

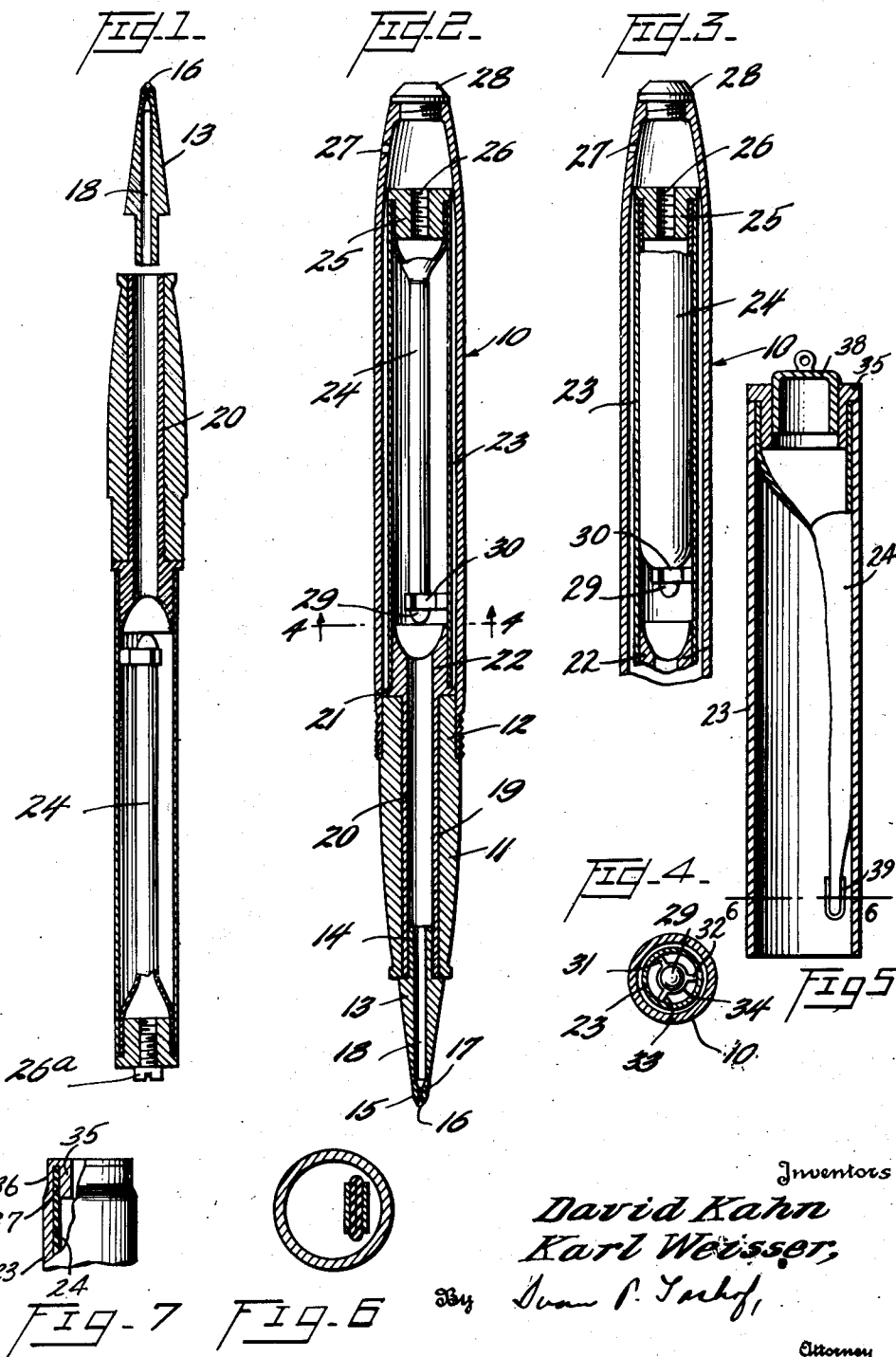
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D. KAHN ET AL

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FOUNTAIN PEN

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FOUNTAIN PEN

David Kahn, Englewood, and Karl Weisser,
Cresskill, N. J., assignors to David Kahn, Inc.,
North Bergen, N. J., a corporation of New Jersey

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The present invention relates to a writing instrument. More particularly, the present invention relates to a writing instrument of the type utilizing a freely rotating ball as the writing tip and provided with a suitable reservoir for supplying a thick, viscous writing fluid to the ball point.

