

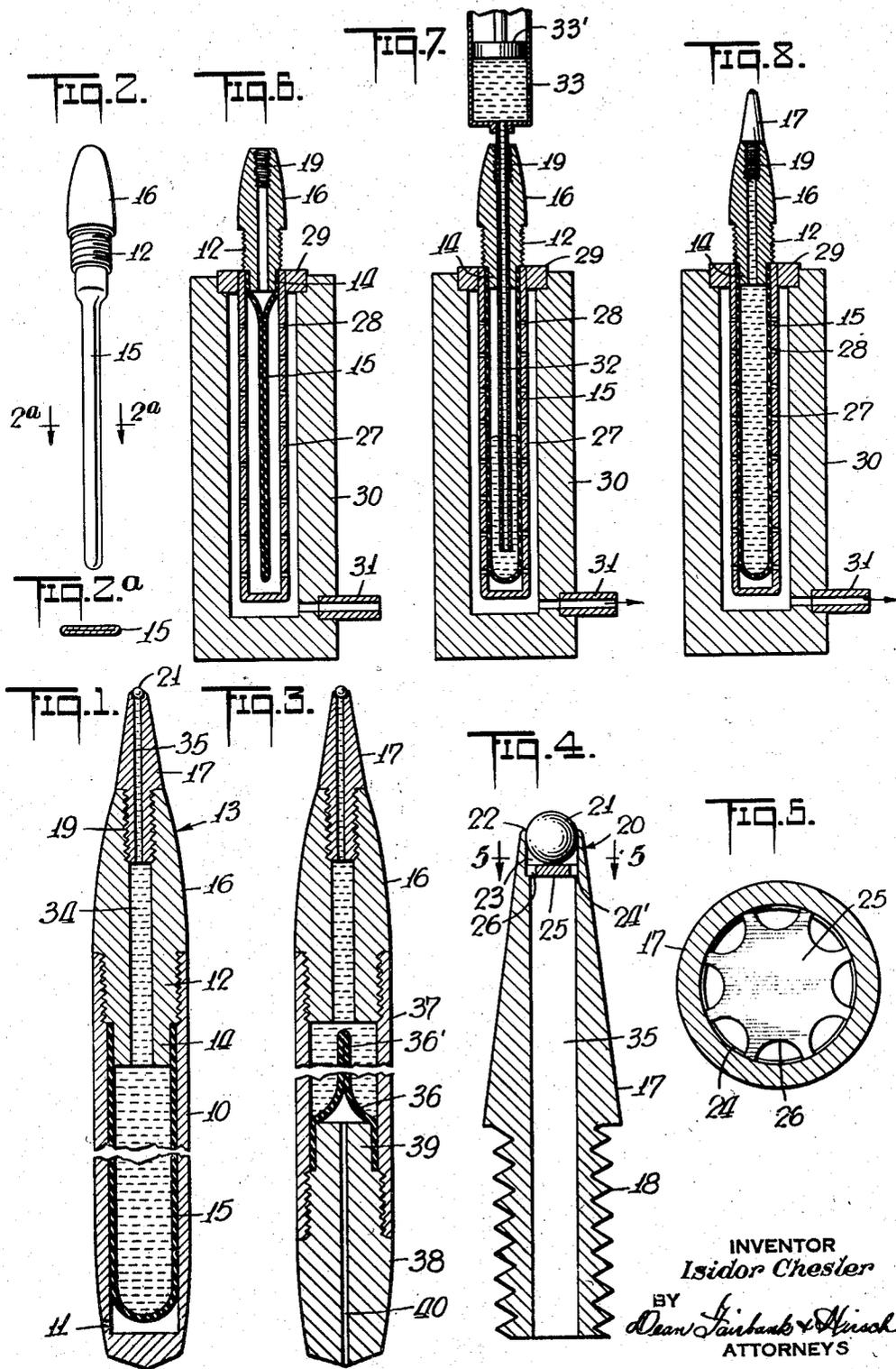
June 22, 1948.

