

UNITED STATES PATENT OFFICE.

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MANUFACTURE OF LUMINOUS PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 290,772, dated December 25, 1883.

Application filed February 26, 1883. (No specimens.)

To all whom it may concern:

Be it known that I, WILLIAM CULLEN HORNE, a subject of the Queen of Great Britain and Ireland, residing at Aldermanbury, in the city of London, Kingdom of Great Britain and Ireland, have invented certain new and useful Improvements in the Manufacture of Luminous Paper, whereby it is rendered luminous; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the combination of phosphorescent substance with pulp in the manufacture of paper in such a way as to produce paper that will, when seen in a dark place after exposure to light, appear distinctly luminous, and will maintain its luminosity for a considerable time—say, for example, throughout a night—without re-exposure to light, which paper may with great advantage be used for various useful purposes, such as (among others) for match-box labels, luggage-labels, labels for bottles, (especially for bottles containing poisons,) labels for crates containing fragile goods, which, by being thus distinguished, will be rendered less liable to rough treatment when being moved about on dark nights; also, for wall-paper, designs blocked upon which may be highly ornamented, while such paper will be serviceable for lighting up to a useful extent passages and chambers, especially water-closets and other places wherein only moderate light is required; for writing-paper and envelopes, business, private, and Christmas cards, and for advertisements, and especially for railway-coach tablets, which, affixed to the ceilings and backs of compartments, will serve the twofold purpose of producing prominent announcements and rendering the carriage sufficiently light to enable lamps to be dispensed with when passing through tunnels during the day-time.

According to my invention, I use what is known to chemists as “sulphide of calcium,” taking care that it is of a quality that will, after exposure to light, remain (as seen in a dark place) luminous for a considerable time, (say, for instance, a whole night.) Such a substance

is that sold commonly as “Puzey’s Luminous Powder.” This I either sprinkle over the paper-pulp when in the paper-maker’s chest, mixing the pulp and powder (in proportions about one hundred pounds of luminous powder to one hundred and thirty pounds of paper in pulp form, containing as little water as possible to carry it through the cylinders to dry) thoroughly by stirring, and finish in the ordinary way of paper-making; or I make with the luminous powder a paste by adding to it twice its weight of boiling water, and allow the mixture to stand for a period of about thirty-six hours, but stirring it at intervals during that period. I then pour off any supernatant water, and thus obtain as a product a paste, I term “luminous water-paste.” I mix this luminous water-paste with paper-pulp, preferably in the condition known in the trade as “three-quarter stuff,” so that the comparatively heavy luminous substance shall not be liable to settle and work out when the material is passing through the machine-cylinder. Thus, in carrying out my invention, to one hundred and eighty pounds of ordinary paper-pulp in condition containing as little water as possible, and known as “three-quarter stuff,” I add one hundred and forty pounds of luminous water-paste such as above referred to. With these I mix a small percentage of smalt or ultra-marine, if white paper is desired, and I stir the compound well in the paper-maker’s chest. Then I roll it out in the ordinary way between cylinders, or treat it with hand-sieves, until it assumes the condition known to paper-makers as “water-leaf.” This water-leaf I then tub-size in the way usually practiced by paper-makers, using size such as ordinarily employed by them. When desired, I impart to the size a water-proof character by adding to it a small percentage of tannin or bichromate of ammonia or other waterproofing substance; but care must be taken to avoid introducing or leaving in the paper-pulp any substances (such, for example, as acids) that will react on the sulphide of calcium, and thereby lessen or destroy its luminosity. The size ought to be neutral. All bleaching-powder must be removed, and the quantity of alum employed should be as small as possible.

In carrying out the above-described processes it is important that iron tools should not be employed. Wooden tools are suitable.

My invention may, besides being applied in the manufacture of white paper, be employed also in conjunction with colors to produce colored luminous papers; but colors containing lead and the heavy metals in general are not so suitable as other pigments.

I am aware that it is not new to render paper and other substances or articles luminous by the external application to them of a luminous paint composed of sulphide of calcium and a vehicle which will become dry by oxidation or evaporation.

I am also aware that it has been proposed to render paper luminous by the external application thereto of luminous or phosphorescent material, which is uniformly distributed by pressure over the surface of the paper.

I am also aware that it is not new to incorporate luminous or phosphorescent material with celluloid.

I do not claim any of the above-described methods or substances as of my invention, and only desire to cover the production of luminous paper by mixing or incorporating sulphide of calcium with the paper-pulp prior to its manufacture into paper. Luminous paper thus made will remain luminous longer after

exposure to light than will paper rendered luminous by the external application of sulphide of calcium. It is far cheaper than a compound of sulphide of calcium with celluloid, and is suitable for many purposes to which such a compound is not applicable.

Having described the nature of my said invention and the manner of carrying it into practical effect, I desire to have it understood that what I consider to be novel and original, and therefore claim as my invention, is—

1. The improvement in the manufacture of luminous paper, consisting in mixing or incorporating sulphide of calcium, either dry or in a state of paste, with the paper-pulp prior to its manufacture into paper, substantially as herein described.

2. As a new article of manufacture, luminous paper having sulphide of calcium incorporated with the pulp from which it is made, as distinguished from paper rendered luminous by the external application of sulphide of calcium, substantially as herein described.

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