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Koelichen, Jr.

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[54] **NIB TUBE FOR DRAWING PENS**

[75] Inventor: **Harald Koelichen, Jr.**, Isardam, Germany

[73] Assignee: **Standardgraph Filler & Fiebig GmbH**, Wohler, Germany

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[51] **Int. Cl.** **C23c 15/00,** B43k 1/06

[58] **Field of Search** 204/192, 298; 401/265

[56] **References Cited**

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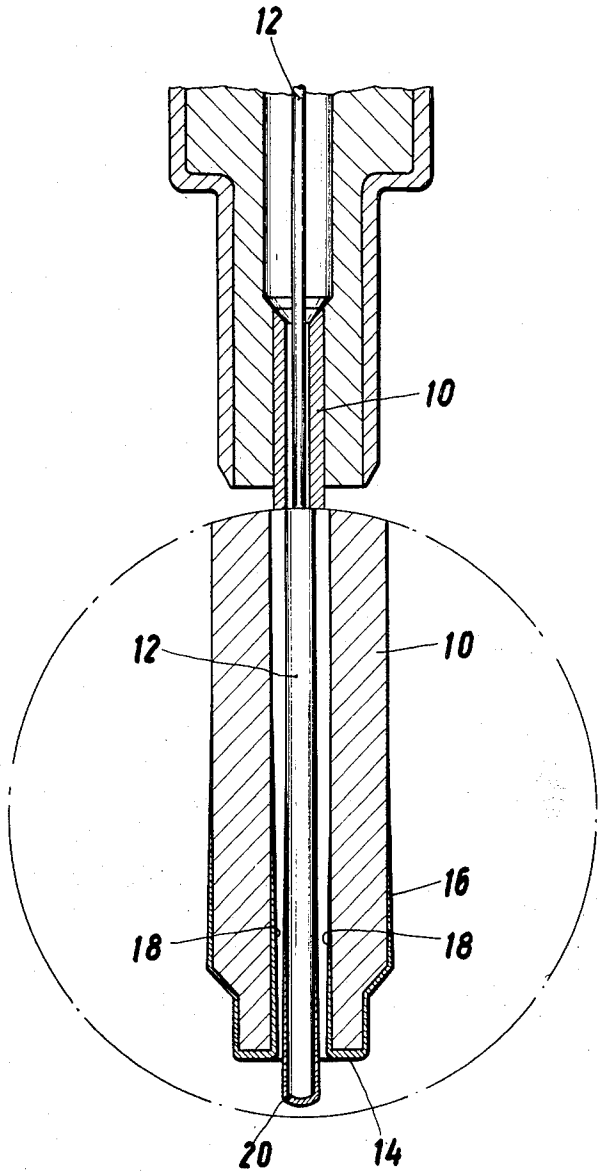
Primary Examiner—T. M. Tufariello

