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WRITING INSTRUMENT

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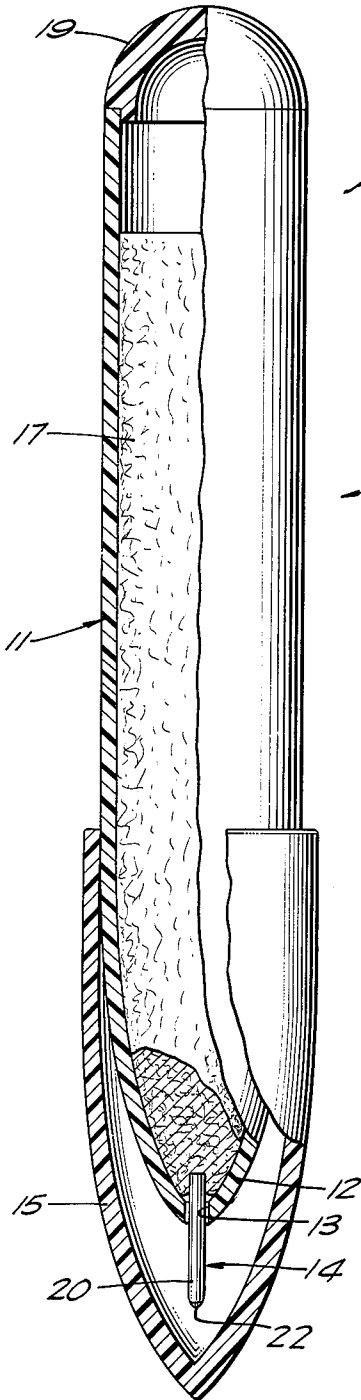


FIG. 1.

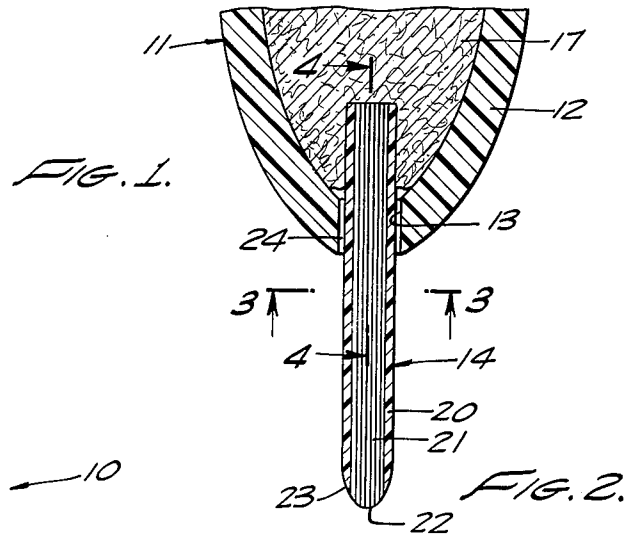


FIG. 3.

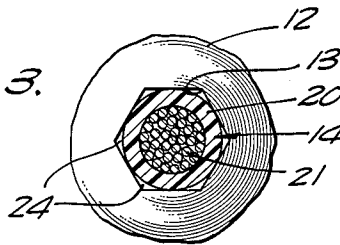
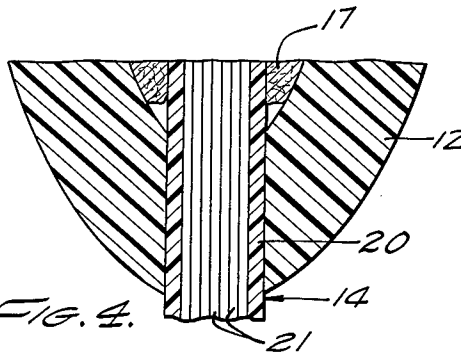


FIG. 4.



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WRITING INSTRUMENT

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21 Claims. (Cl. 15—563)

This invention relates to writing instruments and more particularly to an instrument of the type having a reservoir supply of ink in continuous communication with a stylus or writing nib comprising a very slender flexible bundle of fibers or filaments for feeding ink to the exposed end by capillary action and as needed for leaving a very narrow, thin mark upon the surface contacted, and which capillary feeding core is encapsulated except at its ends by a tubular shroud.

