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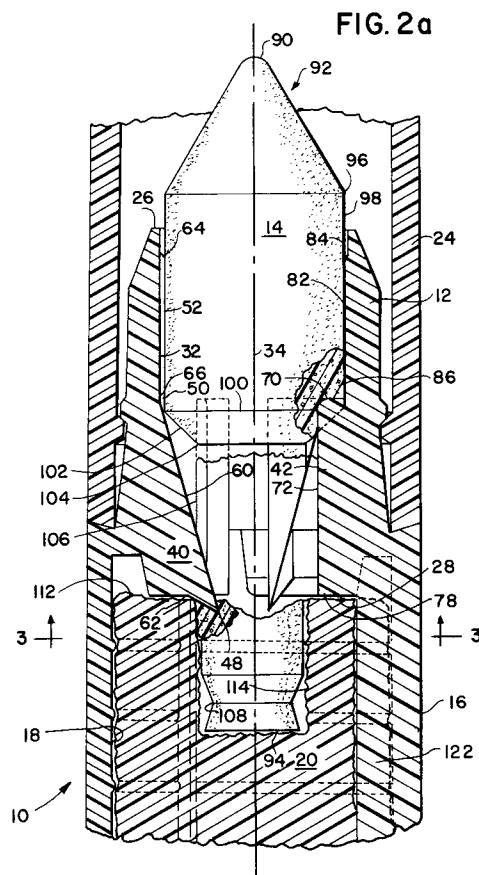
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⑤4 Fluid-dispensing instruments having barbed nib holders.

57 Fluid dispensing instrument (10), such as a writing instrument, comprising a nib holder (12) and a nib (14). The nib holder comprises a generally cylindrical inner wall (32) disposed between its front (26) and back (28) ends, having an opening at one end to receive a nib. Stops (42,44,46) limit the depth of axial insertion of a nib through the opening. Barbs (36,38,40) prevent axial withdrawal of a nib from the opening. The nib comprises a fluid dispensing tip (90) defining its front end and a body (92) made at least in part of resilient material defining its back end. When the writing instrument is assembled, the body is engaged by and resiliently deformed between the barb means and stop means. Also, a method of permanently securing a nib in the nib holder of a fluid dispensing instrument, comprising the steps of inserting the nib in the nib holder through the opening until an abutment of the nib engages a stop of the nib holder, applying an insertion force sufficient to compress the resilient part of the nib and thus move at least part of the nib axially in the nib holder, and removing the insertion force. When the insertion force is removed, the compressed part of the nib relaxes and the part of the nib which previously moved axially in one direction moves axially the other way. When this happens the barb of the nib holder engages and digs into the moving part of the body. Some residual tension will remain in the body after the insertion force is removed if the barbs engage sufficiently to prevent further axial movement of the nib body before the compressed resilient portion of the nib is fully re-

laxed.



## Background of the Invention

The present invention relates generally to an instrument for dispensing a line of fluid from a reservoir onto a surface when the instrument is drawn across the surface. The invention relates particularly to a writing and drawing instrument of the type having a nib, and more particularly to such an instrument in which the nib functions as a wick to transport ink from a reservoir to its writing tip.

In a conventional fluid-dispensing instrument having a wicking nib, the nib is inserted in a nib holder so its back end is in fluid communication with a fluid reservoir and its front end extends out of the nib holder and serves as a writing tip. The reservoir typically is a rigid extension of the nib holder which serves as a handle. The reservoir typically contains a transorb -- an absorbent body in which the fluid is absorbed. One such device is the familiar felt-tipped pen or marker.

In one common marker design, the nib holder and reservoir are made as one molded piece. The front end of the piece functions as the nib holder and has an opening through which the nib is inserted. The back end of the piece has a larger opening to receive the transorb and ink. The larger opening is permanently plugged after the transorb is inserted. One difficulty with this design is how to secure the nib in the nib holder so it is easy to insert when the pen is manufactured, yet difficult to either remove from the nib holder or push into the reservoir when the marker is in the hands of consumers (especially children).

U.S. Patent No. 3,089,182, issued to Lofgren on May 14, 1963, discloses a marking device in which the marking element 16, which may be felt or the like, is held within the tubular neck 22 by stakes such as 28 and 30 which are formed in the metal wall of the container by tools after the marking element is inserted, as illustrated in Fig. 8 and described in Col. 2, lines 53-60. The reference indicates that the illustrated simple, one piece container lowers manufacturing cost (Col. 1, lines 28-30).

U.S. Patent No. 3,684,389 was issued to Eron et al. on August 15, 1972. The writing nibs described in the reference are removable so they can be interchanged with other nibs. (See: the abstract and Col. 1, lines 53-58). Referring to Figs. 1 and 11 in particular, the reference shows protrusions 28 which are intended to engage a nib such as 24. Fig. 3 shows that the protrusions 28 are inclined inwardly toward the opening through which the nib is inserted.

U.S. Patent No. 3,003,181, issued to Rosenthal on October 10, 1951, teaches a marking device having a felt nib 16 retained in a channel 24 of a nib holder 20, which in turn is retained by a reser-

voir 10. The nib 16 extends axially beyond both ends of the nib holder 20. Col. 2, lines 55-62, indicates that the shoulders 48 of the inner portion of the nib are radially compressed when the nib is inserted in the holder 20 through the channel 24. The shoulders 48 spring out to lock the nib in place by engaging the annular face 30 of the nib holder. At the same time, the wings 38 at the other end of the nib engage the stop 40 to secure the nib in place.

