Feb. 23, 1937. D. S. NEILL 2,071,651

PROCESS AND DEVICE FOR DEGUMMING RAMIE AND OTHER SIMILAR FIBERS

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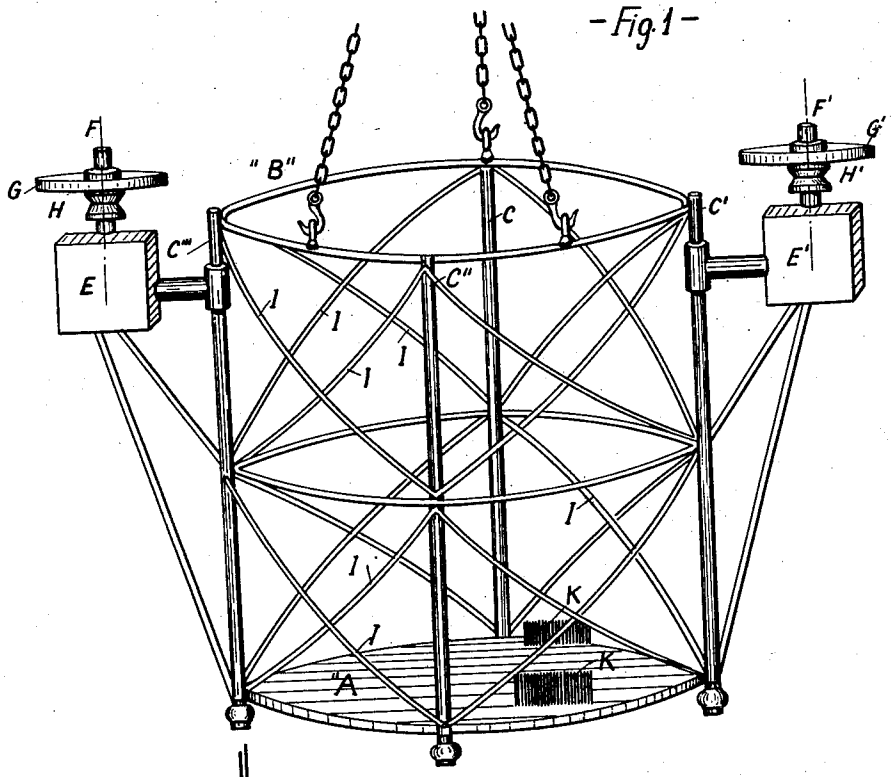
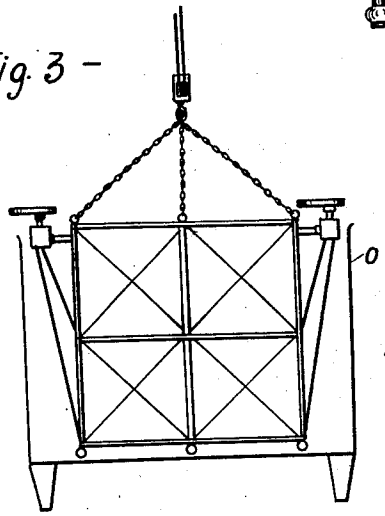
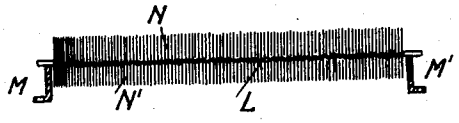
-Fig. 1-



-Fig. 3-



-Fig. 2-



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PROCESS AND DEVICE FOR DEGUMMING RAMIE AND OTHER SIMILAR FIBERS

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6 Claims. (Cl. 92—14)

This present invention is characterized in that the very adhesive gum which binds together the fine filaments of decorticated ramie (China grass) can be completely removed by a very simple and economical process, and with mechanical means without having recourse to any chemical reaction.

The process is essentially mechanical, inasmuch as the degumming is obtained by merely submitting the fiber to a suitable vibratory shaking after a short treatment in an open keir with a light solution of hot water and ordinary soda or potash soap. Neuter soaps, i. e. free of an excess of alkali are preferable, and the water should be soft.

