

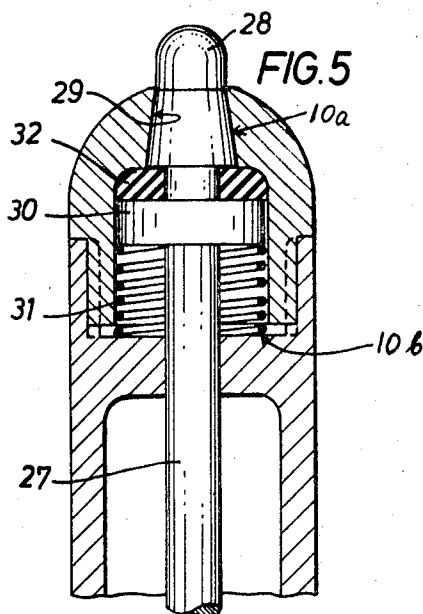
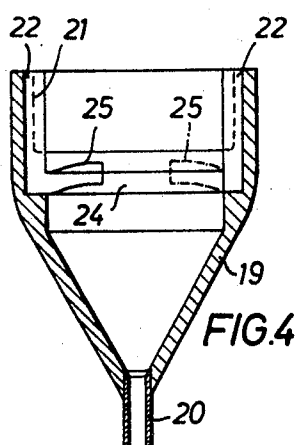
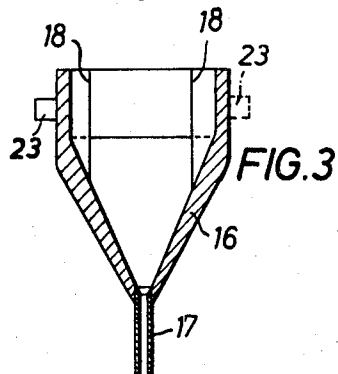
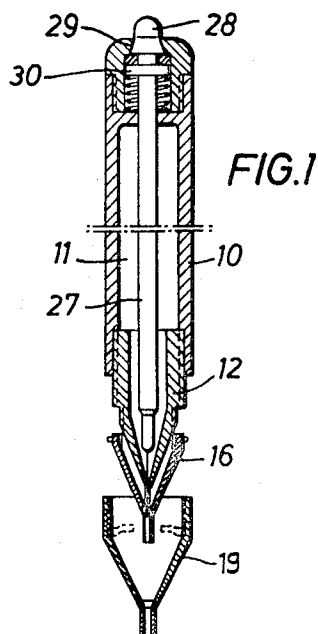
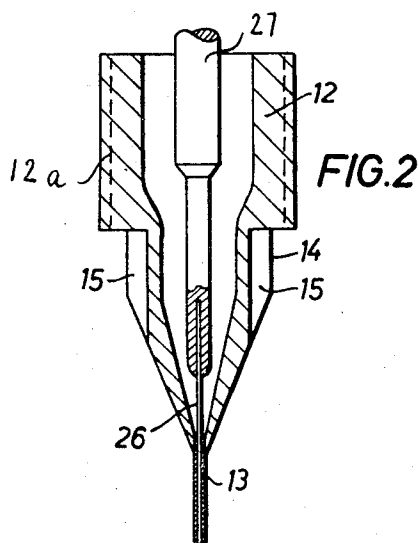
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3,467,477

MARKING DEVICE

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3,467,477

MARKING DEVICE

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6 Claims

ABSTRACT OF THE DISCLOSURE

A barrel defines an inner chamber which contains a supply of marking fluid. An applicator unit is mounted on one end of the barrel and comprises at least two small tubes which coaxially surround one another and of which at least the inner communicates with the marking fluid supply, the outer tube being axially movable with respect to the inner tube and surrounding the same with slight clearance so that its front face can be advanced into the plane of the front face of the inner tube, or forwardly therebeyond, thereby varying the cross-sectional area of the open front end of the fluid supply passage through which fluid escapes, and thus varying the width of a mark made with the marking device.

Background of the invention

The present invention relates generally to marking devices, and more particularly to marking devices having a small tube which defines a passage from which the marking fluid issues. Still more particularly, the present invention refers to a drafting pen.

In marking devices of the general type outlined above, and particularly in drafting pens, it is known to provide a barrel which contains in an internal chamber thereof a supply of marking fluid, which for the sake of convenience will hereafter be referred to as ink. Mounted in the front end of the barrel is a small tube which is arranged so as to extend axially of the barrel and to have its front end project outwardly therebeyond. The rear end of the tube communicates with the ink supply within the barrel and the ink thus can issue from the front end of the tube. The width of the marking which can be made with this type of marking device is substantially identical with the maximum dimension of the cross-sectional area at the outlet of the tube; that is, the diameter in the case of a cylindrical tube.