The Olinsky U.S. Patent No. 4,229,115, issued October 21, 1980, is owned by the assignee of the present invention. This reference illustrates a nib for a writing or drawing instrument which is similar to the nib described herein.

U.S. Patent No. 4,500,222 was issued to Clading-Boel on February 19, 1985. This reference shows a writing instrument including a core or transorb which abuts against a writing ball. Figs. 1 and 2 show triangular-section centering ribs 17. Col. 2, lines 55-64 of the reference indicate that these ribs cut into the core and radially locate and axially retain the core. The core is inserted at the back end of the pen, remote from the ball, as stated at Col. 1, lines 33 and 34.

U.S. Patent No. 4,568,214 was issued to Abbe et al. on February 4, 1986. A nib 1 has a flange 101 which is captured by a shoulder of the outer barrel and an abutment plate of an inner barrel of the device to hold the nib in place. The nib 1 is made of a porous synthetic resin, as disclosed in Col. 2, lines 13-15 of the specification. It appears that the nib 1 and associated parts are inserted in the barrel before the plug 9 is in place, through the rear end of the barrel.

U.S. Patent No. 4,583,875, issued to Manusch et al. on April 22, 1986, describes a writing or drawing instrument having a nib holder 20, one end of which is formed into a closed membrane 6 which has a stop 18 integrally formed. The membrane 6 is pierced by axial insertion of a tool shaped like the trunk of the nib. The stop 18 prevents further insertion of the nib. The reference discloses that, after the membrane 6 is pierced, the residual portion of the membrane engages the nib to keep it in place (Figs. 1 and 4, Col. 2, lines 33-41, Col. 5, lines 12-19, Col. 2, lines 61-Col. 3, line 5). Returning to Fig. 1, the ribs 3 are triangular in section (Col. 3, lines 42-52). The reference indicates that, apart from the nib, the pen can be molded in one piece with two cores (Col. 5, lines 3-11). The reference claims at Col. 6, lines 14-19, that a sintered powder nib can be used, and that no retaining pin or adhesive is necessary to hold the nib in place.

The Smit patent, U.S. Patent No. 4,602,886, issued to July 29, 1986 describes apparatus for advancing a wax crayon out of its case.

## Objects of the Invention

One object of the present invention is a fluid dispensing instrument having a nib and a nib holder which are substantially irreversibly joined in fixed relation without the need for a separate pin or other fastener to join them.

An additional object of the invention is a method for substantially irreversibly joining the nib and nib holder of a fluid dispensing instrument simply by thrusting the former into the latter, without additional forming steps such as staking, puncturing, machining, and the like.

Another object of the present invention is a fluid dispensing instrument which has a nib holder, handle, and reservoir formed as a single, as-molded part; a nib also formed as a single, as-molded part; and means molded into the two parts for substantially permanently joining them.

Yet another object of the invention is a fluid dispensing instrument having a nib made at least partially of resilient material which functions like a built-in spring engaged between the nib and nib holder.

Other objects of the invention and ways of achieving them will become apparent from the present drawings and description.

## Summary of the Invention

One aspect of the present invention is a fluid dispensing instrument comprising a nib holder and a nib. The nib holder comprises a front end, a back end, and a generally cylindrical inner wall disposed between its front and back ends. An insertion opening is provided at one end of the nib holder to receive a nib. (The nib protrudes from an opening at the front of the nib holder in the completed instrument.) The nib holder has stop means located in fixed relation to the inner wall and adapted to limit the depth of axial insertion of a nib through the opening. Barb means located in fixed relation to the inner wall is adapted to permit axial insertion but prevent axial withdrawal of a nib through the insertion opening. The gradual slope angles of the barbs in the preferred embodiment guide the nib into the barrel, preventing misalignment with the reservoir chamber.

The nib comprises a fluid dispensing tip defining its front end, a body made at least partially of resilient material defining its back end, and an abutment to engage the stop means of the nib holder. When the writing instrument is assembled, the body of the nib is engaged and resiliently deformed by the barb means and stop means.

Another aspect of the invention is a method of permanently securing a nib in the nib holder of a fluid dispensing instrument, comprising the steps of

providing a nib and a nib holder, each as described above, and inserting the nib in the nib holder through the insertion opening in the nib holder.

The inserting step is started by inserting the nib into the opening of the nib holder until the abutment of the nib engages the stop of the nib holder. The inserting step is completed by applying an insertion force sufficient to compress the resilient part of the nib and thus move at least part of the body of the nib further axially in the nib holder. When this insertion force is removed, the compressed part of the nib relaxes, the part of the nib which previously moved further axially reverses direction, and the barbs of the nib holder engage and dig into the moving part of the nib body. Some residual tension or compression will remain in the body of the nib after the insertion force is removed if the barb engages sufficiently to prevent further movement of the nib body before the compressed resilient portion of the nib is fully relaxed.

Several advantages of the invention are as follows. The nib holder, handle, and reservoir of the fluid-dispensing instrument can be made as a single molding which does not require machining or forming operations before it can receive the nib. The dispensing instrument is thus assembled easily from a small number of easily formed components. No forming step or fastener is needed to join the nib and nib holder, yet the nib is permanently lodged in the nib holder.

## Brief Description of Drawings

Fig. 1 is front elevation of one embodiment of a fluid dispensing instrument according to the present invention, with the nib and cap removed for clarity of illustration.

Figs. 2a and 2b are, respectively, fragmentary front and rear portions of a section taken along line 2-2 of Fig. 1, with the cap, nib, transorb, and end plug of the instrument in place.

Fig. 3 is a section taken along line 3-3 of Fig. 2, with the transorb and nib removed for greater clarity of illustration.

