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[54] **RECORDING HELIX**
11 Claims, 6 Drawing Figs.

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346/101
[51] Int. Cl..... **G01d 15/06**

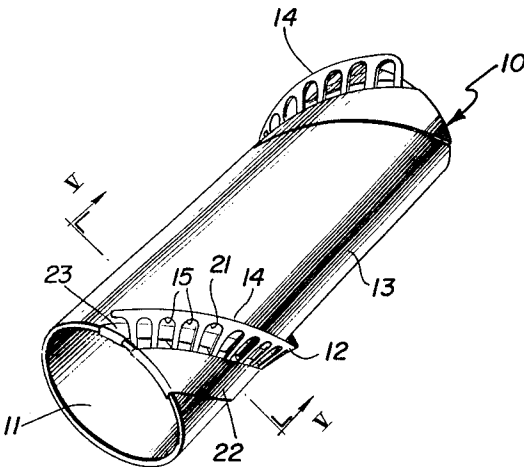
[50] **Field of Search**..... 346/101,
139, 74 (E), (SC)

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ABSTRACT: This invention relates to a recording helix and, more particularly, to drum for use in a graphic communications recorder having a helical electrode mounted thereon.



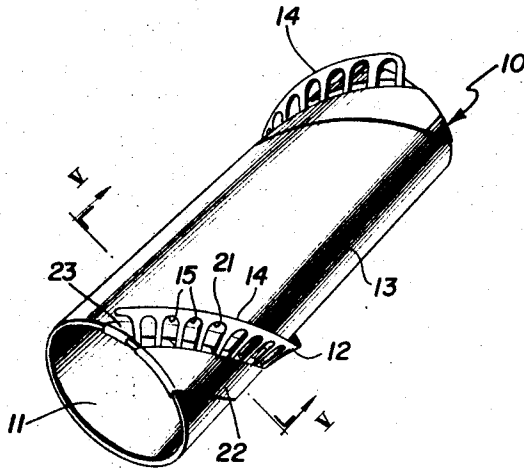


FIG. 1

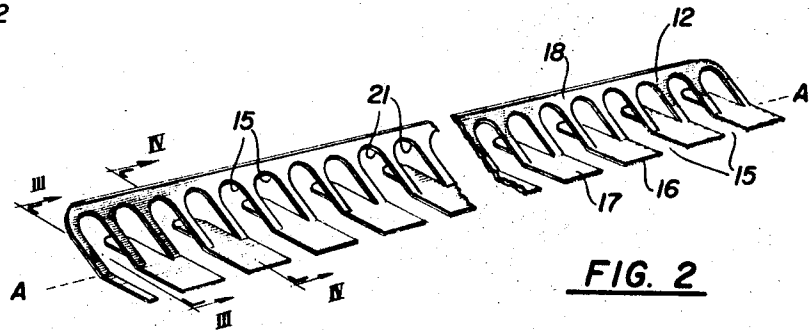


FIG. 2

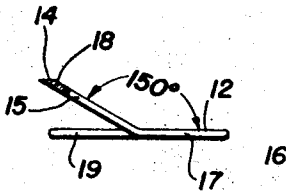


FIG. 3

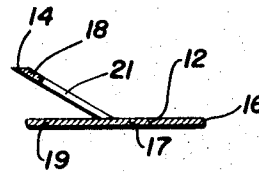


FIG. 4

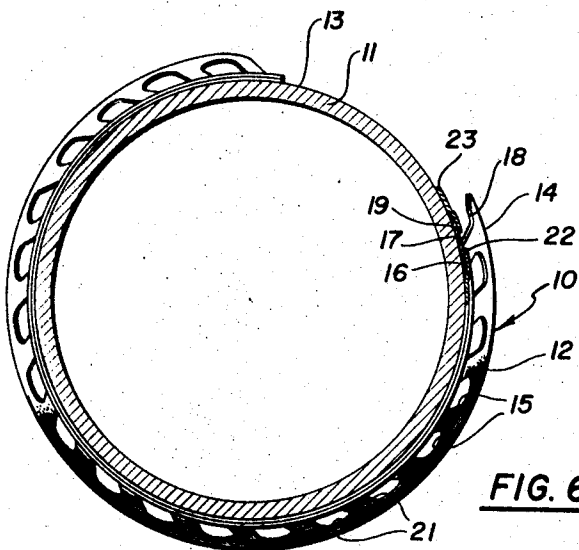


FIG. 6

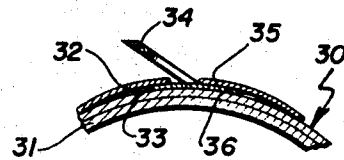


FIG. 5

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RECORDING HELIX

BACKGROUND OF THE INVENTION

In the art of graphic communications, the most effective recording method makes use of an electrically sensitive paper that is fed between a straight-edged blade and a revolving drum helix. The movement of the paper and the rotation of the helix causes the recording point to "scan," i.e., to move from side to side of the paper along successive parallel lines. Experience has shown that the best results are obtained where the blade electrode is rigid and the helical electrode is flexible. It has been difficult in the past to make the helix flexible and still maintain the proper geometry, so that the tendency has been to use a geometrically accurate, but relatively rigid helix. This causes abrasion of the paper and causes distortion of the recorded image. The ultimate result is a lack of discrimination in the resulting image. Furthermore, because the helical electrode was not able to follow irregularities in the paper, it was subject to wear. The recording drums in the past have been heavy and required substantial torque to stop and start, so that it was necessary to provide the recorder with a heavy, bulky, and expensive motor. In addition, these recording drums have been expensive and do not lend themselves to the disposable drum concept that is necessary to the development of an inexpensive recorder that would be in common use by persons unskilled in the recording field.

One of the popular constructions used in the past involved a helix wire of circular cross section which was supported in spaced relationship to the drum by fingers at spaced intervals along the wire. When this drum was rotated and the wire pressed against the paper and the blade electrode during recording, the wire deflected a great deal when recording was taking place at a portion of the wire between the supports and deflected relatively little when recording was taking place on the wire in the vicinity of a support. The effect was a cyclic variation of the pressure of the wire on the paper at the recording point and, therefore, a cyclic variation in the image produced on the paper. In addition, the surface of the wire contacting the paper (and taking part in the ion transfer process to produce the image) was theoretically a line contact in the case of a new electrode. However, as the wire became worn, the contact surface was the chord of the cross section and this chord became larger and larger as wear progressed, so that the definition of the recorded image tended to deteriorate. Also, the wire had a tendency to move longitudinally and to cut through the supporting elements. These and other difficulties experienced with the prior art devices have been obviated in a novel manner by the present invention.

It is, therefore, an outstanding object of the invention to provide a recording helix having an exceptionally flexible electrode.