Writing instruments of this type possess many advantages over the ordinary and conventional writing nib type of fountain pen. A relatively small amount of viscous fluid is fed to the paper by the rotating ball and consequently a single charge of writing fluid in a pen of this character will last for a substantial period of time. The thin layer of viscous fluid which is deposited upon the writing surface needs no blotting since by its very nature it is substantially dry upon deposition. In addition, the freely rotating ball will make a legible line on relatively rough surfaces, such as cloth and other materials, which the conventional writing nib is incapable of freely traversing.

Even with the advantages hereinbefore set forth, however, writing instruments of this type are not always satisfactory, since it is difficult to supply a continuous smooth feed of this material to the writing tip. The thick fluid can not be easily sucked into the reservoir in the manner in which writing fluid or ink is sucked into the reservoir by the sac of a conventional pen. In fountain pens of this character, therefore, it has been customary to charge a reservoir of some type at the factory and supply the pen together with the writing fluid to the user thereof. It has also been difficult to satisfactorily feed the fluid to the writing point and for this reason fountain pens of this type now in use have utilized weights or pistons for feeding fluid to the writing tip. Another type of pen having a writing ball is provided with a reservoir which consists of a relatively large number of connected small conduits capable of feeding fluid by capillary action to the writing ball. In this type of pen, the amount of fluid which can be retained in the reservoir of the pen is limited by the small size of the capillary conduits utilized. In the type of pen which embodies a weight or a piston or equivalent means for exerting a pressure on the thick fluid to facilitate the feed thereof to the writing point, it has been difficult to prevent leakage of the fluid past the piston. As may be understood, the piston or weight should have a free movement within the cylinder constituting the reservoir and with such movement it is almost impossible to prevent leakage of fluid past the piston or weight.

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It is one of the objects of the present invention, therefore, to provide a novel writing instrument preferably of the type employing a freely rotating ball as the writing point, said instrument being provided with a reservoir capable of retaining a relatively large amount of thick viscous writing fluid and of feeding said fluid smoothly under substantially uniform pressure to the writing tip.

A second object of the present invention is to provide in a writing instrument of the character described, a novel reservoir including a resilient, preferably rubber, sac for exerting a constant pressure on the writing fluid, said reservoir having a large capacity for writing fluid which is not determined by the capacity of the rubber sac.

A third object of the present invention is to provide in a writing instrument of the character described a relatively large space acting as a reservoir for a thick viscous writing fluid, said space being bounded by non-yielding walls capable of sustaining substantial pressure and a means, preferably a rubber sac, for exerting a substantial pressure on the writing fluid in said reservoir.

A fourth object of the present invention is to provide in a writing instrument of the type characterized by the provision of a freely rotating ball point, a reservoir for writing fluid including a rubber sac disposed within the reservoir and positioned substantially on the longitudinal axis thereof for exerting pressure on the fluid in the reservoir.

A fifth object of the present invention is to provide in a writing instrument of the character described, a cylindrical container for writing fluid together with a rubber sac member adapted when distended to its normal shape to substantially fill the reservoir, said sac functioning as a means for exerting a uniform pressure on writing fluid within the reservoir, which has compressed said sac so that it will occupy a lesser volume than that of the reservoir when the reservoir is filled.

Other objects and advantages of the present invention will become apparent from the subsequent description and figures of the drawings, wherein:

Figure 1 is a section of the writing instrument with the tip in non-assembled relation and the sac deflated ready for the filling operation;

Fig. 2 is a longitudinal section through the writing instrument of the present invention;

Fig. 3 is a section similar to Fig. 2 with the sac expanded as after the writing fluid has been expelled;

Fig. 4 is a transverse section taken on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged longitudinal section of a modification of the present invention;

Fig. 6 is a section taken on the line 6—6 of Fig. 5; and

Fig. 7 is a detail partly in section showing the construction of the end of the sleeve and sac.

Referring to the figures of the drawing and particularly Figure 2, a writing instrument in accordance with the present invention is shown, including a barrel indicated in general at 10. Fitted into the forward end of the barrel is a pen section 11 provided with a rearward reduced portion 12 which is frictionally fitted within the lower end of the barrel proper. Preferably both the barrel and the pen section are formed from a suitable plastic material such as Celluloid or hard rubber, or any of the other plastics conventionally utilized for this purpose in the art. The lower end of the pen section has fitted therewith a tip member 13, preferably formed from a suitable metal material. The tip member 13 is provided with a reduced portion 14 at its upper end and a seat 15 at its lower end which is adapted to retain a small, freely rotatable writing ball 16. Preferably the seat 15 is bent over the end of the writing ball sufficiently to retain the same there-within and the writing ball is fitted into said seat in such manner as to be freely rotatable. The seat 15 communicates at its upper end with a relatively small channel 17, which in turn communicates with a relatively larger channel or bore 18, both of these channels or bores being adapted to convey a relatively thick writing fluid to the seat 15 and the ball 16.