## Detailed Description of the Invention

While the invention will be described in connection with one or more preferred embodiments, it will be understood that the invention is not limited to those embodiments. On the contrary, the invention includes all alternatives, modifications, and equivalents as may be included within the spirit and scope of the appended claims.

Referring to the Figures, in this embodiment a fluid dispensing instrument generally indicated at 10 comprises a nib holder 12, a nib 14, a generally tubular handle 16, a reservoir 18 refined by the

inner wall of the handle 16, a transorb or absorbent body 20, a plug 22, and a cap 24. In this embodiment, the nib holder 12, handle 16, and reservoir 18 are all a single molded part, while the nib 14, transorb 20, plug 22, and cap 24 are separate parts.

The nib holder 12 comprises a front end defined by an opening 26, a back end 28, and a generally cylindrical inner wall 32 disposed between the front and back ends 26 and 28. The inner wall 32 shown here has a substantially round cross-section, but the shape of the cross-section is not critical herein. The prior art illustrates nibs having square, rectangular, triangular or other cross-sections, and nib holders having correspondingly sectioned interior walls. A longitudinal axis 34 is defined by the common center lines of the nib holder 12, nib 14, handle 16, and associated parts of the illustrated embodiment.

Referring now in particular to Figs. 1 and 2a, the parts of the illustrated embodiment which cooperate with the inner wall 32 to secure the nib 14 are the barbs 36, 38, and 40 and the stops 42, 44, and 46. The number of barbs and stops is not critical; as few as one or as many as desired of each can be provided within the scope of the present invention. Although the barbs and stops 36-46 as illustrated are secured to and extend from the inner wall 32, it is not necessary that these be located there. It is only necessary that they be located in fixed relation to the inner wall 32. For example, if the nib 14 and transorb 20 are integral or capable of moving together axially, the barbs 36-40 and the stops 42-46, or any of them, can be located in the reservoir 18.

In this embodiment, the barbs 36-40 and the stops 42-46 alternate circumferentially about the axis 34. While the cooperating barbs and stops could be located one behind the other or in other relationships, this alternating circumferential relationship facilitates the molding of the barbs and stops as integral parts of the nib holder 12 in a single molding operation, without the need for subsequent forming, cutting, or other material moving steps. The need for "lost wax" or other precision molding methods is also avoided.

Each barb, such as 40, has a nib engaging end such as 48 which extends inward from the inner wall 32 toward the axis 34. In this embodiment, the barb 40 also has a front end 50 merging with an axial rib 52, front facets 54 and 56, a rear facet 58, and an edge 60 dividing the facets 54 and 56. The root of the barb 40 is integral with the inner wall 32. In this embodiment, each rear facet 58 is inclined toward the rear of the instrument 10 from its root 62 to the nib engaging end 48, increasing the sharpness of the nib-engaging end 48 and its tendency to penetrate the nib 14.

Each axial rib, such as 52, has a triangular section with its base at the inner wall 32 and its apex extending radially inwardly toward the axis 34. Thus, each barb such as 40 can be regarded as an axial extension of an axial rib such as 52. The ribs such as 52 engage the nib 14 to center it within the inner wall 32. The rib 52 is further defined by its front end 64 and its back end 66, which are axially separated. With the barb 40 and rib 52 so aligned, the apex of the rib 52 merges with the edge 60 of the barb 40 and with the nib engaging end 48.

Each of the stops 42, 44, and 46 is identical in this embodiment. For brevity, only the stop 42 will be described in detail here. The stop 42 projects toward the axis 34 from the inner wall 32. The stop 42 has a front surface 70, an inner surface 72, sides 74 and 76 (with reference here to Fig. 1), and a rear surface 78. The front surface 70 is approximately square in cross-section, so it will resiliently deform the nib 14 instead of cutting into its surface. While the stop 42 as illustrated projects inwardly from the inner wall 32, in another embodiment the stop 42 could project perpendicularly away from the axis 34, or could be located further back in the instrument 10. As an extreme example, if the transorb 20 and nib 14 move axially as a unit or are one part, the front surface 79 of the plug 22 can serve as such a stop within the scope of the present invention.

The stop 42 also lies behind an axial rib 82 having a front end 84, a back end 86, and a sharp, axially extending edge lying between the ends 84 and 86. This rib has substantially the same dimensions as the rib 52. However, its back end 86 ends abruptly at the surface 70, instead of merging with the inner surface 72 of the stop 42. Thus, in this embodiment a total of six axial ribs are provided, at intervals of 60 degrees, to center and axially guide the nib 14. The surface 70 of the stop 42 lies substantially forward of the nib-engaging end 48 of the barb 40. This relationship is not essential to the present invention. The stops and barbs could be exchanged and still function.

The nib 14 is similar to the nib described in previously-cited U.S. Patent No. 4,229,115. Like the nib shown in the '115 patent, the present nib 14 has a fluid-dispensing tip 90 defining its front end and a body generally indicated at 92 which is defined as the entire nib from behind its fluid dispensing tip 90 to its back end 94. The location of the division between the tip 90 and the body 92 is not significant, and does not necessarily lie at a point of discontinuity such as the edge 96. The nib 14 further comprises a barrel 98 which is defined here, for convenience only, as the portion of the nib 14 between the front edge 96 and a back edge 100. The surface of the barrel 98 between the edges 96 and 100 is substantially cylindrical. Be-

hind the barrel 98, in this embodiment, is a conical abutment 102 lying between the edge 100 and the edge 104 as illustrated in Fig. 2.

