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STERILE INK SUPPLY

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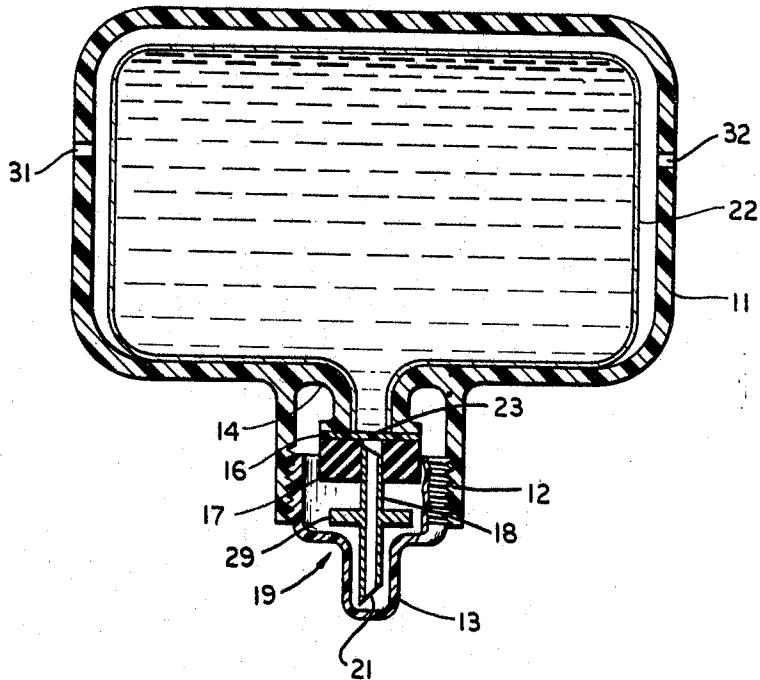


Fig. 1.

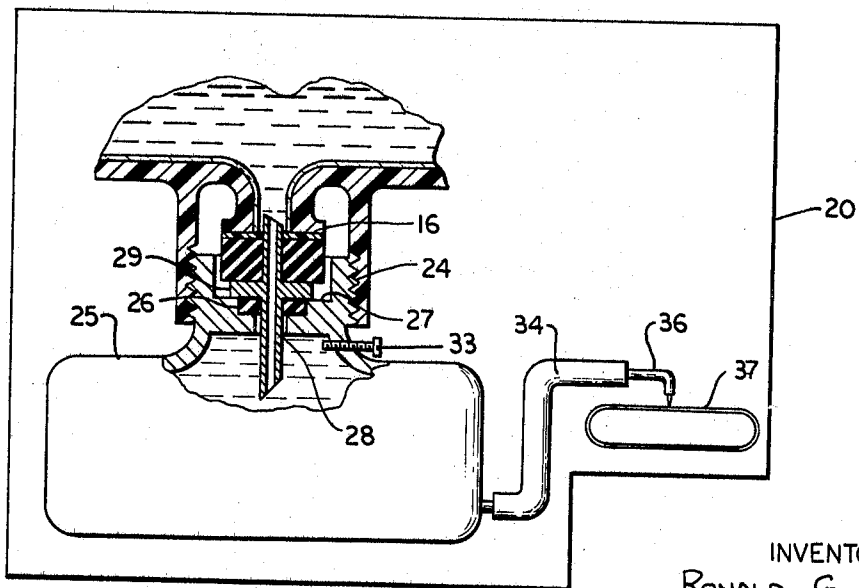


Fig. 2.

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STERILE INK SUPPLY

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13 Claims

ABSTRACT OF THE DISCLOSURE

A rigid case with a collapsible ink-filled bag therein is threadedly connected to a reservoir in a recording instrument. An ink transfer needle is mounted to the case by a combination seal and retainer and normally protected before use by a rigid closure. The transfer tube has a flange engageable with a seat on the reservoir to cause the tube to pierce a container wall during mounting of the case on the reservoir, to admit ink to the reservoir.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to recording instruments, of the ink-writing type, and more particularly to a system for supply of sterile, particle-free and bubble-free ink thereto.

