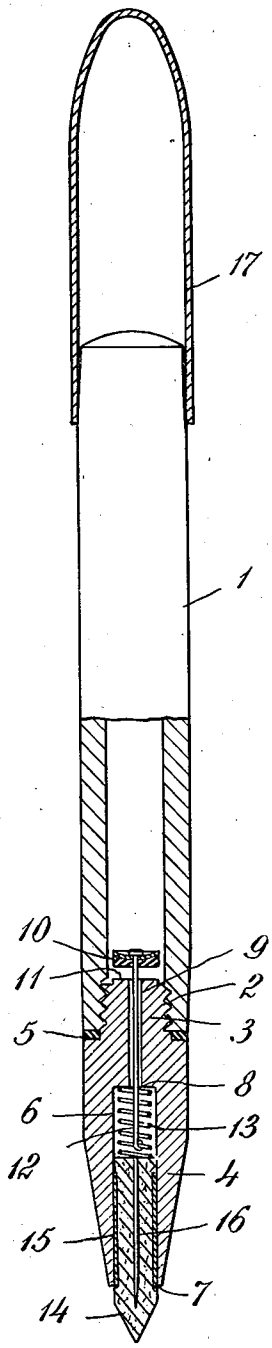
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FOUNTAIN MARKING DEVICE

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FOUNTAIN MARKING DEVICE

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This application is a continuation in part of my copending application Serial No. 406,998, filed August 15. 1941.

The present invention relates to fountain marking applicators for use with thin free flowing inks and more particularly to an improved fountain marking device utilizing volatile solvent dye inks as distinguished from pigment inks.

The present invention has for its object the provision of a novel and improved fountain marking device for use with volatile solvent dye inks such, for instance, as those containing hydrocarbons, fatty acids, esters, ketones and aniline dye.

A further object of the invention is the provision of an inexpensive, fountain pen size marking device which may be conveniently carried in the pocket in any position without danger of flooding or leakage and which, once its resorvoir has been filled, is always ready for immediate use without any preliminary preparation or priming thereof.

Prior to the present invention, liquid distributors of various sorts were available for dispensing small quantities of water, mucilage, bootblacking and the like. In general they comprised a reservoir, stoppered with an applicator-head of hair, rubber, absorbent material or the like, to and over which the liquid flowed from the reservoir. Many of these liquid applicators were also provided with spring closed valve means to cut off the supply of liquid flowing from the reservoir to the applicator head, when the dispenser was not in use.

In addition, heavy, cumbersome, fountain marking devices for use with thick, slow flowing, pigmented inks were available for marking boxes, crates and the like. In general, these were provided with a reservoir, a metal-capped compressed absorbent material nib and a spring closed valve and opening between the reservoir and the metal cap of the nib. In operation, pressure on the writing portion of the nib caused opening of the reservoir valve allowing a not readily determinable quantity of the relatively thick ink to flow down through the opening to the metal cap of the nib and thence down the outside surface of the nib to its writing point, resulting, almost invariably, in an overflow of ink upon the work.

After initial use, such a pigmented ink applicator, unless it first had been thoroughly cleaned, would retain an excess deposit of slow drying thick ink on its outer surface which would both soil the fingers of a subsequent user and interfere with proper flow of ink down the outside surface to the writing point.

Not one of these prior fountain devices, however, can be used satisfactorily to write or mark with thin, free flowing, quick drying, volatile solvent dye inks, such as the improved marking device of the present invention has been designed to accommodate because the joints formed by their constituent parts are not sufficiently gastight and solvent-tight to retain such inks against evaporation and leakage when the device is not in use and, furthermore, such parts, particularly those located between the resorvoir and the applicator head, were not designed to properly control the rate of flow of such free flowing dye inks from the reservoir to the marking point when the applicator is in use, resulting in leakage and flooding of the surface being marked.

The nature of commercially available solvent dye ink such as is used with the device of the present invention is such that when it is exposed for a short time to even a relatively slight temperature increase it volatilizes rapidly. When the ink is contained in a closed chamber, such as it would be in reservoir 1, continued application of body heat by conduction from the hand, or from the body of the user when the marker is carried in the vest-pocket, causes a building up of gas pressure in the reservoir. As will hereinafter be explained, this volatilization and subsequent building up of gas pressure in the reservoir is compensated for during the operation of applicant's device so that none of the deleterious effects as would normally be expected to occur, such as flooding of the nib and leakage of the ink upon the surface being marked, results therefrom.