In this embodiment, the nib 14 is nominally entirely symmetrical about the axis 34. However, when the nib 14 is inserted in the nib holder 12, as shown in Figure 2, the abutment 102 is forced against the front surface 70 so the front surface 70 of the stop such as 42 resiliently deforms (here, compresses) the abutment 102 axially forward from its relaxed position. (Its relaxed position is shown in phantom lines in relation to the stop 70.) At the same time, the portions of the abutment 102 axially in line with the ends such as 48 of the barbs are substantially undeformed, as illustrated in Fig. 2. The cylindrical surface of the barrel 98 is received by the inner wall 32, and the ribs such as 52 and 82 indent the cylindrical surface.

Looking further back on the body 92 of the nib 14, the region behind the back edge 104 of the abutment 102 is a trunk 106 which is generally cylindrical, except that its rear end is pinched at the groove 108. The groove 108 is an artifact of the molding process. In this embodiment, the trunk 106 has a smaller diameter than the barrel 98. The abutment 102 defines a shoulder between the barrel 98 and the trunk 106. The trunk 106 has two functions. First, its cylindrical surface is impaled by the nib-engaging end 48 of the barb 40, as illustrated in Fig. 2. Second, the trunk 106, as well as the barrel 98, wicks fluid from the transorb 20 to the tip 90.

The transorb 20 is an absorbent body which is inserted into the reservoir 18 through the back end 110 before the plug 22 is inserted. The front end 112 of the transorb 20 butts against the stop formed by the back end 28 of the nib holder 12 in this embodiment. The back end 94 of the nib 14 is received within a cylindrical recess 114 in the front end 112 of the transorb 20 in good fluid transfer relationship. The nib 14 and transorb 20 could be and sometimes are provided as a single member, but it is better to provide two coupled members, as illustrated, because the nib 14 must be much harder in order to withstand the pressure of writing or other fluid dispensing operations in which the instrument 10 is drawn across a surface.

In this embodiment, the transorb stop defined in part by the back ends such as 28 of the stops such as 42 is not circumferentially continuous. It is further defined by the three abutments shown in Fig. 1 as 116, 118, and 120. There are circumferential gaps between each stop such as 42 and the flanking abutments such as 116 and 118. These gaps, as well as the groove (15) shown in the nib of U.S. Patent No. 4,229,115, which is omitted here for clarity of illustration, convey ambient air between the nib 14 and the inner wall 32.

As is conventional, the transorb 20 is spaced from and centered within the reservoir wall 18 throughout at least the forward part of its length by ribs 122, 124, and 126 to convey air between the transorb 20 and the wall 18 to the back of the instrument 10. It is necessary to introduce air in this manner to replace the fluid lost during dispensing. Otherwise, a partial vacuum would develop within the writing instrument 10 as fluid was dispensed, stopping the flow of fluid to the fluid dispensing tip 90 of the nib 14.

In the illustrated embodiment, the portion of the nib 14 forward of the edge 96 protrudes beyond the front end 26 of the instrument 10, giving the nib holder 12 the appearance of an ordinary pen or pencil which has a conical writing tip. While this construction is aesthetically pleasing, the edge 96 could be shifted forward or back with respect to the front end 26 of the nib holder 12 without departing from the present invention.

The nib 14 can be made of any porous, resilient material. The material of the nib 14 is resilient because it will deform when compressed or stretched and will return to its original dimensions when the compressing or stretching force is released and the nib is allowed to relax. Three examples of nibs which are both resilient and porous enough to serve the present purposes are ordinary felt nibs, sintered particle nibs, and bonded fiber nibs.

Sintered particle nibs can be made from crystals of ultra high molecular weight polyethylene which are oriented, consolidated, and bonded by extrusion to form a solid body having a network of interstitial spaces between the crystals. The degree of bonding is sufficient to provide resilience and hardness, without obstructing the interstitial spaces. The interstitial spaces wick ink longitudinally through the nib.

Bonded fiber webs are made by bonding and extruding a tow of parallel fibers made of ultra high molecular weight polyethylene to form a rod of longitudinally oriented fibers. The rod can be machined to form a resilient nib having the preferred construction. Interstitial spaces between the fibers wick ink longitudinally through the nib.

Due to the resilience of the body of the nib 14, particularly the portion of the nib 14 which is forward of the abutment 102, the nib 14 itself functions as spring means operatively engaging the stops 42 of the nib holder 12 for urging the body 92 of the nib 14 forward into engagement with the nib engaging end 48 of each barb such as 40.

In this embodiment, the nib 14 is positioned so its barrel 98 is received by the inner wall 32 of the nib holder 12 forward of the stops 42, 44, and 46. The trunk 106, on the other hand, is received by the inner surfaces such as 72 of the stops such as

42. The inner surfaces such as 72 define a passage of reduced diameter which guides the trunk 106 and locates it in the center of the fluid dispensing instrument 10, so the center line of the nib 14 coincides with the axis 34.

The preferred method of permanently securing the nib 14 in the nib holder 12 of the fluid dispensing instrument 10 comprises the steps of providing the nib holder and nib previously described, aligning them on the axis 34 with the nib 14 in front of the nib holder 12, and inserting the body of the nib 14 into the space enclosed by the inner wall 32 of the nib holder 12, via the axial opening defined in the front end 26 of the nib holder 12. The nib is inserted sufficiently that at least a portion of the body 92 is lodged in the inner wall 32; the barbs 36, 38, and 40 engage the body 92 of the nib 14; and the abutment 102 of the nib 14 abuts the stops 42, 44, and 46 of the nib holder 12. In this embodiment, this first step is accomplished by inserting the nib 14 sufficiently that the abutment 102 just touches the surfaces such as 70 of the stops such as 42.