Proposals have been made heretofore to provide hand-held marking devices employing a thick-bodied relatively stiff fibrous nib formed of felting, wicking or the like and functioning to feed ink in a wide strip onto the surface being marked and employing the ink-feeding characteristics of felting and wicking. Writing devices of this type are used to advantage in many fields and serve admirably for marking with large or wide symbols, as for example, in the sign painting art and by merchants and artisans when marking rough surfaces as shipping cartons, lumber, building materials, parcel post packages and the like. Such markers, commonly referred to as fountain brushes, are quite unsuitable for fine work such as that desired for normal writing and accounting purposes requiring sharply defined, narrow, quick-drying lines produced by a nib incapable of flooding as essential characteristics. Felt nibs as heretofore proposed in marking devices have insufficient rigidity and wearing characteristics for practical use as a writing instrument if an attempt is made to slim the nib down to a slender small-diameter contour. The service life is totally unacceptable and the load-supporting characteristics are so small as to require the user to tense the muscles in an attempt to hold the nib lightly contacted with the paper or other writing surface thereby tiring the user after only a very short period of writing. If an attempt is made to sharpen a large cross-section nib of felting to provide a fine writing point, somewhat greater rigidity and supporting capacity is obtained but the sharp point wears away after a brief period of use and there is a pronounced tendency for the sharpened nib to flood as well as to produce a broad line unless the instrument is supported deftly with only the point proper in light contact with the writing surface.

With the foregoing shortcomings and disadvantages of prior proposals in mind, it is pointed out that it is a prime purpose of the present invention to provide an improved writing instrument retaining certain advantages of fibrous and felt-tipped fountain brush-type marking devices while avoiding many of the limitations, defects and shortcomings of the fountain brush. Thus there is provided by the present invention a simply constructed, inexpensive, lightweight hand-held writing instrument of the fountain type featuring a generally rigid writing nib comprising an extremely small diameter bundle of closely compacted filaments, fibers or other equivalent means for feeding ink by capillary action and featuring a thin-walled tubular shroud having numerous functions. Typically the capillary ink-feeding core of the nib may comprise a multiplicity of fine fibers cooperating to provide a large number of very fine capillary passages between their adjacent side walls and having little or no load-supporting capability by themselves, the latter important and essential requirement being performed by the encapsulating or surrounding shroud of thin-walled flexible material. For example, this shroud may comprise a suitable plastic

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immune to attack by the constituents of the ink and having wearing qualities greatly enhancing the wearing properties of the capillary core material. Only the opposite ends of this core are left uncovered, the inner ends being in intimate contact with the ink supply and the outer ends being exposed just sufficiently to convey the ink into contact with the surface being written upon. The end of the shroud is rounded to form a continuation of the wear-rounded exposed outer end of the core.

In normal usage the nib is held at an angle inclined to the surface being written upon with the result that the lowermost edge of the nib shroud forms a glide surface firmly and accurately supporting the writing force applied to the instrument and effective in holding the adjacent end portion of the capillary material in contact with the surface to apply ink thereto.

Accordingly, it is a primary object of the present invention to provide an improved writing instrument featuring a novel nib and capable of making a fine line imprint of predetermined width on a wide range of surfaces and irrespective of whether these surfaces are rough, porous, smooth, glossy, etc.

Another object of the invention is the provision of an inexpensive hand-held writing instrument having an elongated very small diameter nib featuring a capillary core encapsulated in a protective generally rigid shroud for the core, adding support and rigidity thereto and assuming a major portion of the wear-resisting characteristics of the nib assembly.

Another object of the invention is the provision of a writing instrument having a small diameter tubular nib mounted within the lower end thereof and designed to bear against the writing surface and to cooperate with a core filling in forming a multiplicity of capillary ink-feeding channels.

Another object of the invention is the provision of a nib for a writing instrument comprising a thin-walled tubular housing charged throughout its length with capillary ink-feeding means effective to supply ink as needed to the surface-contacting end of the nib.

