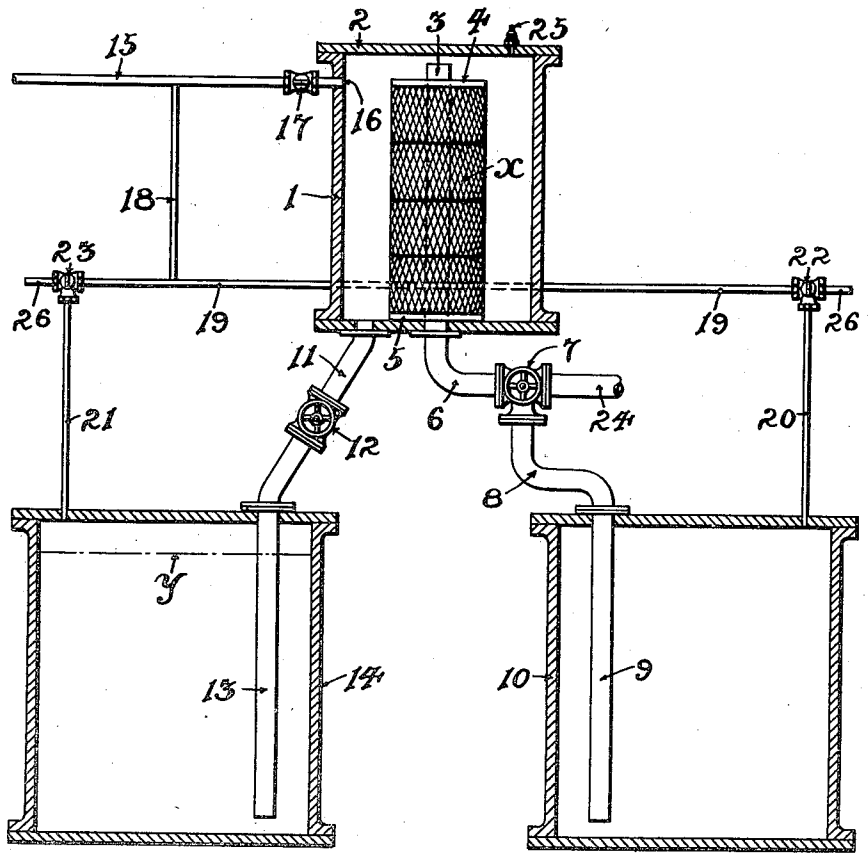
Sept. 21, 1937. J. BRANDWOOD 2,093,880

PROCESS FOR THE PRODUCTION OF TEXTILE YARNS HAVING RUBBER OR THE LIKE INCORPORATED THEREIN

Filed March 7, 1935



Inventor:-
Joseph Brandwood
By His Attorney:-
J. D. Cowan

Patented Sept. 21, 1937 2,093,880

UNITED STATES PATENT OFFICE

2,093,880

PROCESS FOR THE PRODUCTION OF TEXTILE YARNS HAVING RUBBER OR THE LIKE INCORPORATED THEREIN

Joseph Brandwood, Southport, England

Application March 7, 1935, Serial No. 9,749
In Great Britain March 16, 1934

5 Claims. (Cl. 117—2)

When ply or cabled textile yarns for use in the arts, for example in the manufacture of tire cloths, conveyor beltings and driving beltings, are to have incorporated therein rubber or analogous materials, it has been customary to treat the finished ply or cabled yarns with a rubber latex or other coagulatable dispersion. If the component yarns, that is to say the yarns from which the ply or cabled yarns are ultimately to be formed by twisting, are treated and dried, such component yarns will not submit to the necessary twisting.

The present invention is directed to a process whereby a complete ply or cabled yarn—which for convenience I will compendiously refer to hereinafter as a "doubled yarn" and which term will be deemed to include any number of component yarns—will be produced, each component yarn being thoroughly impregnated as to the fibres thereof with the required dispersion. For this purpose according to the invention the component yarns are in their undoubled state treated with the dispersion—which will be hereinafter referred to as a dispersion of rubber latex—under fluid pressure. Excess of latex is then cleared from the surfaces of the yarns; the latter are put up in a doubling frame, and are doubled therein whilst in the moist condition.