Another object of this invention is the provision of a recording helix which will not damage the recording paper.

A further object of the present invention is the provision of a recording helix which is light in weight, has low rotational inertia and can be stopped and started with a small, lightweight, inexpensive motor.

It is another object of the instant invention to provide a recording helix which is inexpensive, so that it is economically feasible to dispose of it after it becomes worn.

A still further object of the invention is the provision of a recording helix whose electrode is capable of long life.

It is a further object of the invention to provide a recording helix which can be fabricated from readily obtainable materials and whose manufacture involves no critical dimensioning.

It is a still further object of the present invention to provide a recording helix that lends itself to use in an inexpensive recorder that is capable of extensive use by persons unskilled in operating machinery.

Another object of the invention is the provision of a recording helix capable of providing a constant pressure against the recording paper without responding to vibrations in the other parts of the apparatus.

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A further object of the invention is the provision of a recording helix in which the element having the operative edge does not move longitudinally relative to the supporting elements and, therefore, does not cut through them.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

SUMMARY OF THE INVENTION

In general, the invention has to do with a recording helix having a main body with a cylindrical surface and having an electrode formed of sheet metal attached to the said surface.

The electrode has an operative edge which forms a helix around the surface and is substantially spaced therefrom. The electrode is rendered flexible by inlets or slots extending inwardly of an opposite parallel edge.

The electrode is in the form of an elongated strip which is bent along a line generally midway between the said two parallel edges to divide it into two panels lying at an obtuse angle to one another. The slots extend entirely across the panel having the said opposite edge and extend a substantial distance into the panel having the said operative edge. A tab is punched from the second panel between each pair of slots and lies in the plane of the panel having the said opposite edge as an extension thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

The character of the invention, however, may be best understood by reference to one of its structural forms, as illustrated by the accompanying drawings, in which:

FIG. 1 is a perspective view of a recording helix embodying the principles of the present invention;

FIG. 2 is a perspective view of an electrode forming part of the invention,

FIG. 3 is a sectional view of the electrode taken on the line III-III of FIG. 2,

FIG. 4 is a sectional view of the electrode taken on the line IV-IV of FIG. 2,

FIG. 5 is a sectional view of the recording helix taken on the line V-V of FIG. 1, and

FIG. 6 is a sectional view of a modified form of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, wherein are best shown the general features of the invention, the recording helix, indicated generally by the reference numeral 10, is shown as having a main body 11 and an electrode 12. The main body is a paper-board tube having a cylindrical surface 13 to which the electrode is attached. The electrode 12 is formed from a sheet of electrically conductive material, such as stainless steel. The electrode has an operative tangential edge 14 which forms a helix around the surface 13 and is substantially spaced therefrom. The electrode is rendered flexible by a plurality of inlets or slots 15 extending inwardly from an opposite parallel edge 16.