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2,444,003

WRITING IMPLEMENT

Filed Jan. 19, 1945



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# UNITED STATES PATENT OFFICE

2,444,003

## WRITING IMPLEMENT

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Application January 19, 1945, Serial No. 573,536

8 Claims. (Cl. 120—42.4)

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The present invention relates generically to dispensers for applying minute quantities of liquid or paste, and in the specific and important application shown in the drawings is concerned with writing implements, more particularly with what may be correctly designated ink pencils or ball point writing pens.

It is among the objects of the invention to provide a liquid or paste dispenser such as a writing implement, of simple relatively inexpensive construction, which is substantially proof against flow stoppage on the one hand, or excessive flow, flooding or waste, on the other, regardless of the temperature, humidity or atmospheric pressure conditions under which the implement is being used, which in the writing implement embodiment requires substantially no service or replacement, but inherently includes a sufficient supply of ink to last for years, even to outlast the implement itself and which makes a line that is substantially smudge-proof and requires no blotting.

A feature of the invention is a writing implement or other applicator of the type referred to, with a ball point seated and confined in a rigid walled ball socket at the forward end of a writing tip mounted upon a rigid barrel that encompasses a reservoir which comprises a flexible wall. That flexible wall is preferably the wall of a flexible sac which is displaced by the liquid content of the reservoir from the position it would assume within the barrel in the absence of such liquid. The body of ink or other incompressible liquid substantially completely fills the reservoir without voids, that is it fills the entire cavity from one face of the sac wall clear to the ball point, sustained atmospheric pressure applied by venting the barrel is exerted against the other face of the sac wall, to cause said wall to become displaced in direction to diminish the volumetric capacity of the reservoir as ink or other liquid is dispensed at the ball point, thereby to maintain the reservoir wall at all times in intimate engagement with the entire surface of the ink or other liquid body remaining in the device, and preventing the formation of voids in the reservoir, until ultimately the sac wall has been restored to substantially the normal or relaxed condition assumed in the absence of liquid. The wall of the sac may be such as to be collapsed in the normal or in relaxed condition with little or no volumetric content of the sac when empty and to be distended by the body of ink filling the same, or it may be open when relaxed and be displaced to collapsed position by the ink filling the reservoir which in

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that case extends about rather than within the sac.

In the accompanying drawings in which are shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a view in longitudinal cross-section of one embodiment of the invention,

Fig. 2 is a perspective view of an element of Fig. 1 prior to being ink filled,

Fig. 2a is a cross-section on line 2a—2a of Fig. 2, Fig. 3 is a view similar to Fig. 1, of an alternative embodiment,

Fig. 4 is a view in longitudinal cross-section on a greatly enlarged scale, showing the writing tip unit of the pen,

Fig. 5 is a view in transverse cross-section on a still larger scale, taken on line 5—5 of Fig. 4, and

Figs. 6, 7 and 8 are views in longitudinal cross-section, more or less diagrammatic, showing progressive steps in the method of ink filling the sac in the embodiment of Figs. 1 and 2.

Referring now to the drawings, there is shown in Fig. 1 a barrel 10 vented at 11 and having threaded into its mouth the plug end 12 of a conical tip 13 that has securely affixed about its reduced rear end 14, the lip of an elongated sac 15, preferably of rubber or synthetic rubber, though desirably of any flexible, water-tight ink-resistant sheet material, even one devoid of elasticity. The particular sac preferred will be more fully described below.

The tip 13 is preferably of two pieces, a base 16 and a writing tip unit 17, the latter being threaded as at 18 into the tapped socket 19 in the tip base 16, and being conformed as a cage 20 at its outer end confining the writing point. That writing point is preferably a hardened metal ball 21 of suitable diameter which may, if desired, be of stainless steel, in most uses about .03 to .05 inch in diameter. The ball is confined in its cage 20 by a seat formed by the inturned lip 22 of the tip which extends somewhat beyond the diameter of the ball. The ball cage affords an annular cavity 23 for accommodating the ink, constantly in contact with the ball and the ink reaches said cavity through axial bore 35 in the tip 17. That bore is preferably of diameter but little smaller than that of the ball and determines a narrow shoulder 24 upon which is seated a metal disk 25 which has ink ports there-through. These ports may be in the form of notches or scallops 26 extending inward from the periphery beyond the periphery of bore 35, but spaced substantially from the center of the disk. The effective area of the notches for ink flow

is preferably as large as feasible, say about one-half the cross sectional area of the bore, for a purpose which will be more apparent in the description of the operation hereinafter.

