

UNITED STATES PATENT OFFICE.

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PROCESS FOR REMOVING PRINTERS' INK FROM PRINTED PAPER BY MEANS OF BLEACHING SUBSTANCES HAVING AN ALKALINE ACTION.

988,874.

Specification of Letters Patent.

Patented Apr. 4, 1911.

No Drawing.

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To all whom it may concern:

Be it known that we, HUGO HENKEL, Ph. D., chemist, and OTTO GESSLER, director, subjects of the King of Prussia and the King of Bavaria, residing at Dusseldorf, Prussia, and Augsburg, Bavaria, Germany, have invented certain new and useful improvements in processes for removing printers' ink from printed paper by means of bleaching substances having an alkaline action, of which the following is a specification.

It has been attempted for a long time to use printed paper again for paper manufacture. The attempts have, however, failed hitherto, owing to the printers' ink adhering to the said paper, having such a great dyeing power that only infinitely small percentages of printed paper could be used for manufacturing new paper. Moreover, only an inferior quality of paper was produced. It has also been attempted to remove printers' ink from the paper but such attempts have not given any satisfactory result. This is due chiefly to the fact that printers' ink mainly consists of soot mixed with oil and settled so firmly in the slimy mass, when the printed paper is treated, that it is impossible to wash it out.

This invention relates to a process by means of which it is possible to free the printed paper from printers' ink without the above mentioned disadvantages.

The process chiefly consists in the soaked and divided paper being treated in an alkaline solution of peroxids in the presence of substances which during the process pass into a colloidal state. As peroxids the peroxids of alkalis or of earth alkalis may be employed, as, for instance, sodium superoxid Na_2O_2 , sodium perborate $\text{NaBO}_3 + 4\text{H}_2\text{O}$, sodium persulfate $\text{Na}_2\text{S}_2\text{O}_8$, potassium superoxid K_2O_2 , potassium perborate, potassium persulfate, magnesium superoxid MgO_2 , barium superoxid BaO_2 and the like. As colloidal substances either silicic acid, already in colloidal state, can be added or compounds can be used which, during the process, pass into the colloidal state, for instance silicates, alumina compounds and the like. The silicic acid develops in a colloid state as the hydrosol of the acid passes over into the hydrogel of the acid. Fine transparent flakes are then formed which may be called colloid silicic acid. It is preferred to employ the so-called

"soluble silicic acid" which is on the market and consists of a compound of water glass and soda, which upon being dissolved in water undergoes a hydrolytic decomposition of such nature that the silicic acid is precipitated in colloidal form. This precipitation of the silicic acid commences after a few minutes and is completed within four or five hours. Of course, the rapidity of this precipitation depends upon the concentration and the temperature. Newly precipitated aluminum hydroxid $\text{Al}(\text{OH})_3 + x\text{H}_2\text{O}$ acts in the same manner.

It has been found that the fat contained in printers' ink, is modified in the alkaline solution of the superoxids in such manner that it loses its binding or cementing force, whereupon it becomes possible for the printers' ink to be converted into an emulsion by the colloidal silicic acid and thus easily separated from the fibers.

The process is carried out for instance, in such manner that the old printed paper is stirred in warm water, whereupon the above mentioned additions of superoxids and colloidal silicic acid, are made. After the reaction is completed, the paper mass is separated from the liquid and can be further purified by additional washing.

Compared to other bleaching substances suggested for the same purpose such as Javelle water chlorid of lime and the like, the peroxids used in the process just described, have the great advantage that the fibers are not so strongly attacked as by the other substances. The peroxids on the contrary act throughout in a harmless manner, so that the material bleached is not damaged. Altogether the bleaching action of the peroxids in the present process plays merely a secondary part. Of great importance is the action of the peroxids on the printers' ink of the paper, the oily binding medium of which is resinified or saponified and thus dissolved. The ink or soot no longer adhering to the fiber, can be absorbed by the colloidal silicic acid. This action of gelatin can be compared to the well known process of forming an emulsion when washing with soap, in which it is assumed that the soap is hydrolytically split in the water into free alkali and acid-fatty acid-salt, the former dissolving the dirt while the latter incloses and removes the particles of dirt during the washing action. A similar dissolving, ab-

sorption and easy removal of printers' ink has been impossible hitherto, so that the attempts to treat newspaper again were hitherto unsuccessful.

- 5 By means of the process according to this invention the said removal of printers' ink can be effected in a simple, quick and cheap manner, without the fibers being damaged or partly destroyed, as is the case when
10 chlorin compounds are used.

That what we claim and desire to secure by Letters Patent is:

1. A process for removing printers' ink from printed paper pulp by means of
15 bleaching substances having an alkaline action, characterized by the printed paper pulp being treated with peroxids in the presence of substances which during the process pass into a colloidal state.

- 10 2. A process of removing printers' ink from printed paper pulp by means of bleaching substances having an alkaline action, characterized by the printed paper pulp being treated with an alkaline solution
15 of a peroxid of alkali in the presence of substances which during the process pass into a colloidal state.

3. A process for removing printers' ink from printed paper pulp by means of

bleaching substances having an alkaline action, characterized by the printed paper pulp being treated with an alkaline solution of a peroxid of earth alkali in the presence of substances which during the process pass into a colloidal state. 30 35

4. A process for removing printers' ink from printed paper pulp by means of bleaching substances having an alkaline action, characterized by the printed paper pulp being treated with peroxids and a substance being already in a colloidal state. 40

5. A process for removing printers' ink from printed paper pulp by means of bleaching substances having an alkaline action, characterized by the printed paper pulp being treated with peroxids and colloidal silicic acid. 45

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

HUGO HENKEL. [L. s.]
OTTO GESSLER.

Witnesses as to Hugo Henkel:

OTTO KÖNIG,
WILLY KLEIN.

Witnesses as to Otto Gessler:

LOUIS MUELLER,
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