Description of the prior art

Prior art ink-writing recording instruments have been plagued by problems of bacterial and particulate contamination, as well as air bubbles in the inking system. Various remedial efforts have been made. Disposable ink cartridges have been used. Flexible bags have been used to facilitate priming and positive displacement of the ink. Yet the aforementioned problems remain to varying degrees, depending upon the instrument and arrangement used. Some examples of known prior art apparatus are the following United States patents:

2,688,428, Manhartberger, Sept. 7, 1954; 2,820,689, Holloway, Jan. 21, 1958; 3,128,144, Roerty, Apr. 7, 1964; 3,145,653, Lake, Aug. 25, 1964; 3,296,624, Ascoli, Jan. 3, 1967; and 3,335,424, Hartai, Aug. 8, 1967.

SUMMARY OF THE INVENTION

Described briefly, in a typical embodiment of the present invention, a case or housing has a bag therein which is collapsible so that the bag remains full of ink at all times. The case has threads thereon for reception on the ink reservoir in a recording instrument. A needle is provided and mounted on the case for operation during connection thereof to the reservoir to puncture the bag and permit transfer of ink through the needle to the reservoir, excluding all dust, bacteria, and air.

BRIEF DESCRIPTION OF THE DRAWING

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

FIG. 1 is a vertical section through a disposable ink holder assembly according to a typical embodiment of the present invention.

FIG. 2 represents a recording instrument schematically with the ink holder of FIGURE 1 secured to the ink reservoir of the instrument and supplying ink thereto, portions of the holder being deleted for conservation of space, and portions shown in section to illustrate certain details of operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing in detail, the case 11 has threads 12 on the inner cylindrical surface of the coupling stem. These receive external threads of a rigid protective closure 19. The case also has a portion 14 extending inwardly from the connector stem and having a membrane 16 secured thereto. A retainer gasket 17 is secured to the membrane 16 and has a central bore therein receiving the upper portion of the transfer tube 18. This tube is snugly retained in the gasket 17 to avoid upward movement thereof, the latter being assured by the protective closure 19 during shipping and handling.

The lower margin of the transfer tube 18 is tapered or inclined as at 21, as is the upper margin thereof, the latter being disposed immediately adjacent the lower face of the portion 23 of membrane 16 forming a lower wall or boundary of the collapsible ink bag 22.

In the use of the assembly of FIGURE 1, the closure 19 is removed therefrom and the case is threaded onto the threads 24 provided on the ink reservoir 25 of the recording instrument (designated schematically at 20 FIGURE 2). In so doing, the lower edge 21 of the ink transfer tube passes through a central aperture in the gasket 26 on the reservoir adjacent the circular ledge 27, and passes on downwardly through the central aperture 28 in the reservoir portion supporting the gasket 26.

During the downward movement of the case, the lower face of radial flange 29 on the needle engages the seat 27 to stop descent of the tube. Further downward movement of the case causes engagement of the membrane central portion 23 with the sharpened upper edge of the tube 18 which thereupon pierces the membrane to enable passage of ink through the tube from the container 22 into the reservoir 25.

Of the aforementioned components, the case 11 may typically be made of plastic which is reasonably rigid to avoid any mechanical pressure on the bag during shipment and handling. The membrane 16 may be plastic heat-sealed to the case at the lower margin of the portion 14. Likewise the closure 19 may be of plastic. The container or bag 22 is made of a plastic which is collapsible under atmospheric pressure so that as ink is withdrawn therefrom, collapse of the bag keeps it full of ink by reducing the internal volume of the bag during withdrawal of ink therefrom.

It seems preferable that the retainer 17 be of rubber to serve the function of keeping the needle from moving into the membrane 16 before desired, and also to provide a good reliable seal around the tube after puncture of the membrane. It is also believed preferable to employ a rubber material for the gasket 26, again to provide a reliable seal for the tube as well as against the flange 29. It is recognized that other materials might also be used, but the extensive use of plastic in the assembly of FIGURE 1, lends itself to a disposable aspect once the supply of ink therein has been exhausted.