In the next step of the method, an axial force is exerted on the nib 14 in the vicinity of the fluid dispensing tip 90, as with a ram having a surface complementary to that of the conical surface between the fluid dispensing tip 90 and the front edge 96. This axial force urges the nib 14 further into the opening defining the front end 26, compressing the abutment 102 of the nib 14 forward of the abutment 102 and urging the nib 14 axially back against the stops such as 42. This axial force also urges the trunk 106 of the nib 14 further back in the nib holder 12.

In the next step in assembling the instrument 10, the axial force applied in the previous step is removed, thereby allowing the resiliently compressed portion of the nib 14 forward of the abutment 102 to expand axially, thereby urging at least a part of the body of the nib 14, and here in particular the trunk 106, axially forward. As a result, the barbs such as 48 cut into and penetrate beneath the surface of the trunk 106. This is illustrated in Fig. 2.

In the preferred mode of practicing the invention, the portion of the nib 14 in front of the abutment 102, which has been compressed by the axial force, will not be fully relaxed when the nib engaging ends 48 of the barbs have sufficiently engaged the cylindrical surface 106 and underlying portions of the trunk 106 to stop the trunk 106 from moving forward. As a result, when the axial force between the nib 14 and nib holder 12 is no longer being applied, the barrel 98 will be urged axially forward by the resilience of the compressed material ahead of the abutment 102, while the part of the body 92 between the stops such as 42 and the

nib engaging ends such as 48 of the barbs will be in tension, and thus resiliently stretched, urging the nib 14 back.

Both the compressed and the stretched parts of the body 92 function as spring means. The resilient expansion of the trunk 106 will substantially entirely counteract the resilient compression of the nib 14 against the stops such as 42. As a result of this dynamic balance, the nib 14 will remain securely impaled on the barbs such as 40, thus preventing the nib 14 from being removed from the nib holder 12 except by breaking the nib 14 or the nib holder 12.

The positions of the barbs such as 40 and stops such as 42 can be exchanged, within the scope of the invention. In such an embodiment, the portion of the body 92 between the barbs and stops will be resiliently compressed after the axial force is removed, while the portions of the body 92 forward of the barbs and behind the stops will be unstressed.

The barbs and stops can also be reversed (i.e. rotated 180 degrees about an axis intersecting and perpendicular to the axis 34) and the nib 14 can be inserted through an opening at the back of the nib holder 12 without departing from the present invention. In the assembled instrument 10, the nib 14 will protrude through a second opening at the front of the nib holder 12, as in the illustrated embodiment.

It is contemplated that this fluid dispensing instrument will have a permanently inserted nib, held by interior components molded into the nib holder 12. Thus, there is no need for a separate staking step or for the insertion of a pin or other part to retain the nib in the nib holder. Furthermore, a fluid dispensing instrument has been described which has a body 10 molded as a single part, and which requires no additional operation such as punching, cutting, or the like to enable it to permanently engage a separately formed nib.

## Claims

1. A fluid dispensing instrument comprising:
  - a. a nib holder comprising a front end; a back end; a generally cylindrical inner wall disposed between said front and back ends and defining an axis; an opening in one said end; stop means located in fixed relation to said inner wall and adapted to limit the depth of axial insertion of a nib; and barb means located in fixed relation to said inner wall and adapted to prevent axial withdrawal of a nib; and
  - b. a nib comprising a fluid dispensing tip defining its front end and a body made at least partially of resilient material defining

its back end, said body being engaged and resiliently deformed by said barb means and said stop means to secure said nib in place.

2. The fluid dispensing instrument of claim 1, wherein said stop means comprises at least a first stop, and wherein said barb means comprises at least a first barb having a forward end and a nib-engaging end, the latter extending backward in relation to the front end of said nib holder.
3. The fluid dispensing instrument of claim 2, wherein said nib holder is a single molded plastic part.
4. The fluid dispensing instrument of claim 2, wherein said first barb is secured to said inner wall.
5. The fluid dispensing instrument of claim 2, wherein said nib holder further comprises second and third barbs, each fixed in relation to said inner wall and each having a forward end and a nib-engaging end, the latter extending backward in relation to the front end of said nib holder, said first, second and third barbs being circumferentially spaced in relation to said inner wall.
6. The fluid dispensing instrument of claim 2, wherein said nib holder further comprises at least a first axial rib fixed to said inner wall and projecting from said inner wall into engagement with the body of said nib, said first rib having front and back ends.
7. The fluid dispensing instrument of claim 6, wherein said first barb is an axial extension of the back end of said first axial rib.
8. The fluid dispensing instrument of claim 6, wherein said first axial rib has a sharp edge extending axially and projecting inward with respect to said inner wall for engaging the body of said nib.
9. The fluid dispensing instrument of claim 8, wherein the edge of said first axial rib merges with the nib-engaging end of said first barb.
10. The fluid dispensing instrument of claim 2, wherein said first stop is fixed to and projects inwardly from the inner wall of said nib holder.
11. The fluid dispensing instrument of claim 2, further comprising second and third stops lo-

cated in fixed relation to said inner wall, said first, second, and third stops being circumferentially spaced.