Such marking devices, for the sake of brevity hereafter called pens, have been found generally to be very satisfactory. They do, however, suffer from some drawbacks, one of which is the fact that the width of the marking which can be made with this type of pen is fixed and can never be varied. Thus, if a marking of different width is to be made, then it is necessary to use a different pen having a tube whose outlet has a cross-sectional area different from the pen used before. This, of course, is a decided disadvantage because it is at best burdensome, and frequently entirely impossible to keep changing from one pen to another whenever the width of the marking has to be varied, an occurrence which is rather frequent particularly in drafting.

An additional disadvantage of the known constructions is the fact that the tube which defines the fluid passage through which the marking fluid or ink escapes, quite frequently becomes partially or completely obstructed by encrustations of pigment. This reduces or completely terminates the flow of ink and necessitates cleaning of the tube. Again, it is burdensome and time-consuming.

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Summary of the invention

The present invention overcomes these disadvantages. More particularly, the present invention provides a marking device which is free from the disadvantages just outlined.

The marking device according to the present invention is so constructed that the width of the marking which can be produced with it may be varied at the will of the user.

Furthermore, my novel marking device disclosed herein is not subject to reduction or termination of ink flow, as known from the prior art, resulting from encrustations formed by pigment, despite the fact that my novel marking device utilizes a fluid-passage defining tube.

The device according to the present invention is simple in its construction, and is therefore inexpensive both to manufacture and to sell.

It is not necessary in my novel marking device to effect the substitution of components in order to vary the width of the marking produced with the device, and no skill is required on the part of the user either to vary the width of the marking or to prevent the formation of encrustations of pigment in the fluid-passage defining tube or to dislodge such encrustations once they are formed.

In accordance with one feature of my invention I provide a marking device, such as a drafting pen, which comprises a barrel unit and an applicator unit. The barrel unit is conventional and defines an inner chamber adapted to contain a supply of marking fluid. The applicator unit, however, differs from what is known. It is mounted on one end of the barrel unit and comprises first means which define a fluid passage communicating with the chamber and which exteriorly of the barrel unit has an outlet of predetermined cross-sectional area. In addition, my applicator unit also comprises second means which is associated with the first means and which is operative for varying the cross-sectional area of the outlet of the fluid passage. By so varying the cross-sectional area of the outlet of the fluid passage, I am able to vary the width of markings which are produced by my device, such variation being effected in dependence upon the cross-sectional area of the outlet.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

Brief description of the drawing

FIG. 1 is a somewhat schematic longitudinal section through a marking device in accordance with my present invention;

FIGS. 2, 3 and 4 are respective detail views of the components which together make up the applicator unit in accordance with my present invention and employed in the marking device shown in FIG. 1; and

FIG. 5 is a detail view of the rear end of the marking device shown in FIG. 1.

Description of the preferred embodiments

Discussing now the drawing in detail, and firstly FIG. 1 thereof, it will be seen that I provide a conventional barrel 10 which may consist of hard rubber, synthetic plastic material, or another suitable material. The barrel 10 defines an interior chamber 11 which can accommodate a body of marking fluid, such as ink, India ink, or the like. Secured in the open front end of the barrel 10, as

clearly evident from FIG. 1, is an applicator unit consisting of the elements 12, 16 and 19.

FIG. 2 illustrates the element 12 more clearly and shows that it consists of a substantially cylindrical rear portion provided with an external screw threads 12a and a forwardly tapering front portion. The member 12 is hollow, as is clearly evident from FIG. 2, and a tube 13 of small cross-sectional area extends through the open tip of the member 12, coaxially therewith in the illustrated embodiment, such that the rear portion of the tube 13 is received within the member 12. The open front end portion of the barrel 10 is internally screw-threaded and, as clearly visible in FIG. 1, the member 12 is threaded into the barrel 10 in mating engagement of its screw threads 12a with the internal screw threads provided on the barrel 10. Thus, the hollow interior of the member 12 communicates with the inner chamber 11 of the barrel 10 and receives from this chamber the marking fluid or ink contained therein. This ink can escape through the tube 13 in the manner well known from the art, and it is of course evident that as the ink escapes from the front end of the tube 13, the marking which will be made in this manner will have a width corresponding substantially to the cross-sectional area of the tube, that is to the diameter of the tube if the same is cylindrical.

