

UNITED STATES PATENT OFFICE

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PENCIL LEAD

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The object of this invention is unburned pencil leads the lines of which cannot be removed either mechanically (by erasing) or with the usual chemicals (diluted acid and alkaline fluids, oxidizing and reducing solutions and gases, organic solvents), nor fade under the influence of light.

Producing indelible writing by means of writing pencils was frustrated chiefly by the fact that the lines made by the leads stick only to the surface of the paper. When lines are made with indelible pencils, the aniline dye-stuff contained in the lead is being absorbed by the tissue of the paper under the influence of air moisture. It penetrates, however, not deeply into the paper. Besides, the aniline dye-stuff can be destroyed under the influence of chemicals so far as to form a colorless combination; nor are they constant against the influence of light.

Therefore, when producing leads which are to fulfill the purpose set forth above, such writing materials have to be used as do not possess the aforesaid unfavorable qualities. Under this aspect, especially soot must be considered, which is neither destructible by chemicals nor subject to the influence of light. The procedure heretofore known of adding soot to such masses out of which pencil leads are made was, however, not fitted for the present purpose nor was it suited for it, because it was not intended to add to the masses such materials as would enable the paper to be colored (blackened) by soot to the depth of its tissue.

This idea is the basis for the present invention. The results of numerous experiments have shown that soot, when applied in the finest colloid distribution, can be introduced into the interior structure of the paper tissue by using the capillary attraction of the paper tissue and will dye it black, provided that, to the mass mixed with soot, such materials will be added that will lower the surface tension of the boundary surface, soot+paper tissue, and therefore penetrate the paper surface adsorptively. Preferably such materials will be used the polar groups of which will support the activity of the surface, e. g. such materials with hydroxyl, carboxyl and sulphur groups. Also capillary attractive hydrocarbon compounds, as Vaseline, are well suited.

Upon writing, a greater amount of soot gathers at the border lines of the cellulose fibre roughened by writing and of the writing material delivered by the lead, whereby the carbon is absorbed by the paper tissue. It may be surmised that Van der Waal forces and Dipol forces are working as binding forces.

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The lead mass can be mixed with a dye-stuff resistable to the influence of chemicals; or the materials added for the purpose of reducing the surface tension can be dyed with such a material; so that the lines made with the lead can be copied. Colored leads produced in this way make lines which cannot be removed either mechanically or chemically and are constant against the influence of light, even on heavily glued paper.

Besides writing leads also drawing leads can be produced, making lines which, in contrast to drawings made with India ink, cannot be destroyed or removed.

In carrying out the said invention, a lead mass is produced which has e. g. the following substances:

Example I

15 parts soot and 15 parts graphite as writing materials,
30 parts talcum as filling and gliding material,
20 parts calcium stearate as gliding material,
10 parts glycerine as surface-active material,
20 parts tragacanth as binding material.

Example II

15 parts soot,
15 parts graphite,
20 parts talcum,
40 parts calcium stearate,
15 parts glycerine,
40 parts benzoyl cellulose and 55 parts vinyl acetate as binding materials.

Example III

15 parts soot,
15 parts graphite,
35 parts talcum,
35 parts calcium stearate,
15 parts Vaseline,
20 parts tragacanth.

The lead masses constituted according to the above examples can be mixed with a copying dye-stuff e. g. Methylene Blue and/or Sudan dyestuff, if leads are desired which can be copied.

The mass is kneaded, rolled, filtered, and pressed into leads in the known way. The leads readily formed do not change during the process of being burned.

Having thus described the invention, I claim as new and desire to secure by Letters Patent:

1. A pencil lead comprising about 15 parts soot, about 15 parts graphite, from 20 to 35 parts talcum, from 20 to 40 parts calcium stearate, from 20 to 40 parts gum tragacanth, and 10 to 15 parts Vaseline.

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2. A pencil lead comprising about 15 parts soot, about 15 parts graphite, about 30 parts talcum, about 20 parts calcium stearate, about 10 parts glycerine, and about 20 parts gum tragacanth.

3. A pencil lead comprising about 15 parts soot, about 15 parts graphite, about 35 parts talcum, about 35 parts calcium stearate, about 15 parts Vaseline, and about 20 parts gum tragacanth.

4. A pencil lead comprising soot, graphite, talcum, calcium stearate, gum tragacanth, and a surface active agent.

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