Another object of the invention is to provide an ink-feeding nib comprising a seamless abrasion resistant plastic tube charged with fibrous material exposed at the opposite ends of the tube and forming a multiplicity of capillary ink-feeding channels.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated—

FIGURE 1 is an elevational view partly in section of a writing instrument incorporating the present invention;

FIGURE 2 is a fragmentary cross-sectional view on an enlarged scale taken through the nib-supporting portion of the instrument;

FIGURE 3 is a fragmentary cross-sectional view on an enlarged scale taken along line 3—3 on FIGURE 2; and

FIGURE 4 is an enlarged fragmentary sectional view taken lengthwise of the writing instrument at the junction of the nib with the main body, as is indicated by the line 4—4 on FIGURE 2.

Referring more particularly to FIGURE 1, there is shown one preferred embodiment of a writing instrument designated generally 10 embodying the features of the present invention. This instrument includes a tubular main body 11 of any suitable material such as molded plastic. Main body 11 has a tapering lower end 12 formed in its axial tip with a noncircular opening 13 supporting therein a nib 14. When not in use, nib 14 is preferably guarded by a protective cap 15 having a friction

fit with either end of the cylindrical main body of the instrument.

Body 11 is intended to be charged with a suitable writing fluid desirably retained by absorbent material 17. This material may consist of a wide variety of substances well known to the art, such as porous fibrous material, felting, a mass of inert granular particles and others. If desired, the upper end of body 11 may be provided with a removable cap 19 permitting recharging of material 17 with a new charge of ink after the initial charge has become exhausted.

Referring more particularly to FIGURES 2, 3, and 4, it will be understood that nib 14 constituting an important component of the present invention includes a generally rigid but slightly flexible open ended tube 20 enclosing a snugly compacted core of capillary ink-feeding material 21. The dimensions of the nib components are shown in exaggerated and greatly amplified scale to facilitate an understanding of the construction, a fact which will be appreciated when it is noted that the exterior or outer diameter of tube 20 is preferably not substantially greater than 50 mils and its internal diameter is about 35 mils. The thickness of the tube wall is, therefore, seen to be about 7 mils. The thickness may be varied depending upon the properties of the constituent material.

Although metal such as brass or aluminum may be employed for the nib, excellent results are obtained with extruded plastic materials immune to attack by the ink to be employed. Tetrafluoroethylene, known commercially under the trade mark Teflon, is particularly suitable because of its strength, toughness, unusually high resistance to abrasion and to attack by ink fluids, its long-wearing characteristics and its exceedingly low coefficient of friction.

Shroud 20 is charged with capillary ink-feeding material of any suitable character as, for example, a multiplicity of very fine fibers or filaments of either an absorbent or nonabsorbent character. More specifically it is found that excellent results are achieved using a core filling of untwisted 3700 denier, 200 filament nylon yarn, this material being drawn through the tube until it is completely charged with these filaments. The upper or interior end of the nib enclosed by holder 11 desirably projects upwardly into the absorbent ink-retaining material 17, or it may be cut off substantially flush with the adjacent end of encapsulating tube 20. The lower ends of the filaments project slightly beyond the outer or writing end of the nib and these are desirably rounded off generally in the manner indicated at 22 in FIGURE 2. The adjacent rim edge of shroud 20 is similarly rounded or chamfered to provide a smooth glide surface 23 merging with and forming a continuation of the rounded tip end 22 of the capillary material. It will, therefore, be recognized that surface 23 is a generally narrow frusto-conical band, a small area of which provides a glide surface or shoe which rides in contact with the surface being written upon as the pen is held in the conventional, normal inclined position with respect to this surface. Likewise it will be recognized that the adjacent rounded end 22 of the filaments is in contact with the writing surface and effective to feed ink to this surface in a very narrow band determined by the very small portion of the rigid glide surface 23 actually in contact with the writing surface. Furthermore, only a relatively small percentage of this glide surface can be brought into contact with the writing surface at any time and it is this small surface which determines the width of the line of ink left by the passage of the nib over the surface.

