

UNITED STATES PATENT OFFICE.

ALBERT E. REED, OF "THE HENLEYS WOOKEY," ENGLAND.

IMPROVEMENT IN THE MANUFACTURE OF PAPER.

Specification forming part of Letters Patent No. 128,978, dated July 16, 1872.

To all to whom it may concern:

Be it known that I, ALBERT EDWIN REED, of The Henleys Wookey, in the county of Somerset, England, a subject of the Queen of Great Britain, have invented or discovered new and useful "Improvements in the Manufacture of Paper;" and I, the said ALBERT EDWIN REED, do hereby declare the nature of the said invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof—that is to say,

In preparing straw, esparto grass, and other raw vegetable fibers for the manufacture of paper, it is usual to boil the raw fiber in an alkaline solution and afterward to remove the alkali from it by washing, in order to permit of the efficient action of the bleaching liquor in which the fiber is subsequently steeped. The better to effect this removal of the alkali the fiber or pulp has also in some cases been pressed by hydraulic pressure to expel, by this means, as much as possible of the alkaline liquor, and the fiber has then been washed in a washing engine or bath, by means of a constant flow of fresh water, until the alkali has been carried off by the water. It is also customary with some manufacturers to add sulphuric acid at a late stage of the washing, but always in connection with the washing process, and at a stage when the water, leaving the engine, is comparatively clear, in order to sour the fiber and facilitate the subsequent action of the bleaching liquor on the fiber, and at the same time to insure the destruction of any remaining alkaline taint. It has, however, always been deemed necessary to have recourse to the washing process, and hitherto it has not been dispensed with in the manner proposed by me, as hereinafter described.

It should be explained that the ordinary method of washing has been to agitate the fiber in a machine technically called a potcher or washing engine. Revolving in this engine and connected to it is a "drum-washer," which continuously draws out and discharges the discolored water from the fiber, clean water at the same time being supplied to the fiber through a tap. This process continues until the coloring matter is removed and the water taken out and discharged by the drum-washer

is comparatively clear. The general principle by which manufacturers have been guided in this process appears to be that the fiber, after being boiled, contains a large quantity of objectionable refuse and coloring matter, necessitating the use of a washing process for its removal. The removal of the alkali by washing, as above described, not only necessitates the employment of a large quantity of water, but there is also a loss of a considerable percentage of fiber, and great inconvenience is caused by pollution of streams arising from the discharge of the wash-waters into them.

My invention consists in the employment of an acid, as hereinafter described, for the purpose of neutralizing the alkali, and enabling the ordinary washing process to be dispensed with, whereby great economy is effected and the pollution of streams by the washing process is avoided.

In carrying out my invention I proceed as follows: After the raw fiber has been boiled in an alkaline solution I remove from it as much as possible of the black alkaline liquor by pressing it in a hydraulic press, so as to leave only about sixty-five per cent. of moisture in the fiber. I then agitate the fiber in a bath containing dilute acid, by preference either sulphuric acid or hydrochloric acid. I prefer to employ for this purpose a potcher or washing engine, similar in form to that ordinarily used, with the exception that the drum-washer and other apparatus for washing are dispensed with. The tank or bath and the agitating-roll and other parts of the engine should be made of materials which will not be acted upon by the acid solution, and the use of iron should be avoided.

Before introducing the fiber into the engine the acid solution with which the fiber is to be treated is prepared in the bath. This I do by first introducing into the bath the requisite quantity of water and then adding to it the acid. I prefer that the acid solution should be of a strength of about one quart of sulphuric acid of commerce, or an equivalent quantity of hydrochloric acid, to about one hundred and twenty gallons of water. This will vary more or less, according to the quantity of alkali retained in the fiber after pressing or other drainage treatment. These quantities are suitable for the treatment of the material ob-

tained from about one hundred weight of crude esparto fiber of ordinary quality. The quantity of acid used should be very slightly in excess of the quantity required for neutralizing the alkali contained in the fiber operated upon. When the acid-bath has been prepared to the requisite strength the fiber is introduced into the engine and is agitated in the solution by the revolving-roll of the engine until the fiber is sufficiently broken in and every part has been equally subjected to the action of the acid. Afterward the pulp may be run off through the outlet-valve on to perforated tiles or other draining surfaces to separate the water from it. It will be found that pulp, treated as above described, will require a longer time for draining than pulp washed in the ordinary way. To expedite the extraction of the liquid from the pulp I run it from the breaking-engine, in which the neutralization has been effected, into the perforated box of a hydraulic press and subject it to hydraulic pressure so that the moisture held in the fiber is reduced to about fifty or sixty per cent.; it is then in a suitable state to be bleached in the ordinary way of bleaching.

The reduction of the moisture may be effect-

ed by other mechanical applications for separating the liquid from the pulp instead of by hydraulic pressure. I prefer that the chlorine solution, in which the fiber is to be ultimately steeped for bleaching, should be of such strength as indicates about three degrees on Twaddle's No. 1 hydrometer. The bleaching may be conducted in the ordinary manner, and the pulp afterward treated as usual for the manufacture of paper.

Having thus described the nature of my said invention and the manner of performing the same, I would have it understood that I claim—

In the treatment of esparto grass and other fibrous substances, the use of acid as hereinbefore described, for the purpose of neutralizing the alkali and enabling the washing process hitherto employed to be dispensed with.

ALBERT E. REED.

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