This provision of a single tube through which the ink can escape, as illustrated in FIG. 2, is conventional.

However, it has already been pointed out that in accordance with my invention the width of the marking made with my novel marking device is to be variable. FIG. 3 shows a second marking member, designated with reference numeral 16, which has a general configuration reminiscent of the configuration of the member 12, or rather of the forwardly tapering front portion thereof, and that front portion is in fact receivable within the hollow space within the interior of the member 16. At its open front end the member 16 carries a second small tube, identified with reference numeral 17, whose cross-sectional area is somewhat larger than that of the tube 13 and which, if the tube 13 is received in the tube 17, surrounds the tube 13 with some clearance. It is of course evident that the configuration of the hollow interior of the member 16 must be such that it can accept the forwardly tapering front portion of the member 12 if the tube 13 is to be received within the tube 17. With such configuration provided the member 16 can be slid over the forwardly tapering front portion of the member 12 without any difficulty and quite freely. The interior of the member 16, that is the inwardly facing circumferential wall surface bounding the hollow interior of this member, is provided with projecting ridges 18 and FIG. 2 shows that the front portion of member 12 is provided with a stepped section 14 which is formed with axially extending grooves 15. When the member 16 is slid over the front portion of the member 12, the ridges 18 are each received in one of the grooves 15, thus making possible axial movement of the member 16 with respect to the member 12 while preventing rotational movement of the members with reference to one another.

It will be clear that, if the transversely extending front face of the tube 17 (not identified with a separate reference numeral) is flush with the transversely extending front face of the tube 13 (also not identified with reference numerals) or extends even forwardly of the same, as a result of axial movement of the member 16 with reference to the member 12, the ink passing through the tube 13 will issue from an outlet whose cross-sectional area is greater than the cross-sectional area of the outlet of tube 13, and accordingly the width of the marking thus produced will be greater than the width of the marking produced by the tube 13 alone.

This provision by itself constitutes a considerable advancement over the known drafting pens of this type. However, I enhance the versatility of my novel marking device still further by providing an additional member 19, illustrated in FIG. 4. Provision of the member 19 makes

possible markings having an even greater width than those which can be made utilizing the tube 17. Member 19, it will be seen, again corresponds substantially in its outline to the members 12 and 16; it is so configured that its hollow interior is capable of accepting freely the member 16. At its open front end the member 19 again carries a tube, here identified with reference numeral 20, and the cross-sectional area of the tube 20 is greater than the cross-sectional area of the tube 17 so that, when the latter extends into the tube 20, the tube 20 will surround the tube 17 with some clearance. Unlike the member 16, however, the member 19 is internally screw-threaded, such thread being indicated with reference numeral 21 and being adapted to mesh with the external screw thread 12a on the cylindrical rear portion of the member 12. FIG. 1 shows that one portion of the screw thread 12a mates with a corresponding screw thread in the interior of the front portion of the barrel 10, as discussed previously, and another portion of the screw thread 12a mates with the screw thread 21 on the member 19, as just pointed out. Thus, the member 19 is secured to the member 12 and thereby to the barrel 10. In addition to the screw thread 21 the member 19 comprises in its interior one or more axially extending grooves 22. The member 16, on the other hand, is provided with one or more radial projections 23 on its outer circumferential surface, one of these projections 23 have been shown in dotted lines as optional. Evidently, the projection or projections 23 will be received in the complementary grooves 22 and the interior of the member 19. These latter grooves 22 merge with an inner circumferential groove 24, as is clearly evident from FIG. 4, and from this groove 24 there branch off what I prefer to call riser grooves 25, whose number is complementary to the number of grooves 22 and accordingly to the number of projections 23. One of these riser grooves 25 is shown in FIG. 4 in dotted lines, and again it should be recalled that this is because the one radial projection 23 in FIG. 3 has been designated as optional so that accordingly the corresponding riser groove 25 is also optional. Of course, more than two of the projections 23 can be provided, and accordingly more than two of the grooves 22 and the riser grooves 25 would then also have to be provided. The general configuration of the grooves 25, and the fact that they are angularly spaced about the inner periphery of the member 19, is evident from FIG. 4.

It is clear that the projections 23 are received in the complementary grooves 22 and that, as the member 19 is turned by virtue of the mating screws 21 and 12a, the projections 23 will move in the circumferential grooves 24 as long as the member 19 is turned in one direction of rotation. The axial movement resulting from meshing of the threads 21 and 12a during such movement causes advancement of the member 16 until the open end of its tube 17 is located in the plane of the open end of the tube 13, that is flush therewith, or until it even projects beyond the open end of the tube 13. If the marking device according to the present invention is used to produce a mark in this condition of adjustment, the width of this mark will be greater than the width of a mark produced with the tube 13 alone.

