PATENT SPECIFICATION 580,663

Convention Dates (Australia)

July 29, 1943.
Aug. 11, 1943.
Sept. 14, 1943.
Dec. 11, 1943.

Corresponding Applications in United Kingdom

No. 13682/44.
No. 13683/44.
No. 13684/44.
No. 13685/44.
} dated July 18, 1944.

(One Complete Specification left under Section 91 (2) of the Patents and Designs Acts, 1907 to 1942.)

Specification Accepted: Sept. 16, 1946.

COMPLETE SPECIFICATION

Improvements in or relating to the Obtaining of Ramie

I, MARK MICHAEL WISE, a British Subject, of 5, Clanalpine Street, Mosman, near Sydney, New South Wales, Australia, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has relevance to the obtaining of Ramie.

Ramie (Rhea Ramie or Chinese grass) is the fibre of several varieties of the genus Boehmeria (M.O. Urticaceæ). As as present known it is obtained by the decortication and de-gumming of the white-leaved Boehmeria nivea and the green-leaved Boehmeria tenacissima.

Ramie fibre is used for making paper, mats and sails, tapestry, tablecloths, damasks, ropes and cords, and also other articles for the textile industry and for silk decoration and otherwise. It is the principal yarn from which gas-mantle fabrics are knitted and woven.

According to the present invention Ramie stems, shortly after the cutting thereof, are subjected to steam treatment under a pressure above atmospheric pressure in a closed receptacle, the said stems being then dried and passed in the dried condition between rollers to effect separation of the said fibres from the other substances of said stems. The invention thus comprises three essential steps, viz.:—

1. Pressure steam treatment of Ramie stems.
2. Drying the treated stems.
3. Crushing the stems whilst in the dry condition.

By one manner of operation of such improved method green Ramie stems, shortly after the cutting thereof and with the leaves stripped therefrom, are subjected to steam treatment under pressure which is above atmospheric pressure in a closed receptacle for the purposes hereinafter mentioned. The steam treated stems are then suitably dried and maintained in a dry condition and then passed between rollers to crush the stems. After being crushed between the rollers which operation separates the fibres from the bark and wood of the stems, the fibres, if necessary, are subjected to further treatment, preferably an air blast or beaters to remove minute particles of bark or other substances which may not be completely separated from the fibres and are clinging thereto.

The term "Green Ramie Stems" is to be understood as Ramie stems which are naturally in, or have been kept in or restored to, substantially that condition in which said stems existed at the cutting thereof for treatment according to this invention.

According to another manner of operation of such improved method, the cutting of the Ramie stems to be treated is done when the said stems have arrived at maturity which is indicated by the bark thereon having turned to brown colour. Before steam treatment as beforementioned the leaves are removed from the stems. The steam treated stems are suitably dried and maintained in a completely dry condition. Subsequently, preferably within a period of time not exceeding ten days from the cutting of the stems, the steam treated stems are passed between rollers for the purpose of being crushed as hereinbefore stated. In this crushing operation the Ramie fibres may or may not be stripped from the stems. If necessary, the separated fibres are subjected to the further treatment aforesaid. It has been found that the Ramie fibres are more readily separated from the bark and wood of the stems when the said stems have been allowed to turn to brown colour before the cutting thereof for treatment.

According to another manner of opera-

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tion of such improved method, the bark of the Ramie stems to be cut and treated is allowed to be undergoing that change from green to brownish colour at the bases of the stems which is indicative of the degree of maturity of the stems before the desired Ramie stems are selected and cut for treatment as beforementioned.

The rollers used for operating on the treated dried Ramie stems abovementioned may be fluted or other suitable rollers; such roller treatment is for the purpose of crushing the said steam treated and dried Ramie stems. If the said rollers are fluted, they may be in two sets, one of which may have wide shallow teeth, and the other narrow deep teeth. The purpose of the steam treatment of the cut Ramie stems is to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of the Ramie fibres. The said steam treatment may be at a pressure of 15—40 lbs. per square inch and it may be carried on for a period of 1 to 6 hours. The said stems can be fed as may be desired to the closed steam treatment receptacle, but it has been found highly advantageous to feed the stems in vertical position relatively to the steam treatment receptacle. It has been found that when the stems are fed into the steam treatment receptacle in vertical position a better disintegration of the stems takes place when crushed between the rollers. The said steam treated stems are then dried by exposure to dry atmospheric air or to hot air or by any other suitable method or means. By such drying the stems may also be made brittle. The said drying operation may be progressed through say a period of 8 to 30 hours or longer.

