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FOUNTAIN PEN FOR PULPY INK

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Fig. 1.

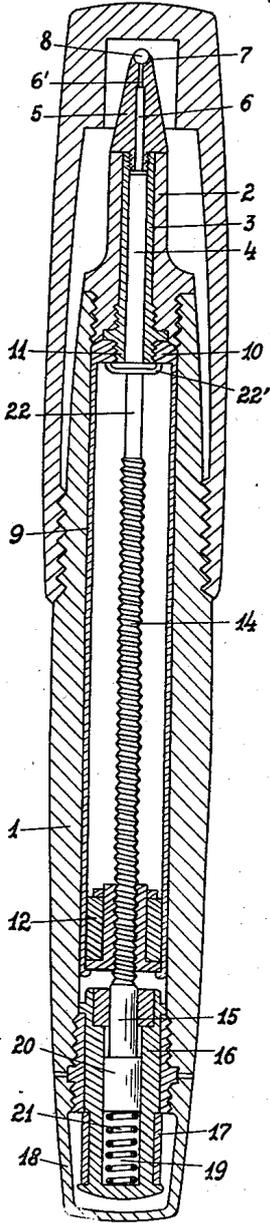


Fig. 3.

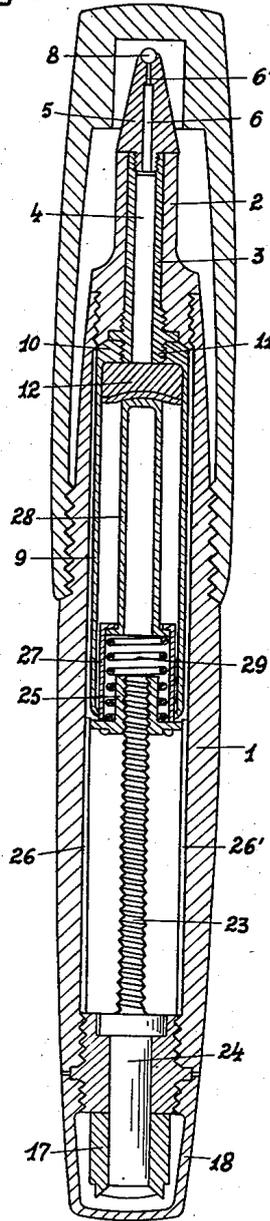


Fig. 4.

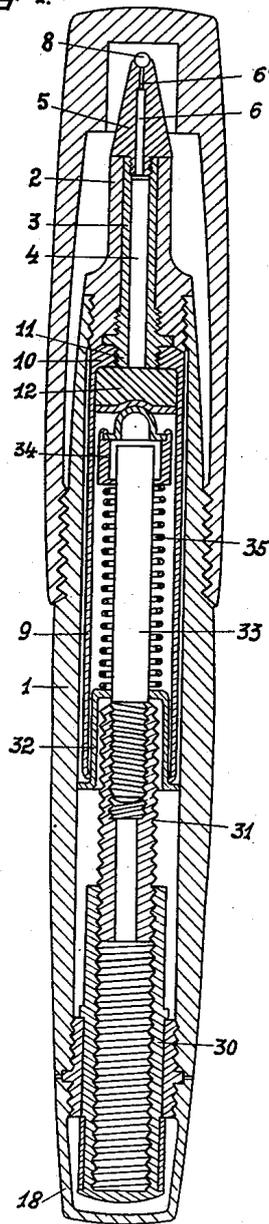


Fig. 2.

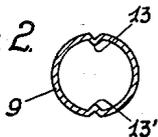
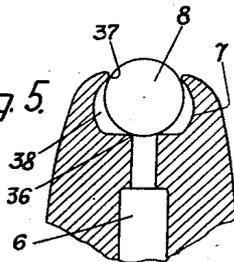


Fig. 5.