The sac 15 employed in the present embodiment is collapsed in the position it would assume within the barrel in the absence of ink or other liquid, as best shown in Figs. 2 and 2a and is biased to return to such collapsed limp or relaxed condition once any impulse tending to expand it is discontinued. Desirably this sac is produced by anodic deposition of rubber upon a flat or blade mandrel (not shown), so that the sac in its unstressed collapsed condition, as best shown in Fig. 2a, has its walls in intimate contact with each other and is substantially devoid of volumetric content with substantially no air therein.

Sac 15 is to be opened or distended to a circular cross section by the introduction of ink to fill the same. The ink must be introduced substantially without entrapped air, as the presence of air or other gas or vapor within the reservoir or in the ink would seriously impair the reliability of writing. To this end the method and equipment diagrammatically shown in Figs. 6, 7 and 8 may desirably be used. The collapsed sac assembled upon the tip base 16, but devoid of the writing tip unit 17 as shown in Fig. 2, is introduced into a cylindrical container 27 perforated at 28 and depending from a collar 29 supported in the mouth of the vacuum chamber 30 which is connected by tube 31 to a suitable vacuum pump (not shown).

As shown in Fig. 7, there is introduced into the tip base 16, the outlet tube 32 of an ink-containing cylinder 33. That tube may be introduced into the collapsed tube 15 as the latter begins to expand under the vacuum applied thereabout. As vacuum is applied to the chamber 30, and through perforations 28, the collapsed sac 15 will obviously become distended to accommodate the tube 32 and to allow the ink from the cylinder 33 (preferably assisted by plunger 33'), to enter the sac. The distention is limited by the wall of the cylinder 27, which wall is preferably of diameter slightly smaller than that of the barrel 10 and limits the sac to full distention but precludes excessive tension on the material thereof. After the sac has thus been filled with ink, substantially devoid of air bubbles, the ink supply tube 32 is removed and the tip point unit 17 is applied, while the application of suction is continued, as best shown in Fig. 8, whereupon suction is discontinued, the sac is removed from the vacuum chamber and the vented barrel 10 is threaded upon the threaded end of the tip base 16 to complete the assembly.

While the use of the implement may be apparent from the foregoing, it will be briefly set forth. Normally the outer surface of the sac wall 15, that is, the surface free from ink is under atmospheric pressure imparted through vent 11 in the barrel 10. Such pressure is applied through the ink filled cavity including the solid column of ink filling the sac and the passage 34 in the tip base and bore 35 in tip unit 17 clear to the ball point 21. Under such sustained pressure, the valve cage 20 is constantly maintained filled with ink which flows through the bore 35 past the disk ball stop 25, but no ink will escape since the ball 21 is urged tightly against its seat 22 and the writing will occur only by the pick-up of ink in the rolling of the ball within the annular ink cavity 23 in the filled cage. That imple-

ment can thus be carried in the pocket, point up or point down.

The line written by the implement is sufficiently thin to dry almost instantly without the need for a blotter and to be substantially smudge-proof. Any grade of ink, fluid or paste may be used in accordance with requirements. Since the ink in the sac is shielded from the atmosphere, even inexpensive oxidizing printers inks that form a film when exposed to the air, may be used without danger of inoperativeness of the implement due to hardening or encrusting of the ink within the barrel or sac.

As the supply of ink is gradually reduced, the sac progressively collapses under the air pressure so as to preclude any voids, whether of air, gas or empty space between the sac wall and the remaining ink and to avoid any vacuum the presence of which might tend to draw the ink backward away from the point and inhibit writing. Thus the sac wall will follow the ink in the reservoir, constantly remaining in intimate contact with the surface of the remaining body of ink, as ink is being withdrawn by rolling the ball point along a surface and preventing the formation of voids in the reservoir. In rarefied atmosphere, as for instance in flying, the implement will not flood as is the case with ordinary pens.