The practical method according to this invention of treating the yarns with the latex dispersion under pressure is to wind the yarns to be treated into cheeses upon a perforated central holder and then to pass the said latex through the coils by differential pressure. Whilst the latter are in situ a compressed gas such as air is passed through the cheeses to clear the excess of latex from the coils of yarn, and the cheeses may then be taken to subsequent doubling in the moist condition, with subsequent drying.

By the term "excess of latex" is herein meant all latex other than that which effects the actual impregnation of the yarns and is thus contained in the body of the latter.

Excellent conditions and results ensue from this process. The impregnation of the fibres of the yarn is thorough, thus providing a true combination of rubber and yarn. The treated yarns, cleared of excess latex, may stand for many hours before being doubled together, as the water content of the latex dispersion tends to equalize itself and drying is thus greatly delayed. Due to the thorough impregnation and the subsequent clearing of the excess latex from the yarn surfaces, there is no coating of rubber on such surfaces nor on the subsequent doubled yarn, giving a very smooth and compact finish to the product, a valuable feature in weaving, for example. Again due to the process, it is found that whilst the ultimate doubled yarn may be vulcanized, such vulcanization is not essential, mere drying being sufficient.

Given, that the rubber latex dispersion is to be applied to the wound yarns under differential pressure, and the excess cleared off by a gas under pressure, it will be understood that any form of apparatus which will effect these operations is suitable for my purpose.

The accompanying drawing illustrates more or less diagrammatically a suitable assembly, and will now be referred to in the following description.

Yarns which are to be impregnated with the rubber latex dispersion and subsequently to be doubled to form the doubled yarn are wound into yarn cheeses upon perforated metal holders. Four of these wound cheeses on their holders are shown at x in the drawing. A treatment vessel 1 is provided having the removable cover 2 and into the vessel 1 there enters a perforated pipe 3 upon which the yarn cheeses x are mounted. Top and bottom closers 4 and 5 are fitted.

The perforated pipe 3 is continued into a bent pipe 6 and a valve 7 gives communication to another bent pipe 8 communicating with a vertical pipe 9 which extends within a vessel 10 to a short distance from the bottom as shown. The interior of the treatment vessel 1 communicates by pipe 11 and valve 12 with a vertical pipe. 13 extending to a short distance of the bottom of a further vessel 14. The vessels 10 and 14 will be referred to as the latex vessels.

The pipe 15 at the upper part of the drawing is an air pipe which communicates with a source of compressed air of known type, not shown, and enters the treatment vessel 1 at 16, a cock 17 being provided. Further, a pipe 18 leads from pipe 15 to a further pipe 19, and this in turn communicates with the latex vessels 10 and 14 by further pipes 20 and 21 respectively, cocks 22 and 23 being fitted.

In operation, the cheeses x are charged within the treatment vessel 1 and annular separating discs, for example discs of waxed paper, are placed between them during the charging. One of the latex vessels 14 is filled to the desired height, for example to level y, with rubber latex dispersion prepared in any known manner and brought to a density conformable with the object desired, viz: the thorough impregnation of the yarns and their fibres. Any preparation of rub-

ber latex commercially available, and let down to the required density with distilled water, may be employed. A suitable concentration for the treatment may contain about 30% of rubber, but this may be varied according to circumstances as required. Air cock 17 being closed, as also air cock 22, and the cock 23 and valve 12 being opened, the compressed air from pipe 21 presses upon the dispersion in latex vessel 14 and causes it to ascend the pipe 13 through valve 12 and pipe 11 into the treatment vessel 1, the pressure ultimately forcing the liquid radially inwardly through the yarn cheeses x into the perforated central pipe 3 and thus by pipe 6 and valve 7, pipes 8 and 9 into the latex vessel 10. This being effected the compressed air is shut off from the pipe 21 by closing air cock 23. Air cock 22 is then opened and compressed air is again admitted to pipes 15, 18 and 19, passing therefrom through cock 22 and pipe 20 to latex vessel 10 and thus forcing the dispersion therein through pipes 9 and 8, valve 7, and pipe 6 to the perforated central pipe 3 and thence radially outwardly through the yarn cheeses x into the treatment vessel 1 and by pipe 11, valve 12 and pipe 13 into the latex vessel 14. This alternation of flow of the liquid is repeated as often as found necessary for the thorough impregnation.