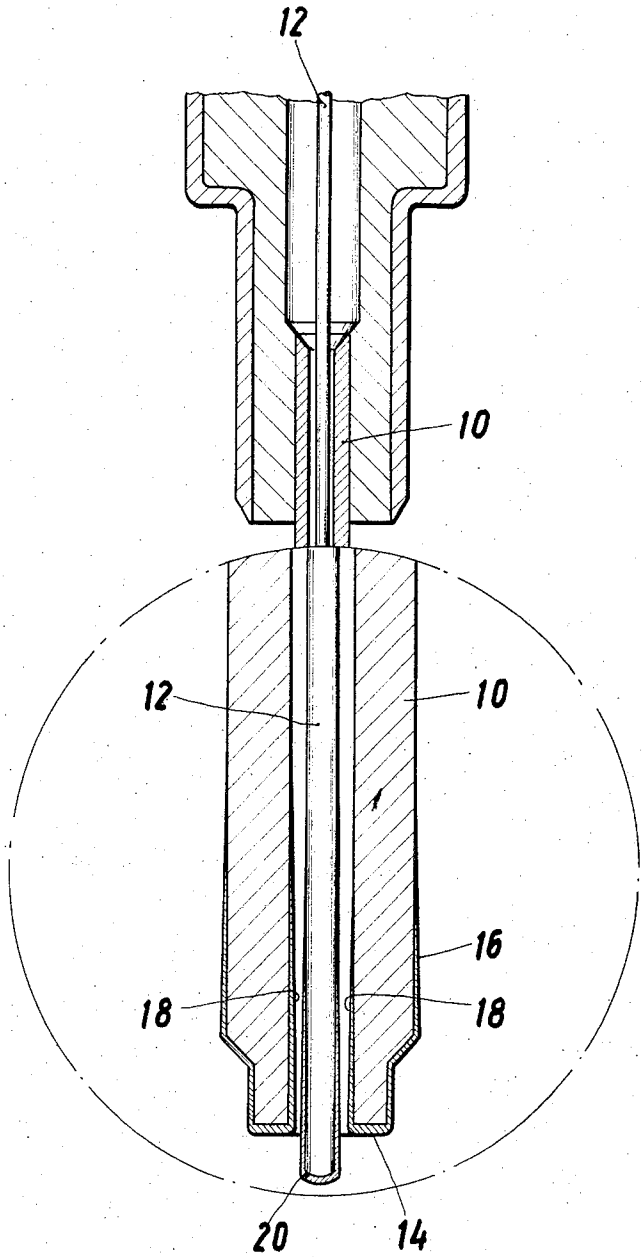
Attorney, Agent, or Firm—Ostrolenk, Faber, Gerb & Soffen

[57] **ABSTRACT**

A writing nib, more especially for drawing pens comprises a tube which is coated by a cathodic sputtering.

3 Claims, 1 Drawing Figure

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NIB TUBE FOR DRAWING PENS

BACKGROUND OF INVENTION

1. Field to which invention relates

The present invention relates to a nib tube for drawing pens for the writing tips of indian drawing pens, which is provided at its front end with a mechanically resistant superficial layer.

2. The prior art

Such abrasion or wear resistant surface layers are made necessary because the writing surface, that is to say the end surface of the tube during drawing is subjected to a high mechanical loading, especially in the case of drawing on plastic foils and even nib tubes made of stainless steel are rapidly worn away so that the line drawn becomes uneven. A long period of life of the nib is to be aimed at for all applications and is in fact an essential condition for the use of a drawing pen if it is used for automatically operating registering equipment or the like.

In the prior art the surface layer has been produced by chrome plating or by the application of a metallic carbide layer. There has also been a proposal to apply such coatings by sputtering or condensation. Such layers cannot, however, be satisfactory in many cases as regards the period of life and the attachment to the underlying material and therefore attempts have been made to increase the life for such writing nibs by inserting into the front end of the writing tube an insert of metallic carbide, sapphire, ceramic material or the like. Such inserts can admittedly increase the length of life of a writing nib substantially but involve a substantial increase in costs which has the effect of making their use only reasonable when special applications are involved. Furthermore such inserts are extremely brittle and there was the danger that in the case of an impact on the insert body it would crack and thus become unusuable. This might even occur in the case of automatic mounting of the writing nib in the case of a recording device of a computer.

SUMMARY OF INVENTION

One aim of the invention is therefore that of constructing the writing nib tube of the tip of a pen in such a manner that it can be produced more cheaply and has the high length of life aimed at.

In order to achieve this aim the invention provides a nib tube of the above-mentioned construction which is characterised in that the tube is provided with the surface layer by means of cathodic sputtering.

This method of cathodic sputtering which provides the possibility of providing on practically any material a thin film of practically any desired material has been found highly advantageous for reinforcing the nib tube. With this method it is possible to coat all the surfaces subjected to mechanical loading with a layer of the desired thickness which has a long period of life. It is not only the end annular face of a nib tube which slides on the material written or drawn on, but also the external peripheral face of the tube, which is slid along a tin plate or a ruler, which is subjected to wear. In this respect there is an increased amount of wear, especially when the edge, along which the tube is passed, is provided with marks, such as millimeter marks, which have a saw-like action.