- 5 12. The fluid dispensing instrument of claim 11, further comprising second and third barbs, each located in fixed relation to said inner wall and each having a nib-engaging end extending backward in relation to the front end of said nib holder, said first, second and third barbs being circumferentially spaced about the axis of said inner wall.
- 10 13. The fluid dispensing instrument of claim 12, wherein said barbs and said stops alternate circumferentially about the axis of said inner wall.
- 15 14. The fluid dispensing instrument of claim 2, wherein said first stop is located forward of the nib engaging end of said first barb.
- 20 15. The fluid dispensing instrument of claim 2, wherein the body of said nib comprises a trunk defining its rear end and a barrel disposed between said trunk and said fluid dispensing tip.
- 25 16. The fluid dispensing instrument of claim 15, wherein said barrel has a larger diameter than said trunk.
- 30 17. The fluid dispensing instrument of claim 15, wherein said body includes at least a first abutment for receiving said first stop.
- 35 18. The fluid dispensing instrument of claim 15, wherein said barrel is received within said inner wall forward of said first stop.
- 40 19. The fluid dispensing instrument of claim 2, wherein a resilient portion of said nib is located at least partially substantially forward of said first abutment and is resiliently compressed axially, thereby urging said first abutment toward said first stop.
- 45 20. The fluid dispensing instrument of claim 2, wherein said resilient portion of said nib is located at least partially substantially behind said first abutment and is resiliently expanded axially, thereby urging said first abutment toward said first stop.
- 50 21. The fluid dispensing instrument of claim 2, further comprising a handle on which said nib holder is mounted.
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22. The fluid dispensing instrument of claim 21, wherein said handle is generally tubular and has a cylindrical inner wall enclosing a reservoir in fluid communication with the body of said nib. 5
23. The fluid dispensing instrument of claim 22, wherein said handle and said nib holder are a single molded part. 10
24. The fluid dispensing instrument of claim 22, further comprising a transorb disposed within said reservoir in fluid transfer contact with the body of said nib. 15
25. A fluid-dispensing instrument comprising:
- a. a one-piece nib holder comprising a front end; a back end; a generally cylindrical inner wall between said front and back ends; an opening at said front end; a plurality of circumferentially spaced stops secured to said inner wall; a plurality of circumferentially-spaced axial ribs fixed to and extending inward with respect to said inner wall, each said rib having axially spaced front and back ends and a sharp edge extending axially and projecting inwardly from said inner wall for slidably engaging the body of a nib; and a plurality of circumferentially-spaced barbs secured to said inner wall axially behind and circumferentially alternating with said stops, each of said barbs having a nib-engaging end extending backward in relation to the front end of said nib holder; and 20
  - b. a nib made of axially resilient material and comprising a fluid-dispensing tip defining its front end; a body defining its back end and comprising a trunk having at least a portion lodged within said inner wall behind said plurality of stops and a barrel between said fluid-dispensing tip and said trunk received in said inner wall forward of said plurality of stops and having a larger diameter than said trunk; an abutment defined by a shoulder where said barrel and said trunk adjoin for receiving the stops of said nib holder; said nib being axially expanded between said stops and said barbs for urging at least a portion of the body of said nib forward into engagement with the nib-engaging ends of said barbs. 25 30 35 40 45 50
26. A method of securing a nib in the nib holder of a fluid dispensing instrument, comprising the steps of: 55
- a. providing a nib holder comprising a front end; a back end; a generally cylindrical

inner wall disposed between said front and back ends and defining an axis; an insertion opening at one of said ends; stop means located in fixed relation to said inner wall and adapted to limit the depth of axial insertion of a nib; and barb means located in fixed relation to said inner wall and adapted to prevent axial withdrawal of a nib;

- b. providing a nib comprising a fluid dispensing tip defining its front end and a body made at least in part of resilient material defining its back end;
- c. inserting the body of said nib into the inner wall of said nib holder sufficiently that at least a portion of said body is lodged in said inner wall, said barb means engages said body, and said body abuts said stop means;
- d. resiliently axially compressing at least a part of said nib by applying an axial force which urges said nib axially against said stop means; and
- e. removing said axial force, thereby allowing the resiliently compressed portion of said nib to expand axially, thereby urging at least a part of the body of said nib axially into engagement with said barb means.

27. The method of claim 27, further comprising the preceding step of forming said nib holder as a single molded part

28. The method of claim 27, wherein said opening is in the front end of said nib holder, said stop means prevents insertion of said nib through said opening, and said barb means prevents withdrawal of said nib through said opening.