Were the ball 21 to be snugly seated between the inturned lip 22 and the edge of the bore 35, then manifestly there would be no communication for the flow of ink to the annular ink cavity 23. If such seat were notched or otherwise interrupted to permit flow of ink to the annular cavity from the restricted bore, the seat would become depressed and worn under the writing pressure of the ball with the result that the ink might flow too freely. By the arrangement shown and described, the ball 21 is snugly held between the centrally solid disk 25 and the lip 22 so that wear at the backstop formed by said disk 25 is reduced to a minimum and looseness is avoided. Moreover, the large diameter axial bore 35 is more easy to produce than the rather small bore required, were the ball to seat directly upon the bore edge, and furthermore such large bore permits the transmission of more pressure to the ball and enhances the seating effectiveness of the latter against the seat 22. When the ink is ultimately exhausted, the pen would have to be sent back to the factory or service station for refilling.

In the alternative embodiment of Fig. 3, an ordinary sac 36, that is, one which is normally distended to have a cylindrical bore, may be used in lieu of the special, normally collapsed sac of Figs. 1 and 2. In that embodiment, the sac does not contain, but is submerged in, the ink within the barrel and the venting occurs to the interior of the sac.

In the particular embodiment shown, the tip is identical with that of Fig. 1 but the barrel 37 has a plug 38 at the rear end thereof, upon the inner reduced end 39 of which is securely mounted the rim of the normally distended sac 36. The barrel is vented, preferably through an axial bore 40 in the plug 38, which communicates with the interior of the sac.

The filling in the embodiment of Fig. 3 will be obvious from that of the embodiment of Figs. 1 and 2 and need not be illustrated. Preferably an equipment similar to that of Figs. 6, 7 and 8 is used, the suction being, however, applied directly through the vent 40 in the implement, which is completely assembled except for the

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point unit 17 of its tip. Under suction the normally distended sac is collapsed, as best shown at 36' in Fig. 3, while the ink is admitted as in the embodiment of Figs. 6, 7 and 8 to fill all of the cavity between the sac (in this case the external surface thereof), and the mouth of the tip base 16. After filling, the writing unit 17 of the tip is applied and the assembly is thus completed.

In operation of the embodiment of Fig. 3, it will be apparent that atmospheric pressure applied through vent 40 to the interior of the sac 36 tends in use, to expand the sac progressively with consumption of the ink to maintain the sac in contact with the ink without any voids in the ink cavity and therefore without suction that would tend to draw the ink away from the writing point.

While the invention is by no means limited to any particular use, it finds a particularly advantageous field of application as a pocket ink pencil, which will unfaillingly make an ink line that is smudge-proof and requires no blotter. It can be used in lieu of the familiar indelible or copying pencil since it makes an ink line and its point applies sufficient pressure to make excellent carbon copies. It is also very useful for check signatures.

The teachings of the present invention may be advantageously applied by way of example as a leak proof dispenser, combined with an applicator for cosmetics, such as lip rouge, mascara and perfume. Such cosmetics, preferably in viscous or pasty form, would be used within the cartridge in place of the ink in the implement above described, and the ball point would of course be of much larger diameter for ease of application without irritation to the delicate skin of the lips. The difficulty of making a lip stick soft enough for ready application, and yet solid enough not to melt in warm weather, the need for pointing the stick and for providing a propel and repel case would all be obviated by the present invention.

The teachings of the present invention when a suitably large point is used, are also applicable to paste and mucilage dispensers. The invention has the further advantage in such application, that the body of paste or mucilage is not exposed to the air, and so does not harden or form an obstructing film on the contents of the dispenser as is inherently the case with conventional squeegee and other rubber mouth mucilage tubes that operate on the principle of admitting air into the system to help feed out the paste.

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

1. A writing implement comprising a writing tip having a ball cage at the forward end thereof, a bore substantially longitudinally through said tip, a ball within said cage, said cage having a ball support through which said bore extends to afford ready communication for ink into the cage, the forward rim of said cage being inturned to afford a seat for said ball, a barrel affixed to said tip, said implement having a vent to the interior of said barrel, an elongated flexible sac within said barrel and affixed at its rim to the rear end of said tip and communicating with said longitudinal bore, said sac being distended with ink filling the same, said sac at its exterior being exposed to the atmosphere through said vent, said sac being adapted by its flexible nature to follow and remain in contact with the ink under

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the atmospheric pressure exerted through said vent as the ink is rolled out by the ball writing point.