For the purposes of the invention it has been found particularly convenient to use metallic carbides, especially titanium carbides or tungsten carbides for forming a surface layer. A preferred layer thickness lies between 3 and 7 microns. Instead of this the surface layer can also consists of metal oxides, metal sulfide, or monocrystals, more especially molybdenum sulfide, applied in the same manner. It has been found that writing tubes reinforced in this manner are superior to all known writing tube nibs with a coating, and also superior to writing tube nibs which have a compaction of the material brought about at the writing tip by pressing. The length of life of the writing tubes in accordance with the invention corresponds approximately to that of conventional writing nibs with insertion bodies made up of moncrystals etc., without having their disadvantages, which are due to the brittleness and the high price.

In accordance with the invention the surface layer, owing to the method used, is thickest at the end annular face of the tube, which serves for writing or drawing but it is also present on the external periphery of the tube and on its inner periphery. It is convenient to provide the cleaning wire with such a superficial layer. In this case the coating is preferably carried out separately before the coating of the writing tube nib.

In accordance with a further form of the invention the surface layer of the writing tube nib has several layers applied to it by cathodic sputtering. These layers consist of different materials, and for example the first layer can consist of a material which prevents oxidation so that as a basic material cheaper materials can be used and it is not absolutely necessary to use stainless steel. A further layer can ensure the mechanical wear resistance aimed at. This layer can be made porous, something which is advantageous as regards writing characteristics. The porosity does not, however, in this case have any disadvantageous effect as regards possible oxidation of the surface lying underneath, because the first layer is resistant to corrosion. Since as a basic body it is not necessary to use noble metals in the case of tube nibs in accordance with the invention, there is a further cheapening as compared with other surface coated writing tube nibs. The invention even makes it possible to produce the writing tube nibs of plastic material because cathodic sputtering can be used to apply metallic coatings to plastic.

DESCRIPTION OF PREFERRED EMBODIMENTS

In what follows an embodiment of the invention will be described with reference to the drawing. The single figure of the drawing shows on a considerably enlarged scale a writing tube nib in accordance with the invention mounted in a conventional writing tip.

The writing tube nib **10** mounted in the writing tip can consist of any suitable materials including non-noble metals or even plastic. It carries a surface layer **14** on the front end annular face of the tube **10** and has a coating **16** on the outer surface of the tube and a coating **18** on the inner bore surface of the tube. This coating **14, 16, 18** is applied by cathodic sputtering. Owing to the method the coating **14** is thicker on the end annular face than the coating **16, 18** on the outer surface and the inner bore surface.

In accordance with the embodiment shown the sliding cleaning wire **12,** arranged inside the tube nib **10** also has a layer coating **20,** which is applied by cathodic sputtering. The coating is, however, not carried out within the writing tube nib **10.**

Instead of a single surface layer it is possible to apply several surface layers on top of one another by cathodic sputtering. For forming coatings it is possible, as above mentioned, to use materials such as, more especially, metallic carbides, metallic oxides or monocrystals, though the invention is not limited to these materials.

I claim:

1. A method for providing a mechanical wear resistant surface layer on a nib tube for a drawing pen wherein the nib tube is provided with an end surface and with side surfaces that extend away from the end surface, said nib tube including a hollow opening having a cleaning wire passing through the opening wherein the method comprises applying to the nib tube by cathodic sputtering a layer of wear resistant material, wherein the surface layer is applied at a greater thickness to the end surface of the nib tube than to the side surface and applying a mechanically wear resistant surface layer to the cleaning wire by cathodic sputtering at the same time that the surface is applied to the nib tube by cathodic sputtering.

2. A method for providing a mechanical wear resistant surface layer on a nib tube for a drawing pen in which the nib tube is provided with an end surface and with side surfaces that extend away from the end surface comprising applying to the nib tube by cathodic sputtering a layer of wear resistant material in which the cathodic sputtering step is performed a plurality of times, with each performance thereof producing a succeeding surface layer of a material over the preceeding surface layer of a different material, thereby forming a plurality of surface layers applied by cathodic sputtering.

3. The method of claim **2** wherein a porous outer layer is provided on the nib tube and wherein the layer therebeneath is corrosive resistant.

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