On the vibratory motion being applied (by the means hereinafter described) at the proper moment, the filaments, by vibrating, shake themselves free of the gummy substance which has become highly diluted and possibly emulsified and deterge themselves one by one, so to say, retaining thereafter unaltered their natural qualities of strength, elasticity etc. By way of example, an embodiment of the invention is shown in the accompanying drawing wherein:

Fig. 1 shows a front view of the cage and the vibratory mechanical shaking device;

Fig. 2 shows, in longitudinal section, one of the additional circular trays which can be inserted into the cage;

Fig. 3 shows, in a longitudinal section, the cage introduced into the keir for the degumming operation.

For degumming the fiber there are two ways of operating; but in either case it is advisable to allow the fiber to soak for several hours beforehand in water before submitting it to the treatment proper, as this will remove a considerable portion of the coloring matter and facilitate subsequent bleaching operations. According to a first method, the fiber is immerged in water either cold or already heated, with about 1% (of the weight of the water) or soap as aforesaid. The temperature is gradually raised to 75°–85° centidegrees (167° to 185° F.) and held at that for about 30 minutes, and then raised to boiling point for two or three minutes.

Thereafter the fiber is extracted from the hot bath and plunged in cold water, running preferably, and submitted to an energetic vibratory shaking. Almost immediately the fiber will be observed to assume the aspect of a silky pulp the filaments disengaging themselves from each other. In less than a minute the operation is completed and the fiber, after being rinsed, always under vibration, and preferably in running water for the purpose also of eliminating the particles of bark entangled in the fiber, is ready for the bleaching bath which if containing hypochlorite of calcium as one of its ingredients will have the effect of causing whatever little residue of soapy matter may be still clinging to the filaments, to flocculate—this flocculation being removed by the subsequent rinsing.

According to another method, at the outstart the process is the same as described in method above indicated; then after the fiber has been allowed to remain at a temperature of from 167 to 185° F. (75°–85° centidegrees) for about 30 minutes the vibratory motion is applied in the same hot bath. The mass of fiber will at once assume the aspect of a silky pulp and the filaments will become disengaged. The fiber is thereupon withdrawn from the soapy solution, is rinsed under vibration in clean hot water, and immerged in a third bath of hot water which is raised for a short while to boiling point, vibration being applied continually in the meantime.

Rinsing in cold water, preferably running, follows; also bleaching process as per the first method.

Of the said two methods it will be found that for the finest grades of fiber, the first and most simple method will give the best result.

So that the vibratory action may be transmitted in the desired conditions to the entire mass of fiber, the latter should be placed in such a manner as to enable the mechanical device whereby the vibration is produced to effectively exercise its effect in the proper direction.

The appliance hereinafter described is one of the means especially adapted to obtain the abovesaid result.

As shown by the annexed drawing it consists substantially in a circular cage, Fig. 1 (the dimensions whereof will vary according to the quantity of fiber it is found desirable to treat at a time), open at the top and closed at the bottom by a platform A as hereinafter described.

The top ring B is joined to the platform by means of four equidistant rods C, C′, C″, C‴, which will serve also as legs, the ends whereof are embossed in rubber. The rods are strongly bound to each other by crossed stays I.

The whole system should be extremely rigid and to this end the metal employed for its construction should be particularly adapted to resist vibration and suitably protected from corrosion caused by the bleaching liquor.

On two of the abovesaid rods which face each

other, (f. i. C' and C''') are fixed, outside of the cage, the vibrating apparatuses. They consist respectively in a supporting block E and E' rigidly attached to the cage and connected with the bottom and lateral sections thereof by means of strong stays. The supporting block carries on the top part an axis F and F' on which revolves, on a horizontal plane, a metal disc, G and G', of such dimensions and weight as to produce the necessary vibration.

The vibration is obtained by the axis of rotation of the disc being made eccentric and the higher the eccentricity the more ample the vibration will be, of course. By suitable means the axis of rotation of the disc can be displaced so as to regulate the amplitude of the vibration.