On the other hand, it will be understood that if the member 19 is rotated in a direction oppositely the aforementioned direction, then the projections 23 enter the riser grooves 25 resulting in relative displacement of the members 19 and 16 in such a manner that the open front end of the tube 20 becomes flush with or extends forwardly beyond the open front end of the tube 13, whereby it is the cross-sectional area of the tube 20 which is determinative of the width of the marking produced in this condition of adjustment. Evidently, the width of the marking will be greatest with this position of adjustment of the embodiment illustrated here by way of example, because the cross-sectional area of the tube 20 is the largest of the three tubes shown.

It is advantageous that there should be some resistance

against movement of the member 16 with reference to the member 12 so as to assure that the member 16 will reliably remain in its selected position until the user of the marking device consciously sets about varying the position of adjustment.

While the drawing illustrates an exemplary embodiment of the way in which the various elements can be connected to one another, it will be evident that many other solutions are conceivable without departing from the spirit of the present invention. Thus, and this is to be mentioned only by way of a single example, there is no reason why the inner screw thread 21 on member 19 should have to mesh only with the screw thread 12a on the cylindrical rear portion of the member 12. It is entirely conceivable to have the screw thread 21 of member 19 mesh with an external screw thread provided on the front portion of the barrel 10, if this should be desired. Again it is emphasized, however, that this is only a single example of the variations which are possible and which will offer themselves readily to those skilled in the art. Other parts of interconnection, just as other types of effecting relative movement of the members with respect to one another, are readily conceivable and are intended to be encompassed in the protection sought herein. The illustrated embodiment, however, has been found to be particularly advantageous because the width of the marking which can be made may be varied by the user with the illustrated embodiment in an extremely convenient manner, adjustment being instantaneously afforded by twisting the member 19 with the fingers until the desired position of adjustment has been obtained.

It is evident from FIGS. 1 and 2, although this has not yet been discussed in the explanation of these figures, that a needle 26 extends through the innermost tube 13, that is the tube having the smallest cross-sectional area and constituting the actual ink passage. This needle 26 is axially reciprocable within the tube 13, and such reciprocation is already known in the art. The purpose of it is to break up and destroy encrustations which form within the tube 13 as the ink dries therewithin and pigment builds up on the inner wall of the tube 13. This is particularly bothersome in the case of India ink which has a tendency to dry very quickly and to form very significant encrustations. In departure from what is known the present invention provides, as is evident from FIGS. 1 and 5, an opening 10a in the rear end of the barrel 10, that is the end which is opposite the one carrying the novel applicator unit already described. A rod 27 carries at its front end the needle 26 (compare FIG. 2) and at its rear end a pushbutton portion 28 which extends outwardly through the opening 10a and beyond the barrel 10. The opening 10a is bounded, as evident from FIG. 5, by an inner circumferential surface which diverges in the direction inwardly towards the chamber 11 and that section of the pushbutton portion 28 which is actually located within the confines of the opening 10a is bounded by an outer peripheral surface 29 complementary to the inner circumferential surface bounding the member 10a. When these two surfaces are in abutment, as illustrated in FIG. 5, they serve to seal the opening 10a and, furthermore, to limit outward movement of the portion 28 and thereby of the rod 27. Inwardly of the portion 28 the rod 27 carries a disk-shaped portion 30 and an expansion spring 31, which surrounds a part of the rod 27, abuts both against the disk-shaped portion 30 and against a wall portion 10b of the barrel 10, permanently urging the rod 27 away from the applicator unit, that is permanently urging the surface 29 into sealing abutment with the peripheral surface bounding the opening 10a. A sealing element 32, for instance an O-ring of rubber or synthetic plastic material, is arranged inwardly of the opening 10a intermediate the same and the disk-shaped portion 30, surrounding a section of the rod 27 and serving to enhance the sealing action at the opening 10a.