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UNITED STATES PATENT OFFICE

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FOUNTAIN PEN FOR PULPY INK

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2 Claims. (Cl. 120-43)

The present invention relates to a fountain pen, which is provided instead of the usual writing pen with a rotatably mounted small ball, which constitutes the writing means. It is well known to fill fountain pens of this kind with a dense, pulpy ink in order that the fountain pen may be used after filling it once during an essentially longer time than when using liquid ink.

However, the known fountain pens of such construction have worked very unsatisfactorily, as the pulpy ink must be of a quickly drying nature in order to become promptly dry on the writing surface and not to be blurred. However, this property of the pulpy ink entailed that the small quantity of pulpy ink which remained around the writing ball after writing became quickly dry and formed a hard layer, which prevented the rotation of the small ball; but the ball has to continuously turn during writing in order to carry the ink or dye from the interior of the pen to the paper. Or, in order that the pen should be always ready for use, the pulpy ink should remain moist in the open air contrarily to its formerly mentioned property.

One object of the invention is to satisfy both contrary requirements. With this object in view the pulpy ink is made of a mixture of two ingredients, one of which is a quickly drying viscous material and the other one a non-drying, preferably even hygroscopic liquid. Both materials should be of such nature that they can be easily separated from each other by physical means. By this it is attained that the quantity of pulpy ink remaining around the ball after writing does not dry, but is maintained moist as it contains a non-drying liquid, while the non-drying ingredient of the ink will be immediately absorbed by the paper during writing and thus is it removed from the pulp and the remaining other ingredient will quickly dry. Every writing surface employed in practice shows a certain absorptive power for moisture which affords the absorption of the small moisture contents of the pulp.

The viscous (pulpy) drying material may be for instance glue or a polysaccharid and the non-drying liquid may be cholesterolised oil or for example glycerine. It is preferable, in general, to use as a non-drying or hygroscopic liquid a fatty material or at least a material having the properties of fats, as such materials lubricate the writing ball, moreover, it has been found that they satisfy also other practical requirements. The pulp is made for example in such a manner that a powdery aniline color is dissolved in about

the same quantity of glycerine and to the solution 35 to 40 per cent viscous dextrin is added, which is obtained in such a way that to powdery dextrin water is admixed and the mixture is heated. Also other materials may be added to this mixture, for example a small quantity of vinegar, which renders the colour more vivid and conserves the pulp. For the latter purpose also carbolic acid may be used. As in the finished pulp the colored liquid forms only a mixture with the dextrin, it may be easily separated from the same by simple physical means. Thus, owing to the absorptive capillary action of the paper the non-drying ingredient penetrates into the same so that it is separated from the dextrinous part.

In order that a pulpy ink of this kind may be readily used, the ball has to apply the pulp in a very thin layer to the paper, as otherwise the latter cannot absorb the whole fluid contents of the pulp and the written text will not dry. The thin layer has the further advantage that the consumption is low and thus one filling may be used for a very long time. Consequently, to this pulp a fountain pen is employed the writing ball of which is in contact with its bearing along two circles only and by this a relatively tight mounting of the ball is attained, so that the same may carry only a very thin layer of the pulp. The ball is easily set in rotation even at the beginning of writing in spite of its tight mounting as it is always surrounded by the moist pulp. Finally, as the pulp of the above composition is very dense it cannot be filled into the fountain pen by its user himself, the less, as if an air bubble is coming into the pulp it hinders the operation of the pen. By this reason, according to the invention, the fountain pen is provided with a container for the pulp, which may be easily interchanged and thus after the consumption of the pulp contents of the pen the empty container is cast off and is substituted by another container filled in the factory.

The annexed drawing illustrates by way of example three embodiments of the fountain pen constructed in accordance with the invention.

Fig. 1 represents an enlarged axial section of the first embodiment.

Fig. 2 is a sectional view of the container of the pulpy ink.

Figs. 3 and 4 are axial sections of two other embodiments equally on an enlarged scale.

Finally, Fig. 5 represents the writing ball and the bearing thereof on a still more enlarged scale and partly in section.