Since the shroud, rather than the core material, takes the applied writing force, the relatively flexible fibers constituting core 21 are not deflected and absorb little or none of either the friction or writing applied forces. In consequence the filament ends in contact with the surface are not spread by the writing pressure but are merely

maintained in very light contact with the surface, and this is true irrespective of the direction from the vertical to which the pen is inclined when starting to write.

Shroud 20 is the main component resisting wear of the nib. If selected from a material having a small coefficient of friction, as is desired, the shroud is found to be extremely long wearing and highly effective in protecting and prolonging the service life of core filling 21.

Another feature of the invention is best shown in FIGURES 2 and 3 and has reference to the mounting of nib 14 in main body 11. Preferably mounting opening 13 is noncircular in cross-section, such as of the hexagonal shape shown in FIGURE 3. The smaller diameter of this hexagonal opening is somewhat less than the exterior diameter of shroud 20 with the result that the shroud has a snug frictional fit within the opening yet leaves a plurality of voids or very small openings 24 serving as air vents to admit air as the ink supply is consumed during use of the instrument. The air vents also accommodate temperature and pressure changes without permitting leakage of the ink supply. Should nib 14 become damaged or unusable for any reason, it can be easily withdrawn and replaced by an identical replacement nib.

The mode of operation of the described writing instrument will be quite apparent from the foregoing detailed description of its components and their operative relationship to one another. As will be readily apparent, the tip of nib 14 may be applied to the surface to be written upon with any portion of glide surface 23 in contact with the writing surface and serving as a glide shoe. Varying writing pressures are absorbed substantially entirely by shroud 20 with but slight or imperceptible flexure of the nib body. Small scale repeated flexure of the nib transversely of its length does occur in normal writing but in an amount so small as to be well within the elastic limit of the nib assembly. Irrespective of this repeated flexure, the nib will instantly return to its original straight condition as the pressure is relieved and this is true even though extreme deflection of the nib occurs through accident or other cause.

Desirably absorbent material 17 is charged with an ink formulation which feeds readily by capillary action and which dries rapidly even on nonporous substrates such as glass, metal, plastics and the like nonporous surfaces, and which resists removal by a wide range of solvents. A suitable ink meeting these requirements consists of 10% ester gum, 5% oil soluble dye, and 85% toluene. Numerous other ink compositions having generally similar characteristics to those just mentioned and known to the art may also be used.

While the particular writing instrument herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A writing instrument having a main body provided with a chamber charged with ink-storing means there-within, an elongated flexible tubular writing nib having an end projecting outwardly from said main body with the interior end thereof in communication with said ink-storing means, said nib comprising a multiplicity of filaments cooperating to provide a capillary ink-feeding system between said ink-storing means and a writing surface when in contact with the outer end of said nib, and a relatively rigid impervious encapsulating shroud snugly enclosing said capillary system substantially throughout the length thereof exteriorly of said main body with its outer end adapted to contact the surface being written upon and functioning to lend writing rigidity to the outer end of

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said filaments and preventing evaporation and drying of ink from the sides of said nib.

2. A writing instrument as defined in claim 1 characterized in that the wear resisting characteristics of said shroud are at least greater than those of said filaments whereby the outer end of said shroud wears away automatically and as an incident to the use of the pen to produce writing thereby exposing new increments of said filaments and supplementing the wear resisting characteristics of said filaments in prolonging the service life of said nib.

3. A writing instrument having an elongated tubular main body charged with ink-storing means therewithin, a long slender flexible tubular writing nib supported in and projecting from one end of said main body with its inner end arranged to be supplied with ink from said ink-storing means, said nib being characterized by a core of fine elements arranged parallel to one another in closely compacted form effective to feed ink by capillary action from said ink-storing means past the exposed outer end of said elements onto a surface in contact with the exposed outer end of said nib as the nib is moved across said surface, and semi-rigid but flexible open-ended tubular shroud means enclosing substantially the full length of said fine elements exteriorly of said instrument body and constituting the means for holding said fine elements snugly and closely compacted therewithin and for lending flexible writing stability to said fine elements.

