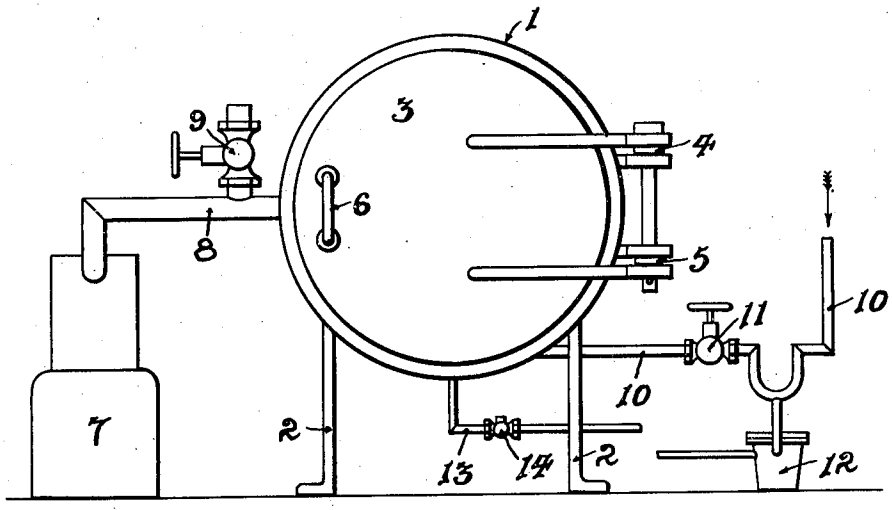
Aug. 23, 1938. J. BRANDWOOD 2,127,638

PROCESS FOR THE TREATMENT OF TEXTILE MATERIALS

Filed June 2, 1937



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Patented Aug. 23, 1938 2,127,638

UNITED STATES PATENT OFFICE

2,127,638

PROCESS FOR THE TREATMENT OF TEXTILE MATERIALS

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Application June 2, 1937, Serial No. 145,982
In Great Britain June 9, 1936

3 Claims. (Cl. 28—58)

In the textile industries various textile yarns or threads are doubled together or cabled with a high degree of twist. As examples may be cited threads of silk or artificial silk which are creped, and also heavy yarns for use in the preparation of tire fabrics or analogous fabrics. The strain imparted to the yarns or threads during the twisting gives rise to a tendency of the complete yarns or threads to crinkle or twist irregularly when freed from the doubling or twisting action. In the case of silk and artificial silk threads this tendency which I may refer to as "liveliness" has been corrected or nullified by treating the finished threads with steam, but conditions in which steam is permitted to condense unduly on such material should be avoided, as such condensation is highly deleterious; and this refers to all fibrous yarns or threads to a greater or lesser degree.

Also in the case of woven or other interlaced fabrics of a compact nature, for example canvas ducks as used in the manufacture of driving and other beltings, there is a tendency for the fabric to creep and become uneven and irregular and this appears to be due to strains inherent in the component yarns or threads thereof and also in some cases to the tension necessarily applied with such yarns or threads in the manufacture of a fabric, e. g., in weaving.

The present invention is directed to the provision of a very simple rapid and efficient method whereby the liveliness of yarns or threads and the creeping of fabrics, above referred to and all effects of irregular stresses and strains set up in yarns or threads or fabrics as a result of their preparation, may be counteracted and the yarns or threads or fabrics permanently set, that is to say flattened or deadened so that these conditions will no longer exist, this being effected without damage to the material. To this end the invention consists in subjecting the textile material in a condition of partial vacuum to the action of steam of a temperature higher than the boiling point of water in the vacuum condition prevailing. The effect of the treatment is in effect a temporary plasticization of the material fibres which serves for the permanent setting of the yarns or threads or fabrics. Very accurate control of the vacuum and steam heat figures is possible, and the required setting can be effected with the addition of a minimum of moisture and without deleterious condensation upon the goods, by breakage of the falling vacuum at a desired point.

The textile material may be in any form, such as yarns or threads in cheeses or in hanks or skeins, and woven fabrics for example in the form of rolls. A suitable apparatus for carrying out the process is shown in the annexed drawing which is schematic, and such process, with comparative vacuum and steam heat figures given by way of example, will now be described, reference being had to such drawing.