In the embodiment according to Fig. 1 the

outer part of the fountain pen is constituted by a hollow body 1, on one end of which a closing member 2 is fastened by its threads. The latter contains a sleeve 3 and a relatively wide channel 4; in the interior of which the pulpy material is forwarded to a head portion 5 of metal in the centre of which there is a tighter channel 6. At the end of the latter channel, in a substantially ball-shaped depression of the head portion 5 a small ball 8 can freely rotate. The end portion 6' of the channel 6 is sufficiently tight to be able to hold the ball 8. In the hollow body 1 of the fountain pen a tube portion 9 is contained, which is preferably made of metal and constitutes an interchangeable container for the pulpy ink. The threaded hole of the covering part 10 of this container is closed by a stopper before use. When interchanging the container 9, the closing member 2 is screwed off, so that together with this portion also the empty container is pulled away from sleeve 1. Now, the stopper is removed from the covering part 10 of the new container, whereafter it may be screwed onto the extension 11 of sleeve 3 and introduced into the fountain pen together with the closing member 2.

The end of the container 9, which in the drawing is the lower one, is closed by a piston 12, which is longitudinally shiftable in this container along both guiding grooves 13 and 13', Fig. 2. These grooves may be constituted for example by two longitudinal ribs of the metallic tube 9, which are opposite to one another. The piston 12 is provided with internal threads and it is screwed to a bolt 14, the end of which being without the tube 9 and being provided with ribs, by which it is connected to a rotatable sleeve 16. This sleeve is mounted at the bottom of the fountain pen and has a handle member 17 which is accessible after removing the closing cap 18. In a hole 19 of the sleeve 16 a piston 20 is shiftable, which is pressed by a spring 21 against the end portion 15 of the bolt 14, in order that the contents of the container 9 should be maintained under pressure.

The upper end 22 of the bolt 14 does not extend to the bottom of the container 9, but it bears on the covering part 10 of the container 9 by means of an elastic stop 22' in order not to hinder the action of spring 21. This end of the bolt 14 is not threaded in order that the piston 12, at the end of its stroke, should no longer engage the bolt.

Due to the fact that the spring 21 is arranged behind the bolt 14 it is possible to employ a short spring and a long container which can receive much pulp. If the container 9 is filled with pulpy ink, an axial pressure is exerted on the piston 12 by the bolt 14 so that the pulpy ink is maintained under pressure. After consumption of a certain quantity of the pulpy ink, the spring 21 is extended so that the pressure exerted on the pulpy ink is reduced; this pressure is restored by turning the member 16 and the bolt 14, which causes a pushing forward of the piston 12. As a reaction of this pressure the spring 21 will be compressed. As soon as the whole supply of pulpy ink is consumed the bolt 14 disengages piston 12 and when turning the member 16 no resistance may be felt, from which it may be seen that the container 9 is empty and is to be substituted by another one.

A slight disadvantage of the described embodiment consists in that when the container is empty, the bolt 14 cannot be used either, as it is not possible to screw the same into another full con-

tainer. Consequently, at this embodiment the spare containers are to be sold with a bolt 14. This drawback is not present in the embodiment represented in Fig. 3. The screw 23 is integral with the bolt 24, which is rotatable in the protecting cap 18 of the fountain pen. The bolt 23 moves the nut 25 in axial direction, and the nut is guided by bars 26 and 26' being in the hollow body 1 of the fountain pen. The nut 25 is connected by means of a cap-like member 27 to a hollow bolt 28 which actuates the piston 12 of the container 9 for the pulpy ink, whereby between the nut 25 and the hollow bolt 28 a spiral spring 29 is inserted. Fig. 3 shows the piston 12 at the end of its stroke. If the container 9 is filled with ink and the piston 12 is at the bottom of the container, also the nut 25 is situated at the lower end of the bolt 23 and the latter extends to the bottom of the hollow bolt 28. This fountain pen works in a similar manner as the embodiment according to Fig. 1, the main difference consisting in that when the container 9 is empty and is thrown away, only the piston 12 is to be cast off therewith, while the bolt 23 remains in the fountain pen. Before inserting the new container of pulpy ink into the fountain pen the bolt 23 is to be turned until the nut 25 is brought to its lower extreme position.