As can be seen in FIG. 2, the electrode 12 is originally formed as an elongated strip which is bent along a line A-A located midway between the operative edge 14 and the opposite edge 16. This divides it into a first panel 17 having the opposite edge 16 and a second panel 18 having the operative edge 14. These panels lie at a substantial angle to one another; in the preferred embodiment, the angle between the panels is an obtuse angle of 150°. The slots 15 extend entirely across the first panel 17 and extend into the second panel 18 a substantial distance.

A tab 19 is removed from the second panel 18 between each pair of slots 15 and, as is best evident in FIG. 4, the tab lies in the plane of the first panel 17 as an extension thereof. The apertures left by this operation are identified by the reference numeral 21.

A strip 22 of pressure-sensitive tape extends over the first panel 17 and onto the surface 13 of the main body 11 to attach the electrode to the main body. A strip 23 of pressure-sensitive tape extends over the tabs 19 and onto the surface 13 to assist in holding the electrode on the main body. This is best seen in FIG. 5.

In FIG. 6 is shown a modification of the invention wherein a recording helix 30 has a main body 31 in the form of a helically wound paper tube. The body has a helical seam 32 under which is inserted the tab 33 of an electrode 34. Then, a strip 35 of pressure-sensitive tape is applied to the panel 36 to lock the electrode to the body.

It can be seen, then, that the present invention provides an inexpensive recording helix that can be disposed of after use. This is possible because the main body is a paper board tube and the electrode a simple stamping. The slots 15 and the apertures 21 make the electrode flexible in such a way that it has the same spring constant throughout its length. This is in contrast to the old wire electrode, wherein the wire was supported at spaced intervals by fingers, so that a given radial pressure on the wire at a support would cause a small displacement, while the same pressure between supports would cause a relatively large displacement.

When the wire electrode wore, the surface contacting the paper became greater and greater until the wire was worn halfway through. The resulting change of recording surface width gave a change in definition (usually for the worse) from a new electrode to an old one. Since the present electrode is made of sheet metal of constant gauge, wearing does not change the width of the operative edge 14. Furthermore, by selecting the gauge of the sheet metal, the width of the operative recording edge of the electrode can be very accurately determined. If the width so selected is the same as the thickness of the blade electrode, the recording "spot" will be a perfectly symmetrical diamond.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, however, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

I claim:

1. A recording helix, comprising:
 - a. a main body having a cylindrical surface,
 - b. an electrode formed of sheet electrically conductive material attached to the said surface, the electrode having an operative edge forming a helix around the surface and substantially spaced therefrom, the electrode being

rendered flexible by inlets extending inwardly of an opposite parallel edge, and

- c. fingers between said inlets, each of which is connected to the cylindrical surface of the body at a point along a helical line which is parallel to and spaced from the helix of the operative edge and lies in a plane at a substantial angle to a plane extending at a right angle to the axis of the body and passing through said point.

2. A recording helix as recited in claim 1 wherein the electrode is in the form of an elongated strip which is bent along a line generally midway between the said two parallel edges to divide it into two panels lying at a substantial angle to one another, and wherein the aforementioned inlets extend entirely across the first panel having the said opposite edge and extending substantially into the second panel having the said operative edge.

3. A recording helix as recited in claim 2, wherein a tab is displaced from the second panel between each pair of inlets, the tab lying in the plane of the first panel as an extension thereof.

4. A recording helix as recited in claim 2, wherein the angle between the first and second panels is an obtuse angle.

5. A recording helix as recited in claim 1, wherein the electrode is formed of stainless steel.

6. A recording helix as recited in claim 2, wherein a strip of tape extends over the said first panel and onto the surface of the main body to attach the electrode to the main body.

7. A recording helix as recited in claim 3, wherein a strip of tape extends over the tabs and onto the surface of the main body to assist in attaching the electrode to the main body.

8. A recording helix as recited in claim 1, wherein the main body is a tube of paperboard.

9. A recording helix as recited in claim 3, wherein the main body is a helically wound tube of paper having a helical seam under which the tabs are inserted.

10. A recording helix as recited in claim 1, wherein the inlets are formed by chemical etching, so that no erratic stressing of the metal takes place.

11. A recording helix, comprising:

- a. a narrow strip of electrically conductive material in sheet form adapted to be arranged helically about a drum, and
- b. a series of integral supporting fingers extending from the strip to the drum, each said finger being connected to the cylindrical surface of the body at a point along a helical line which is parallel to and spaced from the helix of the operative edge and lying in a plane at a substantial angle to the axis of the body.

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