To further treat the Ramie stems which has been subjected to roller treatment as beforementioned for the purpose of removing the bark and wood of the said stems from the Ramie fibres, the said stems after crushing thereof by the said roller treatment may be subjected to further treatment by beaters or by air blast or to other suitable treatment. The raw Ramie fibres thus obtained may then, if desired, be baled for storage or transport.

The waste bark and wood may, if desired, be used as fuel for raising steam for the steam treatment of the Ramie stems as beforementioned or either or both such waste materials may be used for fertilizing purposes. The waste wood may also, if desired, be used after treatment by known methods for the manufacture of paper, fibre boards, artificial fibres, or other manufacturers of cellulosic nature.

To ensure that the bark of the Ramie stems treated as beforementioned will be more readily powdered and removed from the Ramie fibres without chemical treatment it is very advisable that the bark of the Ramie stems shall have changed from or are undergoing change from green to brownish colour before the said stems are cut for treatment in accordance with the invention.

For further de-gumming in case of necessity of the said obtained Ramie fibres, the latter may be ~~subjected~~ to digestion in an aqueous dilute alkaline solution, say sodium hydroxide 0.5% in water. The digesting operation may be performed for a period of say between 15 minutes to 2 hours. Subsequently the said digested fibres may be submitted to bleaching treatment by immersing the said fibres in an aqueous saturated solution of bleaching powder, say from 1 to 48 hours, or in a solution of mineral acid and bleaching powder for a shorter period, or by subjecting the said fibres to the action of chlorine gas. Other means or methods may be adopted for the bleaching of the obtained Ramie fibres. Subsequent to the bleaching treatment of said fibres they are suitably washed and dried when they may be combed ready for use.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Method of obtaining Ramie, consisting in subjecting green Ramie stems shortly after the cutting thereof to steam treatment under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said stems, and passing said stems in the dried condition between rollers to effect separation of the said fibres from the other substances of said stems.

2. Method of obtaining Ramie according to Claim 1, characterized by the further step that the fibres when separated from the other substances of the stems are subjected to air blast or beater treatment to remove minute particles of bark or other substances which may not be completely separated from the fibres and are clinging thereto.

3. Method of obtaining Ramie, consisting in subjecting Ramie stems of which the bases have turned to brown colour to steam treatment shortly after the cutting thereof, the said steam treatment being under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said

tion of such improved method, the bark of the Ramie stems to be cut and treated is allowed to be undergoing that change from green to brownish colour at the bases of the stems which is indicative of the degree of maturity of the stems before the desired Ramie stems are selected and cut for treatment as beforementioned.

The rollers used for operating on the treated dried Ramie stems abovementioned may be fluted or other suitable rollers; such roller treatment is for the purpose of crushing the said steam treated and dried Ramie stems. If the said rollers are fluted, they may be in two sets, one of which may have wide shallow teeth, and the other narrow deep teeth. The purpose of the steam treatment of the cut Ramie stems is to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of the Ramie fibres. The said steam treatment may be at a pressure of 15—40 lbs. per square inch and it may be carried on for a period of 1 to 6 hours. The said stems can be fed as may be desired to the closed steam treatment receptacle, but it has been found highly advantageous to feed the stems in vertical position relatively to the steam treatment receptacle. It has been found that when the stems are fed into the steam treatment receptacle in vertical position a better disintegration of the stems takes place when crushed between the rollers. The said steam treated stems are then dried by exposure to dry atmospheric air or to hot air or by any other suitable method or means. By such drying the stems may also be made brittle. The said drying operation may be progressed through say a period of 8 to 30 hours or longer.

To further treat the Ramie stems which has been subjected to roller treatment as beforementioned for the purpose of removing the bark and wood of the said stems from the Ramie fibres, the said stems after crushing thereof by the said roller treatment may be subjected to further treatment by beaters or by air blast or to other suitable treatment. The raw Ramie fibres thus obtained may then, if desired, be baled for storage or transport.