With the improved marking device of the present invention the user is provided with a convenient fountain pen size ink marker which may be conveniently carried in any position when not in use without leakage, and which when put into use immediately responds with a controlled even ink flow.

The drawing figure shows the marking instrument in side elevation and partly in section.

Referring now to the preferred embodiment of the invention shown in the accompanying drawing, the fountain marking device comprises a reservoir 1 internally threaded at its open end as at 2 to receive the male threaded end 3 of a conical tip member 4, a tight seal being effected between these members by means of a flexible-plastic gasket 5.

The tip member 4 is provided with an auxiliary

reservoir 6 comprising a hollow cylindrical chamber or bore having a large opening 7 at its lower end and a small opening 8 at its upper end opening into a smaller tubular channel or bore 9 which is connected at its other end with reservoir 1.

Normally closing the upper end of channel 9 is a metal capped flexible plastic valve head 10 which seats on the upper end 11 of tip member 4. A hooked pin 12, to the upper end of which is fastened valve head 10, passes down through channel 9 and into chamber 6 where its hooked portion is fastened around one of the lower turns of a helical expansion spring 13 which maintains valve head 10 tightly in position upon seat 11 except when spring 13 is compressed by upward pressure upon a compressed felt nib 14.

Nib 14 is provided with a tight-fitting, rigid cylindrical band 15 (having a diameter substantially that of the nib which it encircles) encompassing it from near its upper end to a short distance from its writing point for the purposes of retaining compression of the felt, to impart to the nib additional stiffness or rigidity and to provide a uniformly snug slidable fit of the nib in its retaining chuck. After long, continuous use a compressed felt nib not provided with such a band or collar 15 will sometimes become saturated and swell to such an extent that it becomes so wedged in the chuck of the tip member 4 as to prevent spring 13 from expanding sufficiently to tightly seat valve head 10, thereby permitting ink to seep down channel 9 to the marking point. In order to obviate the possibility of such an occurrence the band 15 has been provided.

Extending down the center of the nib 14 from the top thereof to a short distance up from its writing point, is a small diametered swooth-surfaced core 16, which may be of metal or any other smooth-surfaced, substantially rigid material. Applicant has found that an ordinary common pin may be advantageously used for the core. The purpose of this core and the part it performs in the operation of the device of applicant's invention will be explained later in this specification.

Use of the flexible plastic gasket 5 and valve head 10 both made of a synthetic rubber-like composition which is impervious to dye ink solvents and gases generated thereby, prevents leaking out of even the most volatile dye inks.

A frictionally fitting cap member 17 is provided for sliding over the tip portion of the marker when it is not in use.

When it is desired to put the marker in condition for operation, cap 17 and tip member 4 are removed from the barrel or reservoir 1 which is then held open end up and filled with the desired color volatile solvent dye ink after which tip member 4 is tightly replaced on the reservoir. The marker is then ready for use and is started by slight writing pressure upon the compressed felt nib 14 which, as heretofore explained, momentarily opens valve head 10 allowing a quantity of the ink to flow down through channel 9 and chamber 6 to the upper end of the compressed felt nib 14 from whence it flows directly down through the felt nib to the writing tip, the rate of flow, as will later be explained, being greatest through the center fibers of the nib and along the surface of its core 16.

It has been found that when the ordinary compressed felt or other fibrous type of nib without a core is first used, the ink flows down through each and every fiber thereof. Thereafter, when the felt has become saturated, the flow is almost entirely down along the outermost fibers thereof resulting in too free a flow and sometimes leakage of ink upon the work. When the nib is of the banded coreless variety the rate of flow is greater down along the outside surface of the band or collar resulting in even greater leakage.

When, however, the nib is provided with a core such as a pin 16, the ink is directed away from the band and the outside fibers of the nib and the rate of flow is greatest down through the fibers adjacent the core and along the surface of the core itself to the end thereof, from whence it flows to the writing tip at the end of the nib.

This phenomenon of ink flow may be atributable to preferential wettability of the core relative to the compressed fibrous material comprising the nib, which under ordinary circumstances is impregnated with a certain percentage of waxy or oily substance which tends to retard the ink flow.