The pen section is provided with a bore 19 which is adapted to receive a reservoir retaining and feed member 20, the forward or lower end of the feed member 20 being interposed between the reduced portion 14 of the tip and the walls of the bore 19 of the pen section 11. At its rearward or upper end, the portion 20 is provided with an annular shoulder or projection which is seated on the end of the reduced portion 12 of the pen section 11, the shoulder being indicated at 21. An extended portion 22 of the member 20 furnishes a seat for a reservoir proper which is indicated at 23. The reservoir 23 is preferably made of metal or plastic or other material capable of withstanding a substantial amount of pressure. Fitted within the upper end of the reservoir 23 in such a manner as to retain a sac 24 therein is a plug member 25 having an orifice 26 extending axially therethrough. The orifice 26 is preferably threaded to receive a screw for a purpose to be hereinafter described.

The upper end of the barrel 10 is provided with a small opening or air vent 27 and with a loosely threaded cap or plug 28 which is adapted to close the upper end thereof. The sac 24 is preferably formed from resilient material such as rubber or any of the artificial elastomers or artificial rubbers known in the art, i. e., such materials as neoprene, butyl rubber or any other material having rubber-like characteristics and substantial resilience and recovery properties.

At the lower end of the sac 24 about a reduced portion or extension 29 thereof, there is provided a metallic spider 30. As shown in Figs. 3 and 4 this spider 30 is provided with arms 31, 32 and 33 which radiate from an annular central portion 34 thereof which is fitted on the projection 29 of the sac and serves to center the sac within the reservoir 23. As shown in Fig. 2, when the reser-

voir is filled with ink, the sac is axially compressed upon itself. The spider 30 which is fixed to the end 29 of the sac 24 has a sliding fit with the inner wall of the reservoir 23. As shown in Fig. 3, when the sac is expanded, the spider is drawn upwardly within the barrel to a slight extent.

The spider serves to not only centralize the sac within the reservoir, but also to maintain the closed end of the sac compressed and thereby enables the sac to exert a more uniform even pressure on the ink. If the spider or some equivalent means are not used, the closed end of the sac being of a heavier rubber than the mid portion or open end of the sac tends to expand first when driving the ink out of the barrel, and consequently ink may be trapped by the sac and not fed to the point.

It is desired to point out that by providing means to partially compress the closed end of the sac 24, it is made certain that the expansion of the sac is initiated near and adjacent the open end of the sac instead of the closed end, and this would occur in the absence of such means with the resulting entrapment of the writing fluid and prevent the use of the latter for writing purposes. That is, the life of the writing instrument would be shortened.

It is preferred that the means for compressing the lower end of the sac 24 also, as stated, function to centralize the sac 24 in the reservoir 23 as this insures that the writing fluid is substantially evenly distributed around the sac 24 and evenly dispelled from the reservoir 23 to the channels 18 and 17 and the ball 16. However, in one form of the invention hereinafter described, centralization may be dispensed with.

Ink is charged into the pen of the present invention in the following manner. Referring to Fig. 1, prior to the charging operation the screw 26a is removed, and the tip 13 is also removed. Thereafter the sac 24 is deflated to the position shown in Fig. 1 by first applying air pressure from any desired source. Any suitable pressure may be employed, as for example, 2 to 5 lbs. per sq. in. This pressure acting on the sac 24 deflates the same. During the period of deflation the screw 26a is removed from the plug 25. After deflation the screw 26a is placed into the plug 25, and this insures that the sac 24 is prevented from inflating under atmospheric pressure. The reservoir 23 is then ready to be filled with writing ink, the latter being fed from an ink feeding device not shown, any suitable pressure being employed, the reservoir 23 being completely filled to its brim with the writing fluid. From the above it is clear that the sac 24 is held in its deflated position both prior to the feeding of the writing fluid and after the feeding of the writing fluid to the reservoir 23. This prevents the sac 24 from forcing the ink out of the feed member 20 prior to the assembly of the tip 13 therewith. Preferably the dense writing fluid is fed around the sac and into the reservoir under pressure and in such a manner as to avoid entrapment of air therein. When the member 14 of the tip 13 is inserted in the feed member 20 after filling to the brim of the open end of the feed member 20, sufficient fluid is displaced to fill the channels 18 and 17 of the tip with the writing fluid. Thereafter, the screw 26a is removed, and the pressure of the sac 24 against the writing fluid in the reservoir 23 serves to feed ink upon rotation of the ball 16.