The waste bark and wood may, if desired, be used as fuel for raising steam for the steam treatment of the Ramie stems as beforementioned or either or both such waste materials may be used for fertilizing purposes. The waste wood may also, if desired, be used after treatment by known methods for the manufacture of paper, fibre boards, artificial fibres, or other manufacturers of cellulosic nature.

To ensure that the bark of the Ramie stems treated as beforementioned will be more readily powdered and removed from the Ramie fibres without chemical treatment it is very advisable that the bark of the Ramie stems shall have changed from or are undergoing change from green to brownish colour before the said stems are cut for treatment in accordance with the invention.

For further de-gumming in case of necessity of the said obtained Ramie fibres, the latter may be ~~subjected~~ subjected to digestion in an aqueous dilute alkaline solution, say sodium hydroxide 0.5% in water. The digesting operation may be performed for a period of say between 15 minutes to 2 hours. Subsequently the said digested fibres may be submitted to bleaching treatment by immersing the said fibres in an aqueous saturated solution of bleaching powder, say from 1 to 48 hours, or in a solution of mineral acid and bleaching powder for a shorter period, or by subjecting the said fibres to the action of chlorine gas. Other means or methods may be adopted for the bleaching of the obtained Ramie fibres. Subsequent to the bleaching treatment of said fibres they are suitably washed and dried when they may be combed ready for use.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Method of obtaining Ramie, consisting in subjecting green Ramie stems shortly after the cutting thereof to steam treatment under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said stems, and passing said stems in the dried condition between rollers to effect separation of the said fibres from the other substances of said stems.

2. Method of obtaining Ramie according to Claim 1, characterized by the further step that the fibres when separated from the other substances of the stems are subjected to air blast or beater treatment to remove minute particles of bark or other substances which may not be completely separated from the fibres and are clinging thereto.

3. Method of obtaining Ramie, consisting in subjecting Ramie stems of which the bases have turned to brown colour to steam treatment shortly after the cutting thereof, the said steam treatment being under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said

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treated stems, and passing said stems in the dried condition between rollers to effect separation of the Ramie fibres from other substances of said stems.

4. Method of obtaining Ramie according to Claim 3, characterized by the further step that the fibres when separated from the other substances of the stems are subjected to beater and/or air blast treatment or otherwise to remove minute particles of bark or other substances which may not be completely separated from the fibres and are clinging thereto.

5. Method of obtaining Ramie according to Claim 1, or Claim 3, in which the steam treatment of the stems is carried on under a pressure of 15—40 lbs. per square inch and for a period ranging from 1 to 6 hours.

6. Method of obtaining Ramie, consisting in subjecting Ramie stems to steam treatment shortly after the cutting thereof but not before said stems have turned to brown colour, the said steam treatment being under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said stems, passing said stems between rollers to crush said stems, and subsequently subjecting said stems to beater and/or air blast treatment or otherwise for the purpose of removing the Ramie fibres from other substances of said stems.

7. Method of obtaining Ramie, consisting in subjecting mature Ramie stems indicated by being of a brown colour to steam treatment shortly after the cutting thereof under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said steam treated stems, maintaining said dried stems in dry condition, passing said stems between rollers which crush the stems, and subsequently treating said crushed stems to remove the Ramie fibres from the bark and wood of said treated stems.

8. Method of obtaining Ramie, consisting in subjecting Ramie stems to steam treatment shortly after the cutting thereof under a pressure above atmospheric pressure in a closed receptacle to effect loosening of the Ramie fibres or such loosening and the de-gumming or partial de-gumming of said fibres, drying said stems, passing said stems between rollers, and subsequently treating said stems to effect separation of the Ramie fibres from other substances of said stems, the bark of the Ramie stems treated as aforesaid having previously been allowed to change in colouration from green to brown before cutting.

9. Method of obtaining Ramie fibres according to any of the preceding Claims in which in order further to de-gum the said fibres they are subjected to digestion in an aqueous dilute alkaline solution as hereinbefore described.

10. Ramie fibre which is obtained by carrying out the method according to Claim 8.

11. Ramie fibre which is obtained by carrying out the method according to any of Claims 1 to 7 and 9.

12. Ramie fibre which is obtained by carrying out the method according to any of the Claims 1 to 9, said fibre being subsequently subjected to treatment for the bleaching thereof.

Dated the 17th day of July, 1944.

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Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1946. Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies, price 1s. 0d. each (inland) 1s. 1d. (abroad). may be obtained.