By means of the present invention, all portions of the assembly of FIGURE 1 which contact the ink during storage and shipment can be sterilized before filling. Filling can be entire so no air bubbles are possible. In this way the supply can be free of bacteria, contaminating particles, and air bubbles. Air vents can be provided at 31 and 32 and sealed after filling and subsequently opened when the supply is installed in the recording instrument.

In the event that any air might be introduced during connection of the assembly because of the small volume of the needle itself, for example, a bleed valve 33 in the reservoir can be opened to permit its exit. It should be understood that the gasket 26 is sufficiently

resilient to close the aperture therein as soon as the needle is withdrawn to replace the cartridge with a new one. In this way the reservoir can be kept full of ink at all times and entry of air, dirt and bacteria can be avoided. Accordingly, the ink supply from the reservoir 25 through tube 34 to the pen 36 for writing on the chart 37 can be kept clean and air-free.

While the invention has been disclosed and described in some detail in the drawings and foregoing description, they are to be considered as illustrative and not restrictive in character, as other modifications may readily suggest themselves to persons skilled in this art and within the broad scope of the invention.

The invention claimed is:

1. In a recording instrument, the combination comprising:
 - a first ink reservoir mounted on the instrument and connected to writing means therein to supply ink to said writing means, said reservoir having first coupling means thereon;
 - a case having second coupling means thereon fittingly receivable on said first coupling means for connection of said case to said reservoir;
 - a container in said case and filled with ink, the wall of said container being collapsible to reduce volume therein as ink is withdrawn to keep said container filled with ink;
 - and an ink transfer conductor communicable with said reservoir and said container through said first and second coupling means to pass ink from said container to said reservoir.
2. The combination of claim 1 wherein: said container has a boundary pierced by said transfer conductor to permit passage of ink from said container only through said transfer conductor.
3. The combination of claim 2 wherein: said reservoir has a first gasket thereon located at said first coupling means and sealingly receiving said transfer conductor to prevent passage of fluid into said reservoir at said coupling means except through said transfer conductor.
4. The combination of claim 3 wherein: said transfer conductor includes transversely extending shoulder means thereon engageable with a seat on said reservoir to limit travel of said conductor toward said reservoir during connection of said case to said reservoir.
5. The combination of claim 4 wherein: a second gasket is provided between said boundary and said shoulder means and urges said transfer conductor into sealing engagement with said first gasket.
6. The combination of claim 5 wherein: said coupling means include a threaded portion on

said case threadedly received on said reservoir and thereby removably affixed thereto.

7. The combination of claim 1 wherein: gasket means are secured to said case at said transfer conductor, said gasket means snugly engaging said transfer conductor.
8. The combination of claim 7 wherein: said transfer conductor is a tube having an upper margin sharpened to pierce a boundary of said container, and a lower margin tapered to facilitate passage thereof through a gasket into said reservoir.
9. The combination of claim 8 wherein: said tube has a radially extending flange thereon between the upper and lower margins thereof abuttingly engageable with an abutment in said first coupling means to effect relative movement of said tube in said gasket means for piercing said boundary during connection of said case to said reservoir.
10. An ink holder comprising:
 - a case;
 - a container in said case and filled with ink;
 - a transfer conductor;
 - and retaining means mounted to said case and engaging said conductor and normally keeping said conductor with a portion thereof disposed adjacent a margin of said container.
11. The ink holder of claim 10 wherein: said conductor is a tube, said portion thereof being shaped to pierce said margin upon relative movement of said tube through said retaining means.
12. The holder of claim 11 wherein: said retaining means is a resilient seal member snugly and sealingly receiving part of said tube therein to normally resist said relative movement.
13. The holder of claim 10 wherein: said case has coupling means thereon including threads receivable on mating threads of a recording instrument ink reservoir; said container is filled with ink, and; a rigid protective closure is threadedly received on said threads and covers said transfer conductor.

References Cited

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101—366; 141—20.5, 114, 329; 22—80, 207; 401—134