May 15, 1962 K. VÖGTLIN 3,035,267

RECORDING APPARATUS

Filed July 1, 1959

FIG. 1a
PRIOR ART

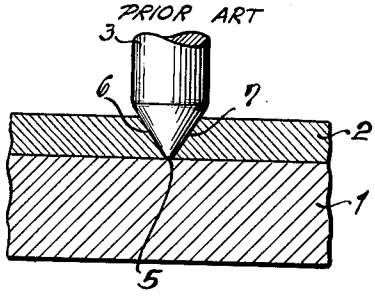



FIG. 2a

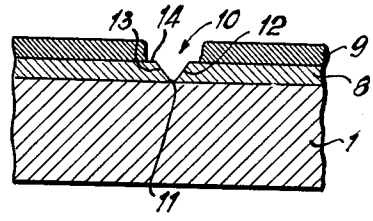



FIG. 1b
PRIOR ART

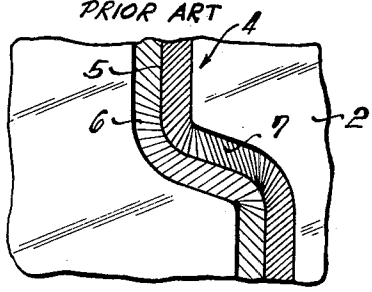



FIG. 2b

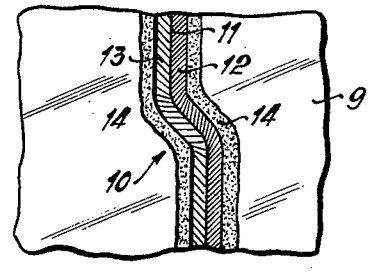



FIG. 3b

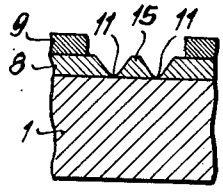



FIG. 3a

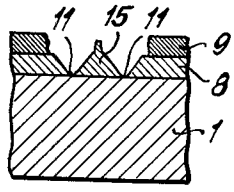



FIG. 3c

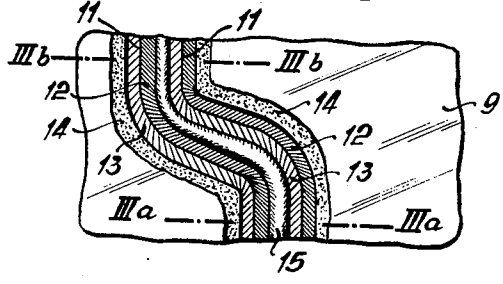
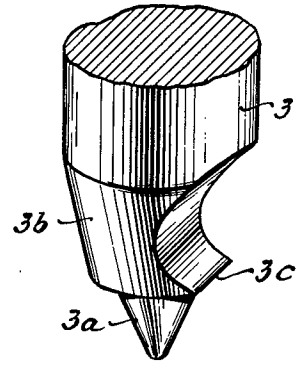



FIG. 4




INVENTOR
Karl Vogtlin

By Michael S. Striker
Attorney

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# RECORDING APPARATUS

Karl Vögtlin, Villingen, Black Forest, Germany, assignor to Kienzle Apparate G.m.b.H., Villingen, Black Forest, Germany

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7 Claims. (Cl. 346—77)

This invention relates to recording apparatus. More particularly, the present invention is concerned with recording on a new type of diagram paper comprising two materials of different hardness and different color.

Diagram papers comprising a paper support of dark color coated with a light-colored layer of wax, varnish or a similar material are well known in the art. When used in recording instruments these diagram papers produce diagrams or recordings of the studied process or property because the writing member of the recording instrument will scrape or deform the coating material, thus leaving an imprint on the diagram paper.

In order to obtain recordings which can be read and evaluated care must be taken that the lines formed on the diagram paper are very thin and that no coating material is broken off from the paper when several lines lie closely together. Therefore, very soft waxes, varnishes and the like are commonly used as the coating material for the conventional diagram papers. With such soft coating materials recordings consisting of thin lines are obtained, which can be easily evaluated with the aid of a microscope. However, reading and evaluating these thin lines with the naked eye is extremely tedious, if not impossible.

It is an object of the present invention to provide a recording apparatus employing a diagram paper on which recordings legible with the naked eye can be obtained.

Another object of the present invention is to provide a recording apparatus giving recordings that can be evaluated easily.

A further object of the present invention is to provide recording apparatus which produces on a two-layer diagram paper a recording including a fine line capable of microscopic examination, and a groove visible to the naked eye.

