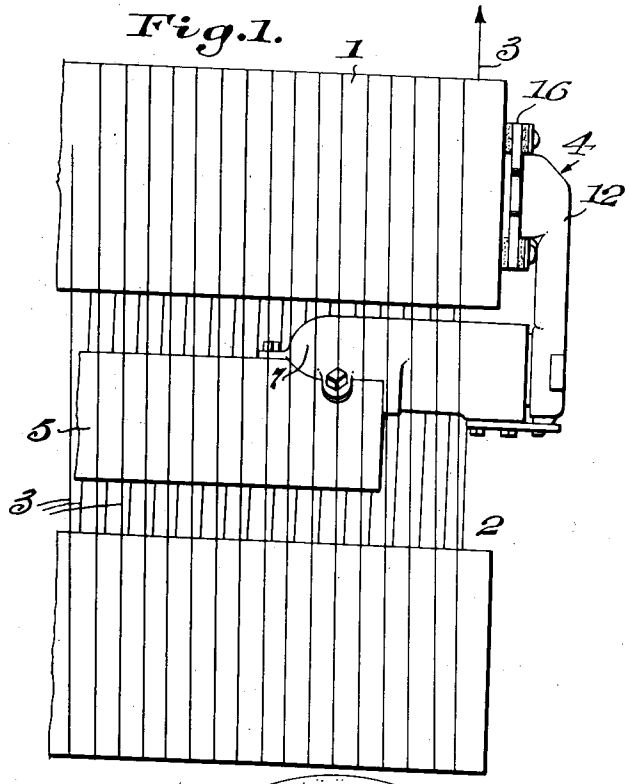
June 10, 1941. J. UYTENBOGAART ET AL 2,244,745

APPARATUS FOR DRYING YARN

Original Filed Aug. 11, 1937 2 Sheets-Sheet 1

Fig. 1.



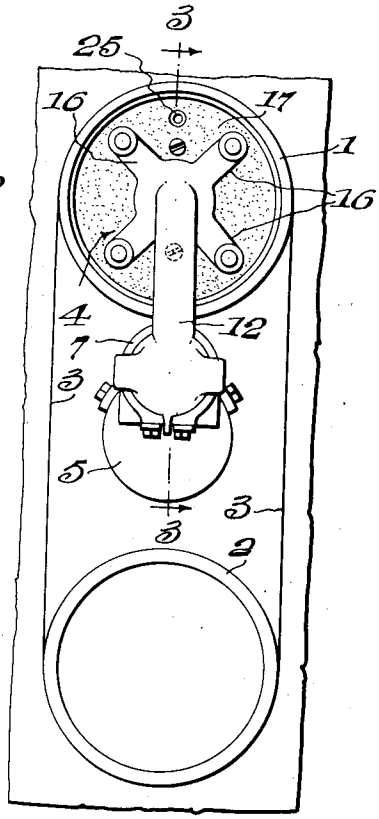


Fig. 2.

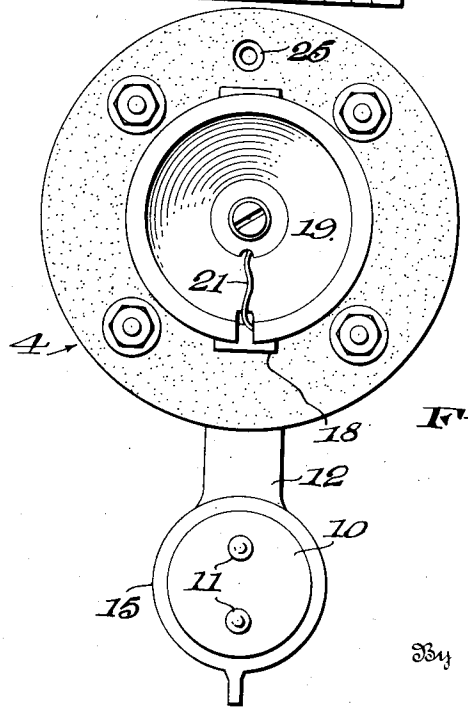


Fig. 5.

Inventors

Johannes Uytenbogaart

Carl F. Gram

By Thomas H. Byron.

Attorney

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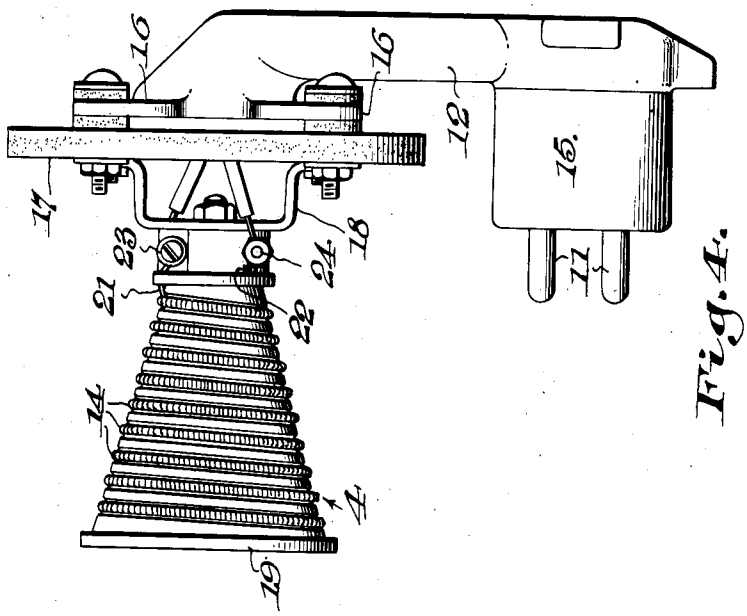


Fig. 4.