The embodiment represented in Fig. 4 is similar to the construction shown in Fig. 3, however, it differs from the same in that it allows a lengthening of the tube-like container 9. With this object in view, in this embodiment instead of the rotating member 24 according to Fig. 3 a sleeve 30 provided with inner threads is employed, which operates another sleeve 31 provided with outer threads. The latter is rigidly connected with a cap 32 guided in the hollow body 1 in lengthwise direction, furthermore with a bolt 33, on the end of which a rotatable connecting member 34 is mounted; the latter transfers the pressure of spring 35 to the piston 12 of the container 9. If the container 9 is filled with pulpy ink, the whole sleeve 31 is in the driving sleeve 30 and the cap 32 slides on the end portion of the sleeve 30, by which the tube-like container 9 may be lengthened as compared with the container of the embodiment according to Fig. 1.

As it follows from the above developments, the member pressing out the pulp, for instance piston 12, cannot be removed from the container, consequently when the container is empty, this member must be thrown away with the container and the spare containers are to be sold together with such a piston. This is preferable on account of the fact that if the end of each container would not be closed by its own piston, that is if the user himself should insert the piston of the fountain pen into the new container, an air bubble could easily remain between the piston and the pulp which would be very detrimental for the operation of the fountain pen.

In the known fountain pens working with a ball, the latter is mounted in a ball-shaped depression. This bearing must have a very exact finish, as the least discrepancy from the spherical surface causes in practice a loosening of the ball in its bearing which prevents a good working of the fountain pen.

According to the invention this disadvantage is avoided in such a way that according to Fig. 5 the broader part of the bearing is widened, so that the ball bears only at its writing part and opposite thereto on an annular surface 37 and 36 respectively of the said bearing. By this it

is attained that the finishing of the bearing depression is rendered very simple as only these two annular surfaces are to be made exact. The ball is continuously in precise contact with these annular surfaces and thus between the ball and these surfaces only the slight interspace is present, which is unavoidable on account of the not fully smooth surface of the used material. This small space suffices for applying the formerly mentioned very thin color-layer to the writing surface. This embodiment has the further advantage that the annular space 38 assures beside the ball a small quantity of pulpy ink, which renders possible a uniform supply of the pulpy ink to the said ball and surely prevents a drying up of the ink as at the leaving place of the pulpy ink there is a greater quantity of the non-drying liquid.

I claim:

1. In a fountain pen with a rotatably mounted small ball as writing means for pulpy ink, an interchangeable container for the pulpy ink, a piston in the said container for pressing the pulpy ink forward, a screw bolt screwed into the said piston and adapted to forward the said piston if rotated, the end of the said screw bolt projecting out of the said piston and of the said container, a spring acting onto the said end of the screw bolt and adapted to hold the pulpy ink under pressure, the said container being adapted to be

replaced after use together with the said piston and the said screw bolt by a filled container of similar description provided with a piston and a screw bolt, this second mentioned container corresponding to the component parts of the fountain pen.

2. In a fountain pen of the type having a barrel and ball at the outer end of the barrel acting as a writing means for pulpy ink, an interchangeable tube like container for the pulpy ink in the barrel, a piston in the said container for pressing the pulpy ink forward, means for exerting pressure on the said piston including a rotatable driving sleeve mounted at the inner end of the barrel and provided with inner threads, a driven sleeve provided with outer threads and in threaded engagement within the driving sleeve, a cap member mounted on said driven sleeve, a bolt on the outer end of said driven sleeve and passing through said cap member a spring surrounding said bolt, a rotatable connecting member mounted on the outer end of said bolt to transfer the pressure of said spring to the piston, the driven sleeve fitting entirely within the driving sleeve, when the piston is in its retracted position, and the cap member sliding over the driving sleeve when it is desired to effect a lengthening of the tube like container.

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