These and other objects not now specifically enumerated will be manifest in the following description of the invention when considered with the accompanying drawing, in which:

FIG. 1*a* is a sectional view of a conventional diagram paper;

FIG. 1*b* is a plan view, in the form of a schematic and enlarged illustration, of a line obtained on a conventional diagram paper;

FIG. 2*a* is a sectional view of one form of a diagram paper according to this invention;

FIG. 2*b* is a schematic plan view of a line as obtained on the diagram paper illustrated in FIG. 2*a*;

FIG. 3*a* and FIG. 3*b* are sectional views of one form of diagram paper according to this invention imprinted by two adjacent lines;

FIG. 3*c* is a schematic plan view of two adjacent imprints on a diagram paper as illustrated in FIGURES 3*a* and 3*b*; and

FIG. 4 is a writing member of a recording instrument, said writing member being particularly suitable for use in conjunction with the diagram papers of this invention.

With the above objects in view, the present invention provides a recording stylus, and a diagram paper which comprises a support coated with two layers of coating materials, the lower layer contiguous to said support consisting of a soft, pliable material adapted to form thin lines when impressed by the writing member of a recording instrument, and the upper layer consisting of a hard brittle material adapted to form thick lines when chipped by the writing member of a recording instrument. The lower layer preferably contrasts in color with said support and said upper layer.



In a preferred embodiment of the present invention, the support is paper and both layers applied to the support are composed of wax, the lower layer consisting of a soft wax and the upper layer consisting of a hard wax. However, the two layers can be formed also from other suitable coating materials such as varnishes of different hardness, while the support may consist of such materials as canvas or film-forming organic plastics.

It is an important feature of the present invention that the two layers of different hardness applied to the support contrast in color with each other and with the support, which makes it possible to better distinguish the upper layer from the lower layer when inspecting the recordings with the naked eye.

The recording stylus of the recording instrument is constructed to produce relatively thick grooves in the upper layer where the hard coating material breaks away, while the lower layer consisting of a soft coating material forms a recording composed of fine lines, which can be evaluated with the desired accuracy under a microscope.

Referring now to the drawing, the conventional diagram paper illustrated in FIG. 1*a* comprises the paper support 1 coated with the layer 2 of soft wax. The writing member 3 of a recording instrument (not shown in FIG. 1*a*) produces in the soft wax layer 2 a very thin impression having a triangular cross section. The paper support 1 is of different color than the wax layer 2 so that the impressions produced are clearly discernible.

FIG. 1*b* illustrates the kind of impressions or lines obtained on the conventional diagram paper shown in FIG. 1*a*. In the middle of the impression 4 there is located the hairline 5 of the recording, said hairline being produced by the conical point of the tapered writing member 3. In the area of the hairline 5 the wax of the layer 2 is completely removed. On both sides of the hairline 5 there lie the border surfaces 6 and 7, which are produced by the curved surface of the conical portion of the writing member 3.

In the embodiment of the present invention shown in FIG. 2*a*, the paper support 1 is coated with two wax layers 8 and 9. The layer 8 consists of a soft wax whereas the layer 9 is made from a relatively hard, brittle wax. The two wax layers and the paper support contrast in color. For example, the paper support may be red, the lower wax layer 8 may be dark green or dark brown and the upper wax layer 9 may be white.

When using the diagram paper shown in FIG. 2*a* in a recording instrument having a recording stylus shaped like the member 3 in FIG. 1*a*, there is obtained an impression of the type illustrated in FIG. 2*b*.

As may be seen from FIG. 2*a*, the cross section 10 of the impression obtained has a lower triangular region similar to the cross section of the impressions produced in conventional diagram paper. This triangular region constitutes the cross section of the impression produced in the soft wax layer 8. At the bottom of the impression, the color of the paper 1 forms the hairline 11. The curved surface of the conical part of the writing member produces the border lines or surfaces 12 and 13 in the soft wax layer 8. Due to the softness of the wax used to make the layer 8, this layer is so easily deformable that the cross section of the impression produced therein

corresponds to the cross section of the conical point of the writing member employed.

As distinguished from the lower layer 8, the upper layer 9 consists of a hard and brittle wax. As a result, this layer breaks away where the recording stylus passes through it, to form an irregular groove as indicated by numeral 14. The removal of wax broken off from layer 9 results in an enlarging and widening of the impressions so that the groove is visible with the naked eye. At the same time, the hairline 11 in the soft wax layer 8 can be easily seen when magnified by a microscope since the border surfaces 12 and 13 in layer 8 contrast with the broken-out areas 14 of layer 9 because of their different color.

The fineness of the lines inspected with the aid of a microscope is of particular importance where two lines lie very close together. If the paper is coated only with one layer of hard wax, two adjacent lines may merge into one coarse line.

FIG. 3*c* is a somewhat schematic plan view of two adjacent impressions obtained on a diagram paper according to this invention while FIGURES 3*a* and 3*b* are sectional views of these impressions, taken on lines III*a*—III*a* and III*b*—III*b* of FIG. 3*c*.

