Patented Nov. 20, 1928. 1,692,774

UNITED STATES PATENT OFFICE.

LEWIS GRAFFLIN, OF SPRINGFIELD, OHIO, ASSIGNOR TO BALL BROTHERS COMPANY, OF MUNCIE, INDIANA, A CORPORATION OF INDIANA.

PAPER AND PAPER STOCK AND METHOD OF PRODUCING THE SAME.

No Drawing. Application filed June 18, 1925. Serial No. 38,105.

In the manufacture of paper suitable for use in making shipping packages it is necessary that such paper be capable of withstanding certain stresses specified by the railroads and, in order to meet such requirements, it has been the custom, heretofore, to produce such paper from a pulp composed in part of disintegrated scrap paper to which has been added a specified proportion of wood fibre made by a process yielding a desired proportion of fibre of sufficient length and strength.

Such fibre generally reaches the paper manufactured in sheets, commonly known as "kraft", which are then disintegrated and added to the disintegrated mass of scrap paper, a sufficient quantity of sizing—such as rosin—being added to make a sufficiently water-proof product.

"Kraft" has heretofore been produced by digesting and disintegrating wood chips in a sulphate solution, washing away the said solution and matting the washed fibres. The term "kraft" as used herein is intended to include such material now commonly known in the art by that name, and either in paper or pulp form.

The object of my present invention is to produce a paper having the desired and necessary characteristics for shipping packages, from a straw fibre and without the use of an added water-proofing ingredient.

To this end I place a sufficient quantity of straw in a digester, add thereto an aqueous sodium sulphate solution having a strength of about 3% Baumé, and after closing the digester, introduce steam at approximately 11 pounds pressure, more or less, maintaining such pressure for about ninety minutes.

Following the cooking operation the mass is passed through a disintegrator, preferably of a type which will rub the fibres at right angles to their lengths rather than by beating. When the fibres have been thoroughly disintegrated the mass, without draining or washing, may be immediately mixed with a desired proportion of pulp formed from scrap paper and passed to the paper forming machine, the result being a paper capable of withstanding the prescribed tests for shipping-package, constituents and being sufficiently water-proof without the addition of the usual water-proofing ingredients.

If desired, the unwashed mass of digested straw and the digesting liquor may be matted into a substitute for "kraft" to be later disintegrated and mixed as described above.

It is essential that the sodium sulphate solution be comparatively weak (a variation of from about 1.75% Baumé to about 5% Baumé being permissible, though approximately 3% Baumé apparently gives the best results). There may also be some variations in the steam pressure used and in the length of time of cooking.

In practice I have found that a very satisfactory product for liners—or face sheets—of corrugated board results from the use of 675 pounds of a good grade of disintegrated scrap paper and 325 pounds of sulphated straw (as described above) and that for corrugated filler sheets a somewhat lower grade of disintegrated scrap paper may be used.

It will be understood that in any method of producing wood fiber by a digesting process the capillary bores of the fibers become thoroughly filled with the digesting liquor and that, of course, the exteriors of the fibers become coated with such liquor. Heretofore the effluent from the digesters has been subject to a thorough washing action for a considerable number of hours, the washing proceeding by a constant addition of fresh water and withdrawal of preceding water so that the digesting liquor has been thoroughly washed out and away from both the walls and bores or the fibers.

My present process, unlike prior methods, involves the utilization of the fibers, at the wet end of the paper forming machines, in a condition where a substantial quantity of treating liquor is retained in and around the fibers so that a substantial quantity of the digester liquor becomes incorporated in the paper product.

I claim as my invention:

1. A paper containing straw fibres and the residue of a weak sodium sulphate liquor in which the straw has been disintegrated.

2. An ingredient for use in the manufacture of paper, consisting of a weak sodium sulphate liquor, and straw fibers which have been produced in said liquor.

3. The method of producing paper which comprises the admixture, with a suitable

pulp, of a pulp composed of unwashed fibres of straw which have been disintegrated in a weak sodium sulphate liquor.

4. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor under heat and matting the same into sheets while containing a substantial residue of said liquor.

5. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor of approximately 3% Baumé under heat, and matting the same into sheets while containing a substantial residue of said liquor.

6. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor under heat of approximately 242 F., and matting the same into sheets while containing a substantial residue of said liquor.

7. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor of approximately 3% Baumé under heat of approximately 242 F., and matting the same into sheets while containing a substantial residue of said liquor.

8. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor under heat, adding the same to a quantity of pulp suitable for paper, and forming paper from such mixture while containing a substantial residue of said liquor.

9. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor of approximately 3% Baumé, under heat, adding the same to a quantity of pulp suitable for paper, and forming paper from such mixture while containing a substantial residue of said liquor.

10. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor under heat of approximately 242 F., adding the same to a quantity of pulp suitable for paper, and forming paper from such mixture while containing a substantial residue of said liquor.

11. The method of producing paper which comprises the disintegration of straw in a weak sodium sulphate aqueous liquor of approximately 3% Baumé under heat of approximately 242 F., adding the same to a quantity of pulp suitable for paper, and forming paper from such mixture while containing a substantial residue of said liquor.

In witness whereof, I have hereunto set my hand at Springfield, Ohio, this 13th day of June, A. D. one thousand nine hundred and twenty-five.

LEWIS GRAFFLIN.