Patented May 27, 1930

1,760,042

UNITED STATES PATENT OFFICE

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PROCESS FOR BLEACHING TEXTILE FIBERS BY MEANS OF OZONE

No Drawing. Application filed November 30, 1926, Serial No. 151,785, and in France February 2, 1926.

The French Patent No. 593,933, filed by the applicants on February 2nd, 1925 for "Processes and apparatus for bleaching textile fibers" refers in particular to a method of treatment, characterized by the combined action on said fibers of chemically pure ozone in carefully proportioned and registered quantities and of steam at a low temperature, the said fibers being suitably prepared and moistened with a chemical agent, preferably with an acid solution.

The French Patent No. 593,933 also refers to several variations of said method and various apparatus which provide a particularly convenient and safe application of the said methods.

The object of this invention is to further improve these methods and its special purpose is:

1. To determine the best proportion between the air and the ozone in the gaseous mixture so as to obtain the bleaching of the fibers within the shortest possible time without deteriorating the fibers.

2. To define the most suitable preparation of the fiber so that it may be uniformly bleached by the ozone without being deteriorated and with the complete elimination of all the cotton blots which in the treatment with chlorine are mechanically eliminated by means of the circulation of the chloric solution.

3. To determine the exact proportion of moisture which the fiber must have when it is exposed to the current of ozonized air.

The method of treatment by ozone of the textile fibers according to the present invention, is characterized in the first place by the fact that ozonized air is produced with a percentage of 4.5 grams to 9 grams of ozone per cubic meter of air, which percentage ensures the best treatment of said fibers with ozone.

The fibers or fabrics treated must undergo a suitable treatment before being subjected to the action of the ozone. This treatment consists preferably in submitting first the fibers or unbleached fabrics to ebullition in a digester under an approximate pressure of three atmospheres for about seven hours, using a bath containing six per cent of melted caustic soda (NaOH) and one percent of sulphoricinate of sodium. The stains, known as blots in the trade, are thus softened and this facilitates their subsequent elimination.

After washing in the digester, it is found a great advantage to treat the articles with a solution of hydrochloric acid (5 grams, of hydrochloric acid at 20° Bé. per litre) for fifteen to twenty minutes at a temperature of about 40° C. This treatment with acid is very suitable before exposing the fiber to the ozone, for the purpose of obtaining very good results and the complete elimination of the stains. With oxalic acid still better results are obtained than with hydrochloric acid.

The textile fibers may then be washed again, although such washing is not indispensable. They are subjected to centrifugal action, so as to reduce their moisture content to a maximum of moisture which may vary between 20 and 25% of the weight of said fibers. The woven or spun fabrics moistened with water or acidulated water are then introduced into the ozonization chamber. The time during which the articles may remain in contact with the ozonized air varies between one and a half hours to half an hour according to the concentration of the ozone (4. 5 grams per cubic meter or of 9 grams per cubic meter).

After the treatment with ozone, the fabrics emerge perfectly bleached and with a whiteness which is better than by the chlorine treatment. Moreover it is possible to merely dry said fabrics in the open air (because the evaporation of the liquid contained in the fiber is already effected to a great extent in the current of ozonized air). Hence the cost of drying is considerably reduced.

In practice, however, it is always advisable, in order to obtain a better bleaching and a more pleasant touch, to again wash the textile fibers after ozonization in a soap bath of one gram per liter (consequently with a much smaller quantity of soap than is required to obtain the same results with chlorine) at a temperature of 50 to 60° centigrade, whilst adding a small quantity of blue. The washing with soap or pure water is particularly effective, if the fibers are exposed to the

ozonized air in the presence of an acid solution.

The methods above described offer numerous advantages: in the first place a perfectly uniform bleaching is obtained and secondly the textile fibers lose nothing of their mechanical resistance, as is proved by tests made with the dynamometer.

These methods make it possible to obtain a large yield and secure the bleaching of the fibers continuously and with a considerable saving of space and labour, as compared with the methods hitherto known. They also make it possible to considerably reduce the total quantity of the ingredients, such as soap, blue, etc., which are usually employed in the known bleaching processes for washing textile fibers after the bleaching operation properly so-called.

The invention applies specially to the characteristics hereinafter stated and to their various combinations.

Claims:

1. A process of bleaching textile fibers, comprising immersing the fibers in an alkaline solution containing caustic soda and sulphoricinate of sodium and placing the moist fibers in contact with an atmosphere of ozonized air containing from 4.5 to 9 grams of ozone per cubic meter of air.

2. A process of bleaching textile fibers comprising immersing the fibers in an alkaline solution containing caustic soda and sulphoricinate of sodium washing the fibers, treating the fibers with an acid solution, and placing the moist fibers in contact with an atmosphere of ozonized air containing from 4.5 to 9 grams of ozone per cubic meter of air.

3. A process of bleaching textile fibers, comprising boiling the fibers in an autoclave in a bath of fused caustic soda and sulphoricinate of soda washing the fibers and placing the moist fibers in contact with an atmosphere of ozonized air.

4. A process of bleaching textile fibers, comprising immersing the fibers in an alkaline solution containing caustic soda and sulphoricinate of sodium, washing the fibers immersing the fibers in a solution of hydrochloric acid at a concentration of approximately 5 grams of acid at 20° Baumé per liter and at a temperature of approximately 40° C., and placing the fibers in contact with an atmosphere of ozonized air.

5. A process of bleaching textile fibers, comprising boiling the fibers in an autoclave in a bath of fused caustic soda and sulphoricinate of soda, washing the fibers, immersing the fibers in a solution of hydrochloric acid at a concentration of approximately 5 grams of acid at 20° Baumé per litre at a temperature of approximately 40° C., and placing the fibers in contact with an atmosphere of ozonized air.

6. Process of bleaching textile fibers, comprising immersing the fibers in an alkaline solution containing caustic soda and sulphoricinate of sodium, saturating the fibers so as to bring the weight of water contained therein to a fraction of approximately twenty to twenty-five per cent of the weight of the fibers being treated, and placing the moist fibers in contact with an atmosphere of ozonized air.

In testimony whereof we affix our signatures.

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