In FIG. 3*c*, the hairlines 11 are situated at some distance from each other. However, as a result of the broken-out portions 14, these two lines take the form of a single groove in the upper wax layer 9. Between the two hairlines 11 having the same color as the paper support 1, there is left the intermediate line 15 being of the same color as the soft wax layer 8. On both sides of the hairlines 11, the lateral border surfaces 12 and 13 of layer 8 are visible. While in the case represented by FIG. 3*a*, a small portion of the hard wax layer 9 has been left behind, FIG. 3*b* illustrates a case where the whole of wax layer 9 has been broken out by the writing member so that only part of the soft wax layer 8 has been left over between the two hairlines 11.

FIG. 4 shows a recording stylus designed to produce impressions in the soft and hard layers of the diagram paper of this invention, which can be distinguished particularly readily. The stylus has a tapered lower section forming the conical point 3*a*. The height of the cone 3*a* is equal to the height of the soft layer 8. Above the conical point 3*a*, the stylus comprises the section 3*b* having the chisel-like edge 3*c*. In operation, the edge 3*c* lifts off the hard layer 9 like a plow, thereby enlarging the broken-out groove region 14.

While the invention has been described with reference to specific embodiments, it will be apparent to those skilled in the art that various modifications may be made and equivalents substituted therefor without departing from the principles and true nature of the present invention.

What is claimed by Letters Patent is:

1. Recording means comprising, in combination, a record carrier including a support and two layers of coating materials on the top face of said support, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard, brittle material; and a recording stylus having a recording portion terminating in a point located on said top face of said support, said recording portion being located in said two layers so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support along a fine line capable of microscopic examination while said recording portion removes and chips said upper hard and brittle layer along a groove visible to the naked eye.

2. Recording means comprising, in combination, a record carrier including a support and two layers of coating materials on the top face of said support, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard brittle material; and a recording stylus having a first portion terminating in a point located on said top face of said support, said first portion being located in said lower layer, said stylus having a second portion wider than said first portion and located in said upper layer so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support along a fine line capable of microscopic examination while said second portion removes and breaks away parts of said upper layer along a groove visible to the naked eye.

3. Recording means comprising, in combination, a record carrier including a support sheet and two layers of coating material on the top face of said support sheet, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard, brittle material; and a recording stylus having a first portion terminating in a point located on said top face of said support sheet, said first portion being located in said lower layer, said stylus having a second portion wider than said first portion and located in said upper layer so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support sheet along a fine line capable of microscopic examination while said second portion removes and breaks away parts of said upper layer along a groove visible to the naked eye.

4. A recording means as set forth in claim 3 wherein said lower and upper layers consist of a soft wax and a hard wax, respectively; and wherein said support sheet consists of paper.

5. Recording means comprising, in combination, a record carrier including a support and two layers of coating materials on the top face of said support, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard, brittle material, said lower layer contrasting in color with said support and said upper layer; and a recording stylus having a first portion terminating in a point located on said top face of said support, said first portion being located in said lower layer, said stylus having a second portion wider than said first portion and located in said upper layer so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support along a fine line capable of microscopic examination while said second portion removes and breaks away parts of said upper layer along a groove visible to the naked eye.

6. Recording means comprising, in combination, a record carrier including a support and two layers of coating materials on the top face of said support, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard, brittle material; and a recording stylus having a first portion terminating in a point located on said top face of said support, said first portion being located in said lower layer, said stylus having a second portion wider than said first portion and forming a transverse shoulder extending to said first portion, said shoulder being located on the top face of said lower layer, and said second portion being located in said upper layer so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support along a fine line capable of microscopic examination while said second portion and said shoulder remove and break away parts of said upper layer from said top face along a groove visible to the naked eye.

7. Recording means comprising, in combination, a record carrier including a support sheet and two layers of coating materials on the top face of said support sheet, the lower layer contiguous to said support consisting of a soft, pliable material, and the upper layer consisting of a hard, brittle material, said support sheet, said lower layer, and said upper layer having different colors; and a recording stylus having a first portion terminating in a

point located on said top face of said support sheet, said first portion being located in said lower layer, said stylus having a second portion wider than said first portion and forming a transverse shoulder extending to said first portion, said shoulder having a chisel-like edge located on the top face of said lower layer, and said second portion being located in said upper layer so that during relative movement between said recording stylus and said record carrier, said point removes said lower layer from said top face of said support sheet along a fine line capable of microscopic examination while said second portion and said chisel-like edge remove and break away parts of said upper layer from said top face along a groove visible to the naked eye.




**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 524,024 | Howe | Aug. 7, 1894 |
| 1,824,885 | Hammond | Sept. 29, 1931 |
| 2,135,538 | Sherman et al. | Nov. 8, 1938 |
| 2,554,017 | Dalton | May 22, 1951 |
| 2,557,148 | Schimmel | June 19, 1951 |
| 2,638,422 | Cooley et al. | May 12, 1953 |
| 2,671,734 | Rosenblum | Mar. 9, 1954 |
| 2,744,329 | Way et al. | May 8, 1956 |
| 2,776,236 | Staehle | Jan. 1, 1957 |
| 2,776,913 | Anderson | Jan. 8, 1957 |
| 2,880,270 | Hell | Mar. 31, 1959 |