In the modification of the device shown in Figs. 5 and 6, a sac is shown which is provided with a

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small clip 39 about the closed end thereof. The function of this small clip which has a general U-shape is to prevent the sac from expanding from the closed end first.

In Fig. 7 there is shown an enlarged detail of the end of the sleeve 23 and the modified plug 35 inserted therein. As shown the end of the sleeve 23 is swaged inwardly as indicated at 36. This serves to compress the sac between the plug 35 and the sleeve 23, this compression being indicated by the reduced portion 37 of the sac. In assembling the sac and sleeve 23 the sac is first placed over the reduced portion of the plug 35, and then the sleeve 23 is slipped over the sac and plug. Thereafter, the end of the sleeve 23 is swaged against the plug to compress the sac.

Having described our invention, what we claim is:

1. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated writing chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its upper open end and its interior open to the atmosphere, and exerting a constant pressure on said fluid to force the fluid into said feed channel, a spider about the lower closed end of said sac member having an annular central portion about said sac member and a plurality of arms extending from said central portion into sliding contact with the walls of the elongated chamber so as to centralize said sac member within said chamber.

2. In a fountain pen including a point, a reservoir comprising a sleeve-like member for holding a writing fluid, a flexible sac within said sleeve-like member having a closed end and its interior open to the atmosphere and normally pressing against said fluid to expel the same, and having an open end within the upper end of said sleeve-like member, means to receive and hold the upper end of said sac against the upper end of said sleeve-like member, and mechanical compressing means about the closed end of the elastic sac member compressing said closed end and preventing premature expansion thereof.

3. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its interior open to the atmosphere, said sac exerting a constant pressure on said fluid to force the fluid into said feed channel, means to retain the upper end of said sac in position in said chamber, and mechanical compressing means about the closed end of said elastic sac compressing said closed end and preventing premature expansion thereof.

4. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its interior open to the atmosphere, said sac exerting a constant pressure on said fluid to force the fluid into said feed channel, means to retain the upper end of said sac in position in said chamber, and mechanical compressing means cooperating with said sac member compressing said closed end and insuring expansion of said sac member

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at a point spaced from the closed end thereof prior to the expansion of the closed end.

5. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its interior open to the atmosphere and exerting a constant pressure on said fluid to force the fluid into said feed channel, means to retain the upper end of said sac in position in said chamber, and mechanical compressing means about the closed end of the elastic sac member compressing said closed end and preventing premature expansion of said closed end, said means being in sliding contact with the wall of the reservoir.

6. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its interior open to the atmosphere and exerting a constant pressure on said fluid to force the fluid into said feed channel, means to retain the upper end of said sac in position in said chamber, and mechanical compressing means cooperating with said sac member and compressing said closed end and insuring expansion of said sac member at a point spaced from the closed end thereof prior to the expansion of the closed end, said means being in sliding contact with the wall of the reservoir.

7. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated writing chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its upper open end and its interior open to the atmosphere, and exerting a constant pressure on said fluid to force the fluid into said feed channel, an annular member about the lower closed end of the sac and compressing said sac at the closed end, and means associated with said annular member for centralizing said sac within the writing chamber.

8. The writing instrument defined in claim 7 in which the annular member is in sliding contact with the wall of the reservoir.

9. In a fountain pen including a point, a reservoir comprising a sleeve-like member for holding a writing fluid, a flexible sac within said sleeve having a closed end and its interior open to the atmosphere and normally pressing against said fluid to expel the same, and having an open end within the upper end of said sleeve, means to receive and hold the upper end of said sac against the upper end of said sleeve, mechanical compressing means about the closed end of the elastic sac member compressing said closed end and preventing premature expansion thereof, and means associated with said compressing means for centralizing said sac within the reservoir.

10. In a writing instrument having a writing point and a feed channel communicating therewith, a reservoir for writing fluid comprising an elongated chamber for said writing fluid opening into said feed channel, an elastic sac member within said chamber having a closed end and its interior open to the atmosphere, said sac exerting a constant pressure on said fluid to force the fluid into said feed channel, means to retain the upper end of said sac in position in said chamber,

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mechanical compressing means cooperating with said sac member compressing said closed end and insuring expansion of said sac member at a point spaced from the closed end thereof prior to the expansion of the closed end, and means associated with said compressing means for centralizing said sac within the reservoir.

DAVID KAHN.
KARL WEISSER.

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