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## METHOD OF REMOVING BLEACHABLE PIGMENTS FROM PAPER CONTAINING LIGNO-CELLULOSIC CONSTITUENTS

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This invention relates generally to the recovery of paper pulp from paper which has been printed upon with a bleachable ink to render such paper available for repeated printings and uses.

The invention resides in the method of so treating paper, at least portions of which have previously been printed upon with a bleachable ink, that the color of the ink will be destroyed and the stock restored to its original color or even to a whiter color while the fibers will have their strength and other desirable properties unimpaired. In short, the process produces from old waste stock a high grade paper having the color and other properties requisite to fit it for use in printing.

Under modern conditions of trade and culture enormous quantities of paper are used for publications which are of only temporary interest or utility. After they have served their purpose they form a large part of the waste material used as raw material in the manufacture of paper board. In the case of paper free from ground wood, the ink is removed and the stock is used in the manufacture of print paper. The processes used for recovering old paper stock for magazine papers, however, are strictly limited to papers free from ground wood and paper containing it must be sorted out at considerable expense to render the resulting selected papers suitable for the deinking processes.

One object of the invention is to make possible the use of mixed papers for the recovery of a clean light colored pulp suitable for the manufacture of any grade of paper that can be made from virgin stock having the same fiber composition.

In general, the broad object of the invention is to render available for repeated printing and use paper containing ligno-cellulosic constituents, such as ground wood, and which has previously been printed upon with bleachable printing ink, and to accomplish this in a simple, practical and economical manner, without impairing the quality of the fibers and while restoring the color of the pulp to its original color or to render it even whiter than it was originally.

The invention proposes the use of pigments in the ink which are free from carbon black or other chemically inert material. The color base of the ink must be made from pigments composed of dyestuffs, metallic lakes of dyestuffs, or any materials having strong color value and at the same time capable of being bleached by the use of hypochlorites of alkaline earths or metals under alkaline conditions maintained alkaline substantially throughout the bleaching reaction. Logwood lakes of iron, tannate of iron and iron lakes of amido naphthol blacks are examples of pigments that have the necessary properties. Pigments of any color can be obtained by the proper choice of dyestuffs and metallic base.

The idea of using pigments that can be rendered colorless by means of hypochlorites has been often suggested and in the case of papers free from ground wood the suggestions are feasible. It is well known, however, that papers containing ground wood cannot be treated with hypochlorites because when it is done in the manner heretofore proposed the carbon dioxide and hydrochloric acid resulting from the action on the pulp will soon create acid conditions. Under neutral or acid conditions chlorination of the lignin present in ground wood results. The compounds formed are distinctly brown in color and they render the pulp unsuitable for use in the manufacture of white paper.

I have discovered that by the addition of alkali during the treatment with hypochlorite at such a rate that a pH above 8 is maintained chlorination is entirely avoided and the reaction is confined to oxidation of the colored constituents so as to render them colorless or substantially so. By the use of sufficient bleaching agent and alkali the stock may be rendered better in quality and lighter in color than it was in the virgin condition.

In the practice of my invention, I take the old printed paper printed with a pigment made, for instance, from the iron lake of log wood and beat the papers in suitable equipment known to the art such as a rod mill described in my Patent No. 1,654,624. To one ton of paper I use six tons of water and twenty pounds of caustic soda. Room temperatures are suitable. Where casein coated papers occur in the stock a temperature of 140° F. may be obtained by blowing steam into the rod mill. The macerated paper stock is conveyed to suitable bleaching equipment such as Belmers, high density bleachers, or other types known to the art and treated with a solution containing two hundred pounds of calcium hypochlorite per ton of paper treated. Other alkali hypochlorites may be used. For example, the use of either sodium hypochlorite or of magnesium hypochlorite is feasible. More or less may be used depending on the whiteness desired for the finished stock. During the bleaching reaction the mass will lose alkalinity rapidly and as soon as it is below a pH of 8 as shown by suitable indicator caustic soda, hydrated lime or any other

suitable alkali may be added to raise the alkalinity to above a pH of 8. From five to ten pounds of caustic soda per ton of pulp is usually sufficient, added in amounts of from two to five pounds at a time. After the bleaching action is complete the pulp is washed and is then in condition for use in the paper mill.

The invention claimed is:

1. The hereindescribed method of removing bleachable printing ink pigments from paper pulp containing ligno-cellulosic constituents which consists in subjecting the paper to the action of an alkaline hypochlorite to bleach the pigment and adding an alkali to the mass from time to time throughout the bleaching operation whereby to maintain the alkalinity of the mass, confine the reaction to the oxidation of the color constituents thereof and preclude chlorination of the lignin present therein throughout the bleaching reaction.

2. The hereindescribed method of removing bleachable printing ink pigment from paper containing ligno-cellulosic constituents which consists in subjecting the pigment of the paper to the action of a bleaching agent consisting of calcium hypochlorite to bleach the pigment and maintaining the alkalinity of the mass throughout the bleaching reaction by adding caustic soda thereto whereby to preclude chlorination of the lignin present in the mass and confine the reaction to the oxidation of the color constituents thereof.

3. The hereindescribed method of removing bleachable printing ink pigments from paper containing ligno-cellulosic constituents which consists in subjecting the pigments to the action of an alkaline hypochlorite to bleach the pigment and adding an alkali to the mass from time to time to maintain the alkalinity thereof substantially at or above a pH of 8 throughout the bleaching reaction whereby to preclude chlorination of the lignin present in the mass and confine the reaction to the oxidation of the color constituents thereof.

4. The hereindescribed method of removing bleachable printing ink pigments from paper containing ligno-cellulosic constituents which consists in subjecting the paper to the action of an alkaline hypochlorite to bleach the pigments therefrom and in adding an alkali to the mass during the bleaching operation to maintain the mass alkaline throughout the bleaching reaction whereby to preclude chlorination of the lignin present in the mass and confine the reaction to the oxidation of the color constituents thereof.

5. The hereindescribed method of removing bleachable printing ink pigments from paper containing ligno-cellulosic constituents which consists in subjecting the material to the action of an alkaline hypochlorite to bleach the pigment and an alkali sufficient in quantity to maintain alkalinity substantial throughout the bleaching reaction whereby to preclude chlorination of the lignin present in the mass and confine the reaction to the oxidation of the color constituents thereof.

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