Looking at it from another viewpoint, it may be said that the surface tension along the outside of the core is less than that of the compressed felt fibers comprising the nib and hence the ink flow takes the path of least resistance. In any event with the use of the cored nib of this invention the flow is even and steady, without any flooding or leakage no matter how long a period the marker has been in continuous use. It also may be noted here that the exposed surface fibers of the nib, except those at the very writing tip thereof, remain relatively dry during the operation of the marker.

As mentioned heretofore, body heat volatilizes a portion of the ink solvent present in reservoir 1 and a certain amount of gas pressure is built up and remains therein while valve 10, 11 is maintained closed. When, however, the ink in auxiliary reservoir 6 becomes exhausted and downward pressure is brought to bear upon the writing point of the nib to effect momentary opening of the valve 10, 11, this gas, together with a small quantity of ink, is released from reservoir 1 and passes down channel 9 into auxiliary reservoir 6. From there the gas is quickly dissipated into the atmosphere via the minute openings between the fibres of the nib, while the ink flow, as heretofore explained, is principally down through the center fibers of the nib and along the surface of its core at a rate sufficient to permit of continuous normal use of the marker without any leakage whatsoever.

Nor will any leakage occur when the marker is not in use even though its auxiliary reservoir be filled with ink and its exposed writing end be left pointed vertically downward. The reason for this is probably that atmospheric pressure about the exposed portion of the nib coupled with rapid volatilizing of the ink solvent effects a balancing or neutralizing of the downward pressure exerted by the ink flowing from auxiliary reservoir 6.

The writing point of the nib 14 illustrated in the accompanying drawing is shown chisel or wedge shaped for writing with either a heavy or a thin line depending upon how the device is held with respect to the writing surface. Of course, if it is desired to mark a surface with a still wider line, a nib having a T, triangular or other shaped writing point may be interchanged therefor.

The uses to which a marking device of the

type contemplated by the present invention may be put are many although it is primarily intended for ready marking or writing upon any type of smooth surface, such as paper, cardboard, wood, prepared fabric surfaces and the like, with a thin, quick drying, volatile solvent dye ink.

Having thus described the invention, its uses and advantages, what is claimed is:

1. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, a spring in the inner end of said first central longitudinal bore normally urging said valve to closed position and the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

2. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, a spring in the inner end of said first central longitudinal bore normally urging said valve to closed position and the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

3. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, spring means for normally urging said valve to closed position, and spring means for normally urging the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

4. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, a substantially rigid core extending longitudinally within the marking nib for a substantial portion of the length thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, spring means for normally urging said valve to closed position, and spring means for normally urging the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

5. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, a substantially rigid core extending longitudinally within the marking nib for a substantial portion of the length thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow

of dye-ink to said marking nib, a spring in the inner end of said first central longitudinal bore normally urging said valve to closed position and the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

6. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, a substantially rigid, smooth-surfaced core extending longitudinally within the marking nib for a substantial portion of the length thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from the inner end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, spring means for normally urging said valve to closed position, and spring means for normally urging the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

7. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, a substantially rigid, smooth-surfaced core extending longitudinally within the marking nib from the inner end thereof to within a short distance from the outer marking end thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from one end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, spring means for normally urging said valve to closed position, and spring means for normally urging the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

8. A fountain marking device for volatile solvent dye-ink, comprising a solvent-tight dye-ink reservoir, a tip member adapted for solvent-tight removable engagement with said reservoir, said tip member having a first central longitudinal bore of substantial diameter adapted to receive and frictionally retain a marking nib, an absorbent fibrous marking nib having a diameter substantially the same as said first bore reciprocably mounted therein, a tight-fitting, rigid band encompassing the marking nib for a substantial portion of its length intermediate the ends thereof, a substantially rigid, smooth-surfaced core extending longitudinally within the marking nib from the inner end thereof to within a short distance from the outer marking end thereof, said tip member having a second central longitudinal bore of substantially smaller diameter than said first bore extending from one end thereof to said first bore to provide a connection permitting the flow of dye-ink from the reservoir to the fibrous marking nib, a valve at the inner end of the tip member for controlling the flow of dye-ink to said marking nib, a spring in the inner end of said first central longitudinal bore normally urging said valve to closed position and the marking nib to marking position with the outer end protruding from the outer end of said tip, said valve being displaceable to open position by pressure exerted longitudinally on the protruding end of the marking nib to permit a supply of dye-ink to flow from the reservoir into said first central longitudinal bore and to said marking nib.

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