The rotation of the disc is obtained by means of a driving belt on the pulley H, H' which is attached to the disc or by any other suitable mechanical device. The intensity of the vibration will be in ratio to the rotational velocity of the disc.

The transmission of the vibration to the entire mass of fiber under treatment is obtained by the following means.

The upper surface of platform A, at the bottom of the cage, made of steel wire netting (such as used for spring mattresses) carries a number of stainless steel needles solidly attached to the netting, protruding about 4 inches therefrom. The diameter of the needles will be that of an ordinary knitting needle.

They are placed at a distance of about ⅓ of an inch from each other, and in rows similarly separated from each other by about ⅓ of an inch. The needles of each row are so placed as to form with those of the next row the vertices of an equilateral triangle.

The fiber, on being removed from the water after the first soaking, is spread out but not pressed on the platform in a layer corresponding in thickness to the length of the needles, and perpendicularly to the direction that the vibratory motion will have, i. e. perpendicular to the rods which carry the vibratory apparatuses.

When this first layer is ready, the second layer is spread out in a like manner on a circular tray L (Fig. 2), made of wire netting same as platform A of a suitable diameter for easy insertion in the cage from the top. On both surfaces of this tray are embedded needles N, N' in a manner identical to that described in respect of the fixed platform. The tray will rest on the platform by means of four legs. The needles N of the under surface of the tray will embed themselves of course in the underlying layer of fiber thus multiplying the number of the vibrating units, the effect of which is increased by the fact that the elastic wire netting answers with extraordinary intensity to the vibration transmitted to it.

Further trays, in all respects identical to L, are then loaded with fiber and placed in the cage, the one on top of the other, so as to completely fill it.

The cage with its load of fiber, being now ready for the degumming operation, it is hoisted by some suitable gear, brought over the keir or vat O containing the solution of water and soap and lowered into same. Thereafter the process is as respectively described for the two aforesaid methods.

Of course there is nothing to prevent that the cage, instead of having a circular shape should have a square one, if this is found more suitable. In the latter case the vibratory devices will be fixed respectively on the two opposite sides of the cage and the trays instead of being circular will be square.

It is obvious that since the fiber remains throughout the various operations embedded on the vibratory needles, the entanglement of the fiber becomes impossible.

The process can be usefully extended to other textile fibers similar to China grass. The phenomena determined by a vibratory motion applied when the fiber has reached the proper stage of treatment, cause the disengagement and detersion of the filaments.

What I claim and desire to secure by Letters Patent is:

1. Process for degumming ramie and other like fibers which comprises soaking the fibers in a solution of soft water and washing soap to soften the gummy substance adhering to the fibers and subjecting the fibers to a vibratory motion.

2. Process for degumming ramie and other fibers of a like nature which comprises boiling the fibers in an open keir in a solution of soft water and ordinary washing soap for the purpose of softening the gummy substance adhering to the fibers and thereafter subjecting the fibers to a vibratory motion.

3. Process for degumming ramie and other like fibers which comprises subjecting the fibers to a hot saponaceous bath, plunging the fibers into cold water and thereafter subjecting the fibers to vibratory motion.

4. A process for degumming ramie and other like fibers which comprises boiling the fibers in a hot soapy solution until the gummy substance adhering to the fibers is softened and then subjecting the fibers to vibratory motion until the said substances are emulsified and separated from the fibers.

5. Apparatus for degumming ramie and other fibers comprising an open-topped cage, a wire platform forming the bottom of the cage, a series of needles with rounded points fixed in said platform in spaced relation to each other, a series of wire trays mounted above said platform in superposed relation, similar needles projecting upwardly and downwardly from each of said trays, the needles being embedded in the fibers on the platform and on the trays, and means for vibrating the cage.

6. Apparatus for degumming ramie and other like fibers comprising a cage, needles mounted in the cage for engaging the fibers, supporting means at each side of the cage, rotary spindles carried by said means, eccentric discs carried by said spindles and means for rotating the spindles and discs for imparting vibratory movement to the cage.

DAVID S. NEILL.