The two air cocks 22 and 23 are three-way cocks, one way communicating with the atmosphere by a short pipe 26. When either latex vessel 10 or 14 is receiving latex the air displaced by entrance of the latter escapes to atmosphere by a pipe 26.

On the top of the container 1 is a cock 25 which is open only to allow escape of air from the top of the container as the latex is forced in from either the latex vessels 10 or 14.

The clearing of excess of rubber latex dispersion from the coils of the yarn cheeses x is now to be effected. For this purpose—the latex being in the vessel 10—valve 7 which is a three-way valve is operated to maintain communication between pipes 6, 8, and 9 but also to open pipe 6 to an outlet 24. Air cock 17 is opened and both air cocks 22 and 23 are closed to the compressed air pipe 19 and the latex vessels 10 and 14 are opened to atmosphere. Valve 12 is closed. Compressed air being now admitted to pipe 15 passes directly by cock 17 into the treatment vessel 1 radially inwardly through the yarn cheeses and into the central pipe 3, and the excess of latex dispersion cleared from the yarn cheese coils passes into the latex vessel 10, the compressed air passing away by outlet 24. This being completed the yarn cheeses x are removed.

As already stated, the yarn cheeses may be left many hours before doubling together need take place, due to the water content of the rubber latex dispersion and its tendency to equalize itself through the yarn package. To effect the doubling of the yarns prepared as above described, the yarn cheeses are taken to a doubling frame, for example one of the flyer or ring doubler type, and are mounted in the creel. Single yarns to be doubled together are then brought down to the flyer or ring traveller as the case may be, and are doubled together as in ordinary doubling. Drying, with vulcanization if desired, of the complete doubled yarns can then be effected, and the yarns are ready for their particular use. Both drying and vulcanizing of the completed yarns can be effected whilst they are in the wound package form.

If required, doubled yarns, which are to be doubled together to form a cabled yarn, may be treated in the manner described herein, with good results due to the fact that treatment takes place upon yarns which are thinner and therefore more amenable to the impregnation treatment, than the subsequent complete and finished yarn. Such doubled yarns which are ultimately to be doubled together are deemed to be included in the expression "single yarns" where employed in the appended claims.

I claim:—

1. In the production of a ply or cabled textile yarn, impregnating with impregnating coagulatable latex single already spun yarns which are ultimately to be doubled together; clearing from the surfaces of the yarns by means of a gas under pressure latex remaining thereon after the impregnation, with consequent removal of latex from the said yarn surfaces, and doubling the yarns together in that condition, followed by drying.

2. For the production of a ply or cabled textile yarn, mounting a coiled package of spun yarns upon a perforated holder, passing a volume of a dispersion of impregnating coagulatable latex through the package by differential pressure; and passing a gas under pressure through the package whilst on its holder and it is free of the volume of latex; the treated yarns being thus left in moist condition with their surfaces free of latex which might coagulate thereon.

3. In the production of a ply or cabled textile yarn, mounting a coiled package of spun yarns upon a perforated holder, passing a volume of a dispersion of impregnating coagulatable latex through the package by differential pressure; passing a gas under pressure through the package whilst on its holder and it is free of the volume of latex, the treated yarns being thus left in moist condition with their surfaces free of latex which might coagulate thereon; and doubling a plurality of the yarns together in the moist condition, followed by drying.

4. For the production of a ply or cabled textile yarn, mounting a coiled package of spun yarns upon a perforated holder, passing a volume of a dispersion of impregnating coagulatable latex through the package by differential pressure in two radial directions alternately; and passing a gas under pressure through the package whilst on its holder and it is free of the volume of latex, the treated yarns being thus left in moist condition with their surfaces free of latex which might coagulate thereon.

5. In the production of a ply or cabled textile yarn, mounting a coiled package of spun yarns upon a perforated holder, passing a volume of a dispersion of impregnating coagulatable latex through the package by differential pressure in two radial directions alternately; passing a gas under pressure through the package whilst on its holder and it is free of the volume of latex, the treated yarns being thus left in moist condition with their surfaces free of latex which might coagulate thereon; and doubling a plurality of the yarns together in the moist condition, followed by drying.

JOSEPH BRANDWOOD.