4. A writing instrument as defined in claim 3 characterized in that said main body is provided with fine bare air vent means through the wall of said main body exteriorly of said nib shroud and closely adjacent the connection of the latter to said instrument body.

5. A writing instrument as defined in claim 3 characterized in that said shroud is formed of thin-walled non-metallic material having sufficient flexibility to withstand repeated slight flexure without taking a set or fracturing.

6. A writing instrument as defined in claim 5 characterized in that said shroud has greater wear-resisting characteristics than said fine ink-feeding elements whereby the latter serve primarily to feed ink to the tip of the shroud in contact with the surface being written upon.

7. A writing instrument as defined in claim 3 characterized in that said shroud comprises a tube of flexible plastic material immune to attack by the ink writing fluid charged within said ink-storing means.

8. A writing instrument as defined in claim 3 characterized in that the exposed outer end of said nib is not substantially thicker than 125 mils.

9. A writing instrument as defined in claim 3 characterized in that said capillary ink-feeding elements comprise a small bundle of fine filaments arranged parallel to one another axially of said shroud with the interior ends thereof in intimate contact with said ink-storing means.

10. A writing instrument as defined in claim 3 characterized in that said ink-feeding elements enclosed by said shroud mutually cooperate to form a multiplicity of capillary passages effective to advance ink axially of said nib to spread a narrow line of ink onto a surface as the outer end of said nib is passed over a surface and irrespective of the position of said surface with respect to the end of the nib.

11. A writing instrument comprising a hollow tubular housing charged with capillary ink-storing means, a writing nib projecting from one end of said tubular housing, said nib comprising a thin-walled tube compactly and snugly enclosing capillary ink-feeding material comprising a compact flexible bundle of filaments which bundle is in contact at its inner end with said ink-storing means, the outer end of said bundle of ink-feeding material being

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semi-spherical in contour and terminating beyond but substantially at the outer end of said tube and being effective to feed ink onto a surface as the semi-spherical nib tip is moved along the surface.

12. A writing instrument as defined in claim 11 in that said nib is adjustable lengthwise of the end of said housing whereby a desired length of said nib can be exposed to vary the degree of flexibility of the nib to suit individual users.

13. A writing instrument as defined in claim 12 characterized in that said nib has a firm frictional fit in an opening through one end of said instrument housing and being forcibly adjustable axially of said opening, said frictional fit being effective to hold the nib firmly supported and against axial movement under normally applied writing pressure but being movable to a different position under deliberately applied pressure.

14. A writing instrument as defined in claim 13 characterized in the provision of minute atmospheric air vent means between the interior and exterior of said housing in an area in close proximity to said nib.

15. A nib adapted to be mounted in a holder for a supply of writing fluid, said nib comprising an elongated thin-walled slightly flexible tube open at its opposite ends, said tube having one end thereof rounded to provide a smooth glide surface when said nib is placed in contact with a surface to be written upon at a conventional writing angle for a hand-held writing instrument, said tubing being formed of semi-rigid wear-resisting material and being charged with a snugly-fitting flexible core comprising a multiplicity of filaments extending the length of said tube, the outer exposed ends of said filaments being contoured to provide an outwardly protruding semi-spherical surface merging smoothly with the similarly rounded glide surface on the outer end of said flexible tube and which core of filaments is effective to feed ink to a writing surface in contact therewith and with said glide surface.

16. A nib as defined in claim 14 characterized in that said thin-walled tube is formed of resilient nonmetallic material and capable of flexing repeatedly without assuming permanent deformation in response to changing load forces normally applied to nibs when in use.

17. A nib as defined in claim 14 characterized in that said thin-walled tube is seamless plastic material.

18. A nib as defined in claim 15 characterized in that said nib has an external diameter not in excess of 50 mils.

19. A nib as defined in claim 18 characterized in that the same has an internal diameter of approximately 35 mils.

20. A nib as defined in claim 19 characterized in that said tube is formed of flexible plastic material such as tetrafluoroethylene having a very low coefficient of friction.

21. A nib as defined in claim 19 characterized in that said core comprises untwisted nylon yarn.

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