2. In a writing implement, a rigid casing having a constantly open vent, a ball writing point, a rigid-walled ball socket at the forward end of said casing snugly accommodating said ball point for free rolling movement and supported wholly by the rigid walls thereof, means defining an ink reservoir in said casing and leading to said ball writing point, said reservoir including a flexible wall member exposed on one face to the ink and on the other face to the atmosphere through said vent, said flexible wall member being adapted by its flexible nature to follow and remain in contact with the ink under the atmospheric pressure exerted through said vent as the ink is rolled out from said reservoir by the ball writing point and to prevent contact of the ink with the atmosphere in the reservoir.

3. A device of the character described comprising a barrel having a tip and a ball point rotatably seated at the outer end of the latter, a reservoir communicating with said ball point and including a flexible sac wall and extending longitudinally within said barrel, a body of liquid substantially completely filling said reservoir without voids therein clear to said ball point and maintaining the sac wall displaced from the position it would assume within the barrel in the absence of such liquid, one face of which sac wall is in contact with the liquid and the other free of such contact, said sac wall in fully distended but otherwise unstretched condition substantially filling the bore of the barrel, said barrel having a vent from the outer air to that face of the sac wall free from contact with the liquid, whereby, as liquid is withdrawn by rolling the point along a surface, the atmospheric pressure is maintained through the vent of the barrel at the surface of the sac wall free of liquid, so that the sac will be and remain in intimate engagement at all times with the remaining body of liquid in the reservoir.

4. The combination recited in claim 3, in which the sac is affixed at its rim to the rear end of the barrel, the vent is at the rear end of the barrel and the cavity between the barrel and the convex surface of the sac constitutes the reservoir.

5. A writing implement comprising a rigid barrel having a writing tip, presenting a rigid-walled ball socket at the forward end and a ball writing point snugly seated in the socket for free rolling movement and supported wholly by said rigid wall, said barrel having a vented end closure, a normally distended sac mounted at its rim upon the inner end of said closure and confined in said barrel, said sac being collapsed under the pressure of ink submerging said sac within said barrel.

6. The combination recited in claim 5 in which the cap end of the barrel comprises a removable plug, the inner end of which mounts the rim of the sac, said plug being axially vented.

7. A writing implement comprising a barrel tube, a conical tip affixed upon the forward end thereof, said tip having a base and a removable forward tip unit, a ball cage at the forward end of the latter including an inturned lip on said unit confining and seating a writing ball within said cage, an axial bore in said tip end for feeding ink into said cage, a ball stop about said bore at the inner end of said cage, a vented plug seated in the outer end of said barrel tube, a normally distended flexible sac affixed at its rim upon the

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inner end of said plug and confined in said barrel, said sac being collapsed by the ink filling the barrel.

8. A writing implement comprising a rigid barrel having a writing tip presenting a rigid-walled ball socket at the forward end and a ball point snugly seated in the socket for free rolling movement, a flexible, substantially non-elastic sac affixed at its rim to the inner part of said tip and extending longitudinally of said barrel, the exterior face of said sac being free from contact with the ink, said barrel having a vent from the outer air to said latter face of the sac, said sac being adapted by its flexible nature to follow and remain in contact with the ink.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
381,731	Walker	Apr. 24, 1880

8

Number	Name	Date
448,939	Cronkhite	Mar. 24, 1891
600,299	Werner	Mar. 8, 1898
715,359	Dickie	Dec. 9, 1902
789,532	Gallagher	May 9, 1905
807,280	Kegrize	Dec. 12, 1905
896,772	Sullivan	Aug. 25, 1908
1,065,872	Johnson	June 24, 1913
1,181,574	Crocker	May 2, 1916
1,663,665	Loomis	Mar. 27, 1928
2,096,397	Harris	Oct. 19, 1937
2,107,424	Platt	Feb. 8, 1938
2,204,778	Sturn	June 18, 1940
2,333,451	Sussman	May 23, 1944
2,349,322	White	May 23, 1944
2,376,222	Barlow	May 15, 1945
2,397,229	Biro	Mar. 26, 1946
2,413,904	Biro	Jan. 7, 1947

FOREIGN PATENTS

Number	Country	Date
218,660	Switzerland	1942
564,173	Great Britain	Sept. 15, 1944