FIG. 1

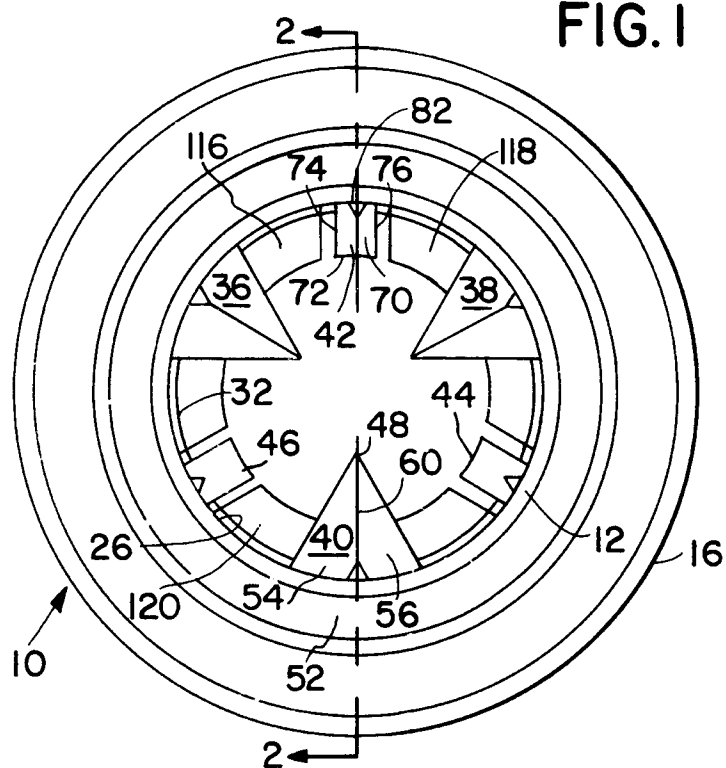


FIG. 3

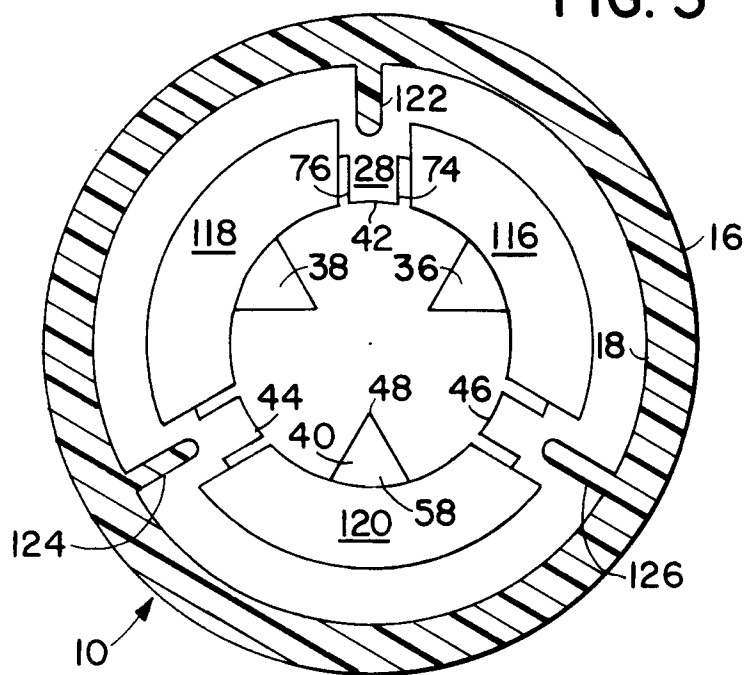


FIG. 2a

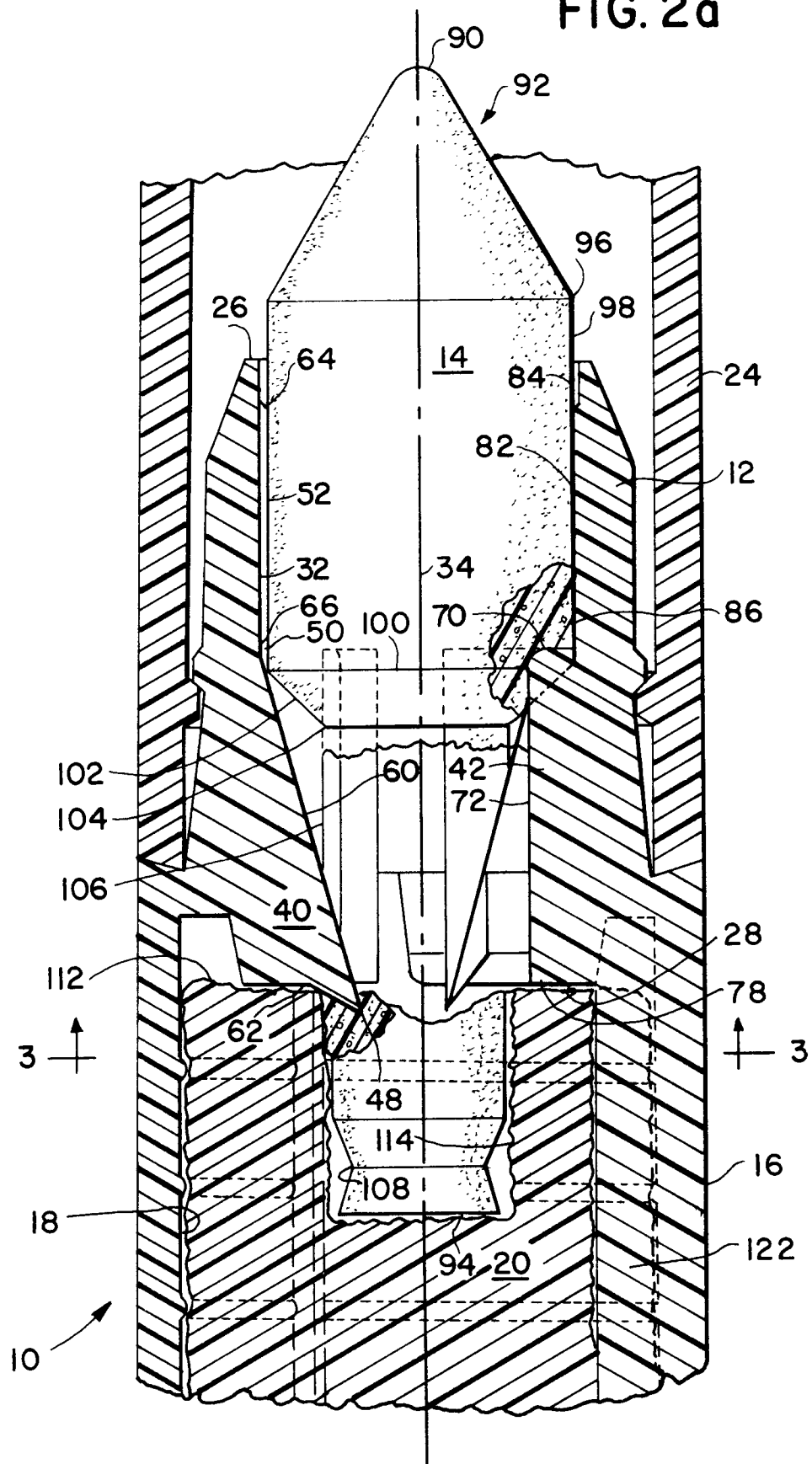
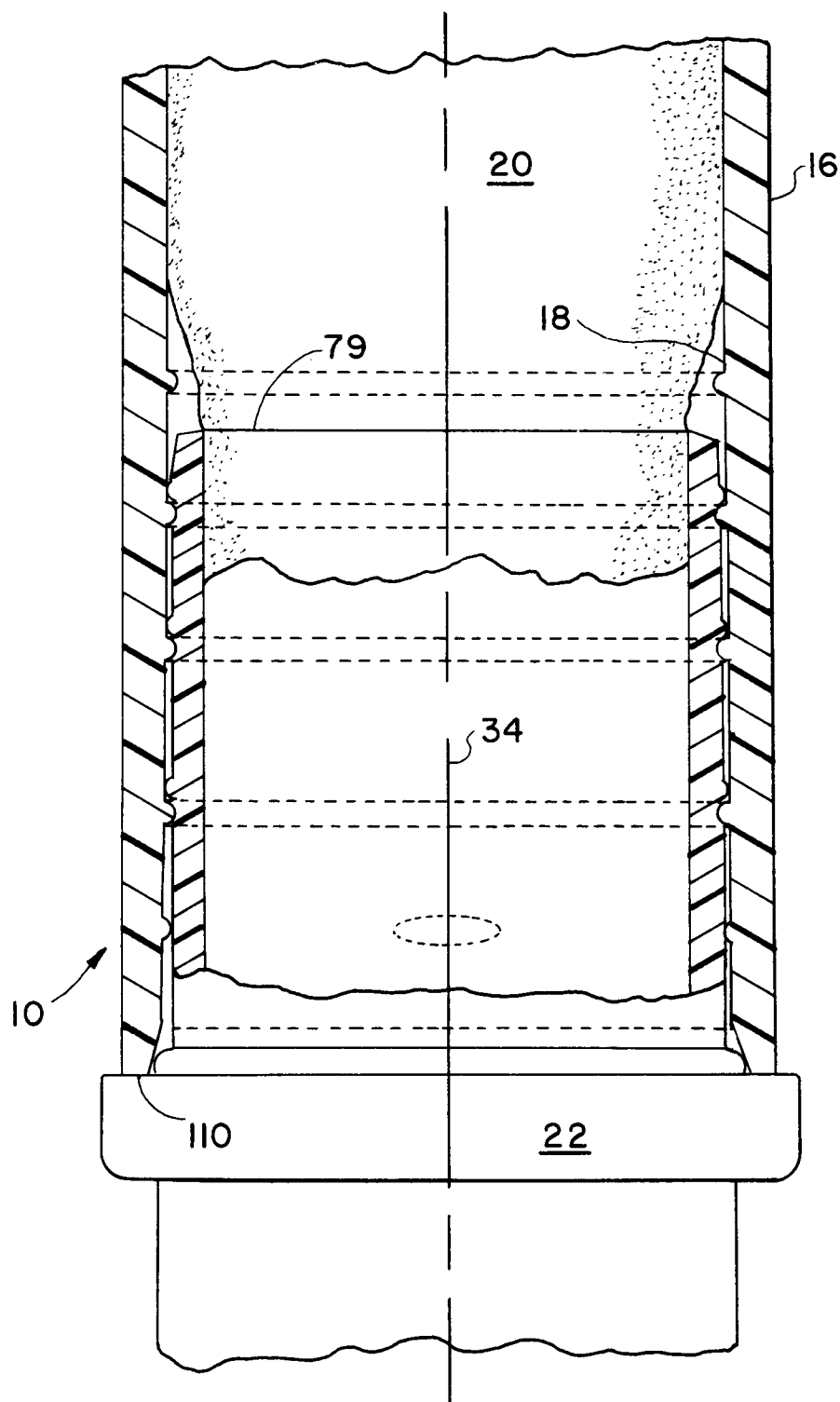


FIG. 2b





European Patent  
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## EUROPEAN SEARCH REPORT

Application Number

EP 92 10 0780

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2 319 942 (FABER-CASTELL)  * page 3, paragraph 5 - page 5, last paragraph; claim 5; figures *	1-7, 10, 11, 12, 14, 21-24, 26-28	B43K8/02
Y	---	8, 9	
A	---	19, 20, 25	
D, Y	US-A-4 500 222 (CLADING -BOEL) * column 1, line 67 - column 3, line 32; figures *	8, 9	
A	---		
A	GB-A-1 350 320 (NOGUCHI)  * page 2, line 65 - page 3, line 66; figures *	1-6, 8, 10, 14-18, 21-28	
D, A	US-A-4 583 875 (MANUSCH ET AL.)  * column 4, line 52 - column 6, line 10; figures *	1-6, 8, 10, 14-18, 21-28	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	---		B43K
A	GB-A-1 086 310 (KABUSHIKI KAISHA) * page 1, line 43 - line 67; figures *	1, 2, 4, 5	
A	---		
A	GB-A-2 067 475 (WAITE & SON) * abstract; figures *	1	
D, A	---		
D, A	US-A-4 229 115 (OLINSKY) * abstract; figure 1 *	15-17	
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07 MAY 1992	Examiner PERNEY Y.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document  T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			