It is evident that the spring 31 permanently tends to

withdraw the needle 26 rearwardly of the open front end of the tube 13. Although this is a well known fact it might be peripherally mentioned that the needle 26 must of course be received with clearance in the tube 13 to establish with the same a capillary passage since otherwise the escape of ink through the tube 13 would be prevented. If, now, encrustations of pigment form in the space or clearance between the needle 26 and the inner circumferential wall of the tube 13, thus reducing or preventing the flow of ink through the clearance, the user of my novel marking device need simply depress the portion 28 once, twice or several times against the oppositely directed action of the spring 31. This results in axial reciprocation of the needle 26 within the tube 13 and destroys encrustations which have formed in the clearance between the needle 26 and the inner circumferential surface of the tube 13. Evidently, the spring 31 will return the portion 28 to a sealing position as soon as oppositely directed pressure on it by the fingers of the user is released, thus preventing the outflow of ink at this rear end of the marking device. It is clear that actuation of the portion 28 in this manner not only serves to destroy encrustations formed in the tube 13, but that the momentary communication which is established between the chamber 11 and the ambient atmosphere when the portion 28 is depressed against the action of the spring 31, will facilitate flow of the ink through the tube 13.

It should be mentioned for the sake of completeness of the explanations incorporated herein that in FIGS. 1 and 5 the barrel 10 is assumed to comprise an end cap which is screw threaded onto the rear end portion of the barrel and which defines with the wall 10b thereof the small auxiliary chamber in which the members 30, 31 and 32 are located. However, this is so obvious from the drawing, and particularly from FIG. 5, that the provision of separate reference numerals for this feature are not believed necessary. In any case, this does not constitute a part of the present invention, it being evident that it is immaterial how the arrangement shown in FIG. 5 is introduced into the rear end portion of the barrel 10.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of marking devices differing from the types described above.

While the invention has been illustrated and described as embodied in a marking device which is particularly suitable as a drafting pen, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is:

1. A marking device, particularly a drafting pen, comprising, in combination, a barrel defining an inner chamber adapted to contain a supply of marking fluid; and an applicator unit mounted on one end of said barrel and comprising three superimposed funnel-shaped members arranged along a common axis with each other and movable relative to each other in axial direction, each of said members having an open ended axially extended tubular outlet of different diameter so that the tubular outlet of one of said members forming the innermost of said three members may be received with clearance in the tubular outlet of a second of said three members forming an intermediate member and the tubular outlet of the latter may be received with clearance in the tubular outlet of the third

member forming the outermost of the three members, said first member being fixedly connected to one end of said barrel so that said chamber communicates with the interior of said first member and fluid contained in said chamber may pass through the fluid passage defined by the tubular outlet of said first member, connecting means for connecting said third member to said first member turnably about said axis and movable in axial direction relative to said first member during such turning, first guide means between said first and said second member for guiding said second member on said first member movable in axial direction while preventing said second member from turning relative to said first member, and second guide means between said second and said third member arranged and constructed for axially moving, during turning of said third member in one direction about said axis, said second member relative to said first member to an active position in which the open end of the tubular outlet of said second member is substantially in one plane with that of said first member and for axially moving said open end of said tubular outlet of said second member to an inactive rearwardly displaced position during turning of said third member in the opposite direction while the open end of the tubular outlet of said third member moves to its active position in which it is substantially in one plane with that of said first member.

2. In a marking device as defined in claim 1; further comprising a needle member received in said inner tube axially reciprocable in said fluid passage; and manually actuable means carried by said barrel unit exteriorly thereof and operatively associated with said needle member for enabling reciprocation thereof at the will of an operator, whereby to destroy encrustations of marking fluid pigment in said fluid passage.

3. In a marking device as defined in claim 1, wherein said barrel unit comprises another end spaced from said one end and provided with an aperture communicating with said chamber; and further comprising an assembly

for destroying encrustations of marking fluid pigment which form in said passage, said assembly including a first member located in said barrel and having a needle portion received in said inner tube, and a second member rigid with said first member sealingly received in said aperture and having an engaging portion extending outwardly of said aperture and reciprocable between a rest position in which it extends outwardly and an operative position in which it is displaced in inward direction, movement of said engaging portion between said position effecting reciprocation of said needle portion, and biasing means permanently biasing said second member to said rest position thereof.

4. A marking device as defined in claim 1, wherein said connecting means between said first and said third member comprise mating screw threads on said first and said third member.

5. A marking device as defined in claim 1, wherein said first guide means between said first and said second member comprise an axial groove on one of said two members and an axially extending ridge located in said groove and fixed to the other of said two members.

6. A marking device as defined in claim 1, wherein said second guide means between said second and said third member comprise a spirally extending groove in one of said two members and a radial projection extending into said groove and fixed to the other of said two members.

References Cited

UNITED STATES PATENTS

2,891,512	6/1959	Kovács	401—258
3,336,909	8/1967	Diamond	401—259

FOREIGN PATENTS

1,131,287	10/1956	France.
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