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CONDUCTIVE PAPER

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This invention relates generally to a novel conducting paper, and more particularly to a light colored conducting paper which is adapted to form the conducting base of an electrosensitive recording blank. This application is a continuation in part of our copending application, Serial No. 286,804, filed July 27, 1939, for Conductive papers, now Patent No. 2,374,214, issued April 24, 1945.

It has been proposed heretofore to produce conductive sheets by incorporating powdered metals in the fibrous structure of a paper but apparently a film of oxide or other material forms between the particles which impairs its conductivity.

In the process of electric recording it is advantageous to utilize a light colored paper which is electrically conductive, but the prior art fails to teach a method of producing conductive metallic papers, the known conducting papers being either dark colored and composed of various compositions of carbon or depending upon ionic conduction. It is also advantageous that a paper should not require preparatory treatment such as humidification or dehumidification as such operations are expensive.

Accordingly, the principal object of this invention is to produce a novel light colored recording paper suitable for use without preparation or treatment supplementary to the recording process.

Another object of this invention is to produce a metal bearing recording paper which is electrically conductive.

A still further object of this invention is to provide a paper containing aluminum powder and suitable for electrical recording.

As stated above, when aluminum or other metallic powder is mixed with fibrous paper pulp it is found that the electrical conductivity of the resulting product is impaired for the reason that a film of oxide or other material forms between the particles of metal and acts as an insulator. However, we have found that certain materials, which are reducing or neutral to the metallic powders, have the property of promoting conductive intimacy of the particles of powdered metal and preventing formation of highly insulating films on the surface thereof and when the metallic powder is mixed with such material or vehicle a metallic appearing mass is obtained in which the metallic particles make sufficient electric contact to produce a conductive mixture. Various of such materials are disclosed in our aforesaid patent, and include solid fusible com-

pounds, such as monohydric alcohols, simple polyhydric alcohols, sugars, hydroxy carboxylic acids, aldehydes, ketones, and diglycol stearate which is a stearic acid ester of diethylene glycol.

5 Of the foregoing materials, the stearic acid esters of diethylene glycol, both the monostearate and the distearate, have been found to be especially suitable for promoting the conductive intimacy of the particles of powdered metal in an electro-
10 sensitive paper recording blank. They have a low melting point, about 130° F., which simplifies the calendering and smoothing operations for properly conditioning the surface of the paper blank to minimize stylus bounce and the accumu-
15 lation of particles on the point of the stylus as it bears on the surface of the blank during recording operations. They are not rapidly dissolved in water, and thus the finished blanks are less affected by handling, humidity and water-spot-
20 ting. Also, they are waxy materials, and the blanks are less likely to be scratched or abraded, and creases in the paper may be smoothed out more easily.

The diglycol stearate may be melted and mixed
25 with from 30 to 150% of metal powder, such as aluminum, and allowed to cool. This mixture is found to be electrically conductive and may therefore be incorporated in fibrous sheets such as paper. Aluminum is cited by way of example
30 only, since it is obvious that other powdered metals may be substituted, such as copper, brass, bronze, iron, zinc, etc. These metallic powders which are obtained in flaky form, such as aluminum, copper, brass, bronze, etc., are preferred due
35 to the greater light reflecting properties thereof and hence lighter color.

A mixture of one or both of the stearates named above and a metal powder may be incorporated into a sheet of paper by first introducing
40 the aluminum or other metal powder into a beater with the paper pulp in the usual manner, and after the web is at least partially dried the mixture may be impregnated with an aqueous or alcoholic solution of the diglycol stearate. The
45 web may be impregnated by running the same through a bath of molten vehicle or transferring the vehicle from a roll to the web. The web may then be dried and subjected to hot calendering which will melt the diglycol stearate and form a
50 conducting mixture with the metal powder in the paper.

Conductive papers of this nature are usually provided with a color-changing material whereby the passage of marking current through the
55 paper produces a color change in accordance with

the desired pattern to be reproduced thereon. Materials such as lead thiosulphate, lead thiocyanate or mercuric sulphide may be put in the beaters with the metallic powder whereby the material becomes an integral part of the fibrous structure of the paper. The coloring material may also be incorporated as a layer external to the web of the paper. In any case passage of electrical current through the sheet, which has been made conductive in the manner described above, results in reproduction of the desired character or pattern on the surface of the paper. From the above description it is evident that the objects of this invention have been accomplished in that there results a novel light colored metal bearing paper which is a good electrical conductor so that the facsimile or other recording currents readily pass through the impregnated paper base and produce fine definition of the recorded subject matter on the surface of the recording blank.

Further advantages and modifications of this invention will be obvious to those skilled in the art, and therefore we desire that this invention

shall be limited only to the extent required by the prior art and appended claims.

What is claimed is:

- 5 1. A conducting paper comprising a fibrous body containing a mixture of finely divided metal particles and a stearic acid ester of diethylene glycol dispersed throughout said fibrous body, said ester promoting conductive intimacy of said metal particles.
- 10 2. A conducting paper comprising a fibrous body containing a mixture of finely divided metal particles and diethylene glycol monostearate dispersed throughout said fibrous body, said diethylene glycol monostearate promoting conductive
- 15 3. A conducting paper comprising a fibrous body containing a mixture of finely divided metal particles and diethylene glycol distearate dispersed throughout said fibrous body, said diethylene glycol distearate promoting conductive
- 20 intimacy of said metal particles.

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