

UNITED STATES PATENT OFFICE.

GEORGE E. ARMSTRONG, OF NEW YORK, N. Y.

PROCESS OF EDUCING AND DEGUMMING FIBROUS MATERIAL.

SPECIFICATION forming part of Letters Patent No. 464,056, dated December 1, 1891.

Application filed April 4, 1890. Serial No. 346,592. (No specimens.)

To all whom it may concern:

Be it known that I, GEORGE E. ARMSTRONG, a subject of the Queen of Great Britain, residing at New York, in the State of New York, have invented certain new and useful Improvements in the Process of Educing and Degumming Fibrous Material, of which the following is a specification.

My process is applicable to the manufacturing of all fibrous stalks, leaves, grasses, yarn, or textiles, and, I proceed to describe my method as applied to the manufacture of flax; but it is equally advantageous when used with other fibrous substances, such as hemp, ramie, jute, cotton-stalks, yarns, textiles, &c.

I am aware that various forms of treatment as substitutes for "retting" have been proposed; but none of them, so far as I have learned, have resulted in producing a satisfactory product, all being defective in some respect.

My improved process may be practiced as follows: After the flax has been pulled or cut, I first strip off the seed, which can thus be saved either for feeding, crushing, or sowing purposes. I next pass the straw, stem, or leaf of the plants in their natural state or the yarn or textiles into my resolving solution. The composition of this resolving solution is one of the essential and novel features of my invention, and the use of the materials specified by me for such solution is one of the features which gives distinguishing novelty and merit to my process.

My solution consists of the following ingredients: To each gallon of water (preferably used warm) I add from one to seven ounces of a dry compound composed as follows: sodium carbonate, 41.55; sodium stearate, 5.40; sodium palmitate, 7.12; sodium oleate, 20.55; sodium myristate and laurate, .37; resin, 25.01. Of course any known chemical equivalent or equivalents of any of the above-mentioned ingredients may be substituted therefor. The above proportions are those which I find best adapted to the purpose; but such proportions may of course be varied to a very considerable extent, and one or more of the ingredients may be omitted, the essential feature consisting in the use of a considerable portion of resin in connection with saponaceous ingredients, which render the resin soluble

in water. Application of this resolving solution for from one to eight minutes is sufficient, the length of time depending upon the character and condition of the plant, yarn, or textile treated; but a longer application will not injure the material.

The dry compound used in the resolving solution which I have hereinbefore mentioned is an entirely new compound, and is one of the essential features of my invention. Being a dry powder, it is of course totally different from the soaps and soapy substances heretofore used in this art. Its effects, too, and the results produced by it upon the material to which it is applied are new and useful. More than has ever been done before, the gummy portions of the material acted upon are eliminated. Thus the natural oily nature of the fiber is better preserved, giving the material more sheen or gloss and rendering it more pliable, less liable to shrinkage, and facilitating the bleaching, dyeing, and finishing. After the surplus solution has been pressed out of the material, in order to save the same the material may be passed through fresh water for the purpose of washing it free of the solution and again squeezed; but this washing is not essential. The material should then be passed through a weak solution of acidulated water, for the purpose of arresting any undue action of the treating solution and preventing its going beyond the point desired, or farther than is necessary to set the cuticle and woody portion free. For this weak solution of acidulated water I prefer to use acetic acid, as it is less dangerous from careless handling; but phosphoric, sulphuric, sulphurous, or any other acid or combination of acids which has a neutralizing effect, or a bath of salt sea-water will serve the same purpose. After the final washing the material is squeezed as dry as possible and thoroughly dried, either by artificial or natural heat. The material may then be opened or finished by any of the mechanical contrivances known to the art.

This process of disintegration or freeing the staple from the gums, cuticle, and woody portions of the plant I find also applicable to yarns and textiles the fiber of which has been treated by the old processes and retains considerable of such deleterious portions of the

plant. I use it also on plants from which the gums, cuticle, and woody portions can be removed easily. Generally, however, in the disintegration of fiber when it is in the raw state I find it advisable to use some additional step or steps, which I will now proceed to describe.

I find it very advantageous in some cases to bruise or slightly crush the plant before the application upon it of my resolving solution. When this is done, the resolving solution acts upon the material very much more quickly.

I have found by experiment that the time required for the application of my resolving solution can be reduced by this preliminary bruising or slightly crushing one-half, and in some plants very much more. To accomplish this bruising or slightly crushing, I use the ordinary contrivances known to the art. I have found, too, that if the plant be more or less dry when thus bruised or slightly crushed the fiber is apt to be cut or injured. In such cases, therefore, I pass the raw straw, stem, or leaf of the plant in their natural state into a chest or cistern containing steam or hot or even cold water. This moistening-bath renders the plant pliable and prevents the fiber from being injured during this process of slightly crushing or bruising.

Naturally the fiber is of a creamy white color; but I have found by experience that it is stained by the action of other elements in the plant during the process of disintegration, thus rendering the bleaching of the material more difficult. I have discovered that the action of this coloring-matter upon the fiber can be neutralized and its natural color preserved by slightly acidulating the moistening-bath already referred to. Another effect of the acidulating of the moistening-bath is to preserve the reed or ribbon of the fiber more intact. I therefore sometimes slightly acidulate this preliminary moistening-bath. I have also discovered that the action of my resolving solution can be greatly accelerated, as well as rendered very much more efficient for all the purposes set forth, by rubbing or rolling the material during the application of the resolving solution, using for this purpose the ordinary machinery known to the art. I recommend this additional process particularly when the material has not already been treated by my preliminary moistening-bath and bruising referred to above. These additional steps which I have described may also be employed to advantage in connection with other resolving solutions than the one herein described.

I have found that the final washing of the material does not entirely eliminate the action of the acidulated bath referred to above as a neutralizing agent to my treating solution, and in cases where the material acted upon is an exceedingly delicate one and where an exceedingly fine and strong product—such as shirtings or cambrics—is desired, I have found

that such final washing can be assisted and made entirely competent for all purposes in the following manner: Ammonia may be added to neutralize the acid, and then I slightly heat the material to evaporate the ammonia, thus freeing it from all chemicals previously used. Each one of these operations may be repeated if the results are inadequate.

The advantages of my improved treatment are that it not only does away with all of the delays and injurious results incident to the retting process and obviates the necessity of using the strong chemicals which are required to remove the stains incident to the old retting process, but it is expeditious, preserves the natural color of the fiber and its natural oily nature, &c. The strength, spinning, and weaving qualities are greatly increased, the product can be more easily spun dry, and the fibers become more closely contiguous after wet spinning. The spinning room or factory will not be required to be provided with a moistened atmosphere, and the yarns, threads, or fabrics produced will take dyes with greater uniformity. Owing to more of the material being saved, the yield is increased and the value enhanced for fine work, as the filaments can be split up to their finest degree. By varying the strength of the solution the results can be changed to suit all requirements. A stronger treating solution produces a finer filament, but with more tow; a weak solution a larger yield of what is known as "line." I find, also, that the yarn and thread produced from both the line and the tow spin better, attain an elasticity, and have greater strength than that produced by any other process with which I am familiar.

My treating solution can also be applied to straws, leaves, and plants which have been previously dried and crushed. The process can thus be practiced at any time, for it can be commenced, immediately after the crop is harvested, on green straw, stalks, or leaves, avoiding unnecessary delays or expense of drying, or it can be used upon dry material, and, as I have stated above, it can be used upon manufactured material, such as yarn and textiles.

I am aware that various attempts have been made to educe fibers from raw material by various quick processes as substitutes for "retting," by the use of strong alkalis, by neutral soaps, oils, and acids under various conditions. These I do not claim; but claim, broadly, the treatment of fiber, whether manufactured or unmanufactured, with a highly-resinous and saponaceous menstruum to dissolve the gummy matter which unites the fibers—such as flax—to the cuticle or bark or woody portion of the stalks.

What I claim, and desire to secure by Letters Patent, is—

1. The process of disintegrating vegetable fibrous substances, which consists in subjecting them from one to eight minutes, or thereabout, to a highly resinous saponaceous so-

lution herein described; second, the application of an acidulated bath, and, third, washing the material, substantially as and for the purpose set forth.

5 2. The process of disintegrating vegetable fibrous substances, which consists in subjecting them from one to eight minutes, or thereabout, to a highly resinous saponaceous solution herein described, and the application
10 of an acidulated bath, substantially as and for the purposes set forth..

3. The process of disintegrating vegetable fibrous substances, which consists in bruising or slightly crushing the plant and then sub-
15 jecting it to a highly resinous saponaceous solution, substantially as described.

4. The process of disintegrating vegetable fibrous substances, which consists in moistening the plant and bruising or slightly crush-
20 ing the same and then subjecting it to a highly resinous saponaceous solution, substantially as described.

5. The process of disintegrating vegetable fibrous substances, which consists in moisten-
25 ing the plant in a slightly acidulated bath and bruising or slightly crushing the same, and then applying a resolving solution, substantially as described.

6. The process of disintegrating vegetable
30 fibrous substances, which consists in subjecting them to a highly resinous saponaceous solution and at the same time rubbing or rolling the material, substantially as described.

7. The process of disintegrating vegetable
35 fibrous substances, which consists in subject-

ing them to a resolving solution, then applying an acidulated bath, and then neutralizing the acid of said bath, substantially as described.

8. The process of disintegrating vegetable
40 fibrous substances, which consists in subjecting them to a highly resinous saponaceous solution, substantially as described.

9. The process of disintegrating vegetable fibrous substances, which consists in moist-
45 ening the material in a slightly acidulated bath and bruising or slightly crushing the same, then subjecting it to a highly resinous saponaceous solution, and rubbing or rolling the material, then the application of an acidu-
50 lated bath, and then washing the material, substantially as described.

10. The process of disintegrating vegetable fibrous substances, which consists in moisten-
55 ing the material in a slightly acidulated bath and bruising or slightly crushing the same, then subjecting it to a highly resinous saponaceous solution and rubbing or rolling the material, then the application of an acidulat-
60 ed bath, and then neutralizing the acid of said last-named bath, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 3d day of April, 1890.

GEORGE E. ARMSTRONG.

Witnesses:

J. E. HINDON HYDE,

CHANDLER P. ANDERSON.