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FIP8309 OR 674,759
TREATMENT & CHEMICAL MODIFI-
ATION OF TEXTILES & FIBERS,

UNITED STATES PATENT OFFICE.

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BLEACHING FABRICS.

SPECIFICATION forming part of Letters Patent No. 674,759, dated May 21, 1901.

Application filed February 19, 1900. Serial No. 5,825. (No specimens.)

To all whom it may concern:

Be it known that we, CHARLES FREDERICK CROSS, residing at 4 New Court, Carey street, London, England, and GEORGE ALFRED PARKES, residing at Muckmore, county of Antrim, Ireland, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Bleaching Vegetable Textile Fabrics, (for which we have made application for a patent in Great Britain, No. 25,076, dated December 18, 1899,) of which the following is a specification.

Our invention relates to the bleaching of vegetable textile materials, chiefly those made of cotton and flax, and to those steps of the entire bleaching process in which the materials are treated with alkaline reagents at more or less elevated temperature.

The immediate object of the present invention is to provide means for safely carrying out a drastic alkaline treatment under the condition of reducing to a minimum the proportion of alkaline lye to the material treated.

It is well known that in ordinary boiling in vomiting-keirs the proportion of liquor to goods is from seven to ten to one. In keirs with forced circulation it has been possible to reduce this to about one-half the above proportion. In our improved method the proportion is so far reduced that the process becomes one of steaming (in contact with the active solution) rather than boiling, and the circulation of the solution is consequently dispensed with. At the same time we associate with the more active alkali, such as caustic soda, other reagents having specific effects (*a*) upon the physical properties of the active solution and (*b*) upon the constituents of the fibers which it is required to attack and remove. Thus for treating linen-webs we prepare an aqueous solution of one to two per cent. caustic soda, to which we add silicate of soda to increase its viscosity and a mineral or other suitable oil emulsified with a soda or potash-soap solution. The proportion of the ingredients of the mixture may be varied. We find the following a mixture suitable for linen-webs: 1.75 pounds soap, 14.0 pounds silicate, 1.5 pounds caustic soda, (NaOH,) 1.75 pounds oil, and ten gallons water. For treating flax goods of open texture, such as cambrics or damasks, we increase the water to fifteen gallons, retaining the above proportions of the other ingredients. This mixture at 30° to 40° centigrade is of a gelatinous character, so that it does not run to form uneven patches. It is placed in the box of a starch-mangle and the webs of linen are run through it at their full width, and after passing through the squeezing-rollers are run into a roll or batch. Cotton piece-goods are similarly treated. On the outside of the roll a few folds of fabric, which may be remnants or fents also saturated with the solution, should be wound to form a protective covering and prevent unequal action on the fabric. In the roll or batch they are exposed to the action of "dry" steam at pressure not exceeding four pounds per square inch for one to two hours. By this treatment the non-cellulose constituents are powerfully attacked. The goods are afterward subjected to an ordinary open boil to clear away the constituents thus attacked. This boiling may be effected in apparatus of the kind described in the specification Serial No. 728,783, in which case the steaming may be effected in the same apparatus before the boiling. This operation may be carried out in many cases upon the "brown" or "gray" goods. In other cases it is necessary to prepare them by a preliminary lime-boil or other scouring process.

By the treatment above set forth the linen-webs are brought at once to the condition suitable for the "dipping" and first course of bleaching operations. Cotton fabrics are so far advanced that they may be completely bleached by the ordinary treatment with bleaching-powder solution, scouring, and washing.

The mechanical arrangements for treating yarns require to be modified. Warps or chains may be saturated with the active solution in continuous length, as in the case of fabric; but for impregnating yarns in the hank it is convenient to operate, as in a dyeing process, by being immersed in the solution and giving the usual manipulation for evenly distributing the solution, and then laid up to drain and freed from excess of solution by

squeezing-rollers or centrifugal action. The yarns may then be placed in a cage to be steamed, this cage being preferably lined with remnants or fents (which had been also impregnated with the alkaline solution) to protect the outside portions of the yarn.

For goods of comparatively slight make, whether fabric or yarn, the proportions of the chemical agents in the active solution are reduced, especially the caustic soda, the proportion of which may be from a 0.5 to a 1.5 per cent. solution; and the same applies in producing limited bleaching effects, such as half-bleaches and scoured shades. The two essentials of our treatment are, first, steaming in the rolled batch, the cloth being at full width, and, second, applying to the cloth or goods a mixture of reactive chemicals, as specified, designed to attack in a specific manner the non-cellulose constituents of the fiber, which it is the purpose of the bleaching process, and more particularly the alkaline treatment, to remove. Our mode of treatment gives results not attained by any previously-known process. Thus what we effect is (*a*) cotton cloth taken from the gray, in the one treatment in two stages—that is, first, steaming in the batch, and, second, clearing-boil—is fully "bottomed" or prepared for full white with one treatment with weak "chemick" or bleaching-powder, and we get the "madder-bleach" in printer's cloth and a full white or Egyptian cotton by means of the single alkaline treatment, and (*b*) linen goods can be taken in many cases in the gray, in some cases for a lime-boil, and in the one single alkaline treatment are fully bottomed and prepared for the dipping or bleaching treatment as usually understood. Thus in the "North-of-Ireland" linen-bleach we replace four successive lye-boils, with attendant mill-washes and incidental "grassing," by the one exhaustive operation under the conditions specified.

We are aware that textile fabrics—*i. e.*, woven goods—have been saturated with alkaline solutions and steamed; but the fabrics have not been so treated at the width nor have solutions been employed having the particular physical character herein specified, and consequently there has been great unevenness in the treatment, accompanied by tendering, due to local concentration of the active solution and excessive chemical action. We therefore make no general claim for a process of steaming with alkaline solutions; but,

Having thus particularly described and ascertained the nature of this invention and the best means we know of carrying the same into practical effect, we claim—

The herein-described method of bleaching vegetable fabrics, which consists in saturating them at the full width with a mixture of soap, silicate, caustic soda, oil and water, and then exposing them thus saturated to the action of steam.

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

CHARLES F. CROSS.
GEORGE A. PARKES.

Witnesses:
D. LAWSON,
P. SIMONTON.