the edges of the opening 8 in plug 7.

This small ridge of rubber skin is finally pushed into the recess 31 of plug 7 by the step collar 20 as the conical flow- and prick-pin pushes into the ink reservoir.

While the pen housing 3 is held very snug on the neck 2 of the pen point holding stem 4, it is advisable in this case to provide a number of countersunk screws 1 around the circumference as a safeguard, so that the housing cannot slip off the neck 2 when the empty ink container is pulled out. A cap over the pen point is provided.

Although I have illustrated and described my invention with some degree of particularity, I realize that in practice various alterations therein may be made. I therefore reserve the right and privilege of changing the form of the details of construction or otherwise altering the arrangement of the correlated parts without departing from the spirit of the invention or the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by United States Letters Patent is:

1. An ink cartridge as a readily replaceable element for use in fountain pens wherein are included a cartridge receiving barrel, a pen carrier and a pen carried thereby and a piercing pin all having an ink flow duct therethrough leading into the interior of the barrel; said cartridge comprising an ink reservoir shell slidably receivable in a pen barrel and having a large axially centered opening in the end thereof presentable to a piercing pin, a thin rubber membrane and means for holding the same stretched taut over said opening for normally sealing the opening against ink leakage but adapted upon contact with a piercing pin and by reason of its inherent elasticity to be suddenly ruptured thereby and suddenly spring in all directions outwardly from its center throughout the full diameter of said large central opening to break the seal across the whole of the large opening and permit entry of the piercing pin and its duct into the shell interior, and supplementary sealing means engageable in ink sealing contact with the piercing pin outwardly and endwise of said membrane.

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2. An ink cartridge structure as defined in claim 1 in which the ink reservoir shell is composed of an inner liquid sealing rubber sac and an outer rigid housing composed of multiple assembled parts having longitudinally spaced circumferential ribs projecting outwardly therefrom for sliding contact internally of a pen barrel and effective for accurately centering the cartridge end opening with the piercing pin.

3. An ink cartridge structure as defined in claim 1 in which the supplementary sealing means comprises a rubber ring having a center opening shaped to receive and engage in sealing contact with a piercing pin during insertion of the cartridge into a pen barrel and before the rupturing of the rubber membrane is effected by said pin.

4. An ink cartridge structure as defined in claim 1 in which the supplementary sealing means comprises a rubber ring having a center opening shaped to receive and engage in sealing contact with a piercing pin during insertion of the cartridge into a pen barrel, means forming a chamber in which to encase said rubber ring, and means for enlarging or diminishing the size of said chamber to vary the size and sealing effect of said pin receiving rubber ring center opening.

5. An ink cartridge structure as defined in claim 1 in which the ink reservoir shell is composed of an inner liquid sealing rubber sac and an outer rigid housing composed of multiple assembled parts having longitudinally spaced circumferential ribs projecting outwardly therefrom for sliding contact internally of a pen barrel and effective for accurately centering the cartridge end opening with the piercing pin, in which the supplementary sealing means comprises a rubber ring having a center opening shaped to receive and engage in sealing contact with a piercing pin during insertion of the cartridge into a pen barrel and before the rupturing of the rubber membrane is effected by said pin, and there also being included on said metal housing a finger knob disposed to facilitate manipulation of the cartridge during insertion and removal thereof and so spaced from the supplementary sealing means as to be engageable by an end of the pen barrel for holding the supplementary sealing means securely and under constant pressure against the piercing pin.

6. In a fountain pen, a hollow cylindrical barrel, a screw cap closing one end of the barrel, a pen carrying plug closing the other end of the barrel, a piercing pin carried by said plug and projecting axially into said barrel and including a long cylindrical body merging smoothly and directly into the base portion of a conform end extremity, said pen plug and pin having duct means therethrough and opening interiorly of the barrel through said conform pin end, and a readily replaceable ink cartridge slidably received in said barrel and comprising an ink reservoir shell having a large opening in the end thereof presented toward the piercing pin and sealed prior to full seating of the cartridge in the barrel by a thin rubber membrane and means for holding the same stretched taut over said large opening and adapted to be ruptured by the pin during the final stage of insertion of the cartridge into the barrel, and a supplementary seal ring having a central opening therein leading to the membrane sealed large opening and including a

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cylindrical portion and a conical portion to receive the cylindrical and conical portions of the pin and engageable in sealing contact with the pin both to and after rupturing of said membrane, the cartridge being of such length that it will be engaged by said cap when fully inserted in the barrel and be held by the cap in ink sealing contact against the piercing pin.

7. Pen structure as defined in claim 6 in which there is included means forming a chamber in which to encase said rubber ring, and means for enlarging or diminishing the size of said chamber to vary the size and sealing effect of said pin receiving rubber ring center opening.

8. Pen structure as defined in claim 6 in which the conform pin end portion has openings therein leading into the pin duct and disposed to receive any ink tending to leak from the interior of the cartridge between the pin and seal ring before it reaches the cylindrical portion of the supplementary seal ring opening.

9. Pen structure as defined in claim 6 in which the cartridge portion engaged by the screw cap comprises a finger knob disposed to facilitate insertion and removal of the cartridge and having a swivel washer thereon engaged by the screw cap.

10. Pen structure as defined in claim 6 in which the ink reservoir shell is composed of an inner rubber sac and an outer rigid metal housing, the membrane being disposed between two plug rings inserted in said housing one thereof being equipped with the large opening and having the sac secured thereto and the other having a dome shaped recess lying opposite the conform portion of the piercing pin and adapted to receive a portion of the supplementary seal ring, and there also being included a cap threaded on the housing and engaging said seal whereby upon adjustment of said cartridge cap the seal ring can be pressed into the dome shaped recess to deform the seal ring and vary the efficiency of the sealing contact of the seal ring with the piercing pin.

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