A cylindrical casing 1 of suitable metal is mounted upon bearing brackets 2 of metal to a desired number, this casing having a door 3 with hinges 4 and 5 and a handle 6. The interior of the casing communicates with a vacuum pump 7 by a pipe 8 and valve 9, the latter being a valve which may be operated to open communication to atmosphere as required. By a pipe 10 and valve 11 the interior of the casing 1 is put into communication with a source of steam, not shown. A steam trap 12 is provided so that as little water of condensation as possible may enter the casing 1 when the valve 11 is open. A drain pipe 13 has thereon a valve 14 which may be a check valve, that is to say a valve which will permit outflow of any water of condensation from the interior of the casing 1 when the latter is at atmospheric pressure, but will prevent access of air thereto when not desired. Shelves of wire mesh or other form—not shown—may be fitted within the casing 1 to receive goods to be treated. In practice it is found sufficient to have a lining of rubber or the like upon the front edge of the casing to secure airtightness when the interior thereof is evacuated, but securing bolts may be provided. Known forms of steam and vacuum gauges being fitted to the casing, this completes a simple assembly of apparatus for carrying out the process by manual operation, and this will now be described.

The vacuum pump being started, the interior of the casing 1 is evacuated to 28" of mercury column. When this figure is reached as shown on the indicator, the vacuum pump is stopped. The steam valve 11 is now opened and steam at a pressure of 50 lbs. to the square inch as indicated on the pressure gauge is admitted to the casing 1. For gradual admission of the steam the end of the steam pipe 10 may terminate within the casing 1 in the form of a nozzle of desired cross-sectional area. Admission of steam continues until the degree of vacuum within the casing shows a fall to a figure from 15" to 10" of mercury column, depending upon the nature of the goods being treated, that is to say until

the desired degree of plasticization of the same has been reached. The steam valve 11 is then closed and the valve 9 operated to admit atmospheric air, the remaining vacuum in the casing being thus broken. The goods are then removed.

With the degree of original vacuum indicated, viz: 28" of mercury column, or 1 lb. pressure absolute, the boiling point of water in such vacuum is approximately 102 degrees Fahrenheit. Saturated steam at 50 lbs. per square inch, pressure gauge, has a temperature of approximately 298 degrees Fahrenheit. It will be seen therefore that the treatment commences with a considerable heat reserve in the steam above the boiling point in the vacuum conditions prevailing, and due to the presence of this heat reserve in the operation all the advantages of steam treatment in setting the textile material are obtained without injurious condensation of steam thereon and without the risk of damage to the said material, in particular, goods of artificial silk, which would result from the direct application thereto, in atmosphere, of steam at the degree of temperature given.

As will be understood, the figures given in the above example may be varied as desired, so long as the basic principle is observed, to wit, that the entering steam is at a temperature above the boiling point of water at the vacuum degree selected, and that the plasticization effect is attained upon the material, without undue condensation.

The vacuum pump may continue to exhaust the casing 1 throughout the treatment with steam, the pump and the steam supply being stopped together, if this is found desirable, and the steam from the said casing may pass to the pump through or over a condenser of any form. Such an assembly will be understood without special illustration or further description. Also, the various steps of evacuation of the casing 1; operation of the steam valve 11; and admission of atmospheric air, may all be controlled and operated automatically by electrical means with the use of a diaphragm switch or the like in the manner known in general application for the performance of a sequence of steps.

I claim:

1. Process for the setting of twisted textile yarns or threads and fabrics, for the counteraction of strains set up therein in the course of their preparation, which process consists in subjecting the textile materials in a partial vacuum in a closed casing to gradually entering steam having a higher degree of temperature than the boiling point of water in the vacuum conditions prevailing and thus having a heat reserve over such boiling point, and on completion of desired treatment of the materials breaking the vacuum whilst the steam temperature is still sufficiently high to prevent undue condensation of such steam upon the material.

2. Process for the setting of twisted textile yarns or threads and fabrics, for the counteraction of strains set up therein in the course of their preparation, which process consists in subjecting the textile materials in a partial vacuum in a closed casing to gradually entering steam having a higher degree of temperature than the boiling point of water in the vacuum conditions prevailing and thus having a heat reserve over such boiling point, and on completion of desired treatment of the materials breaking the vacuum whilst a degree of steam heat reserve still exists.

3. Process for the setting of twisted textile yarns or threads and fabrics for the counteraction of strains set up therein in the course of their preparation which process consists in charging the textile material in a closable casing, evacuating the said casing of air to 28" of mercury column, admitting steam thereto at a pressure of 50 lbs. per square inch pressure gauge, and shutting off the steam and breaking the falling vacuum when it has reached a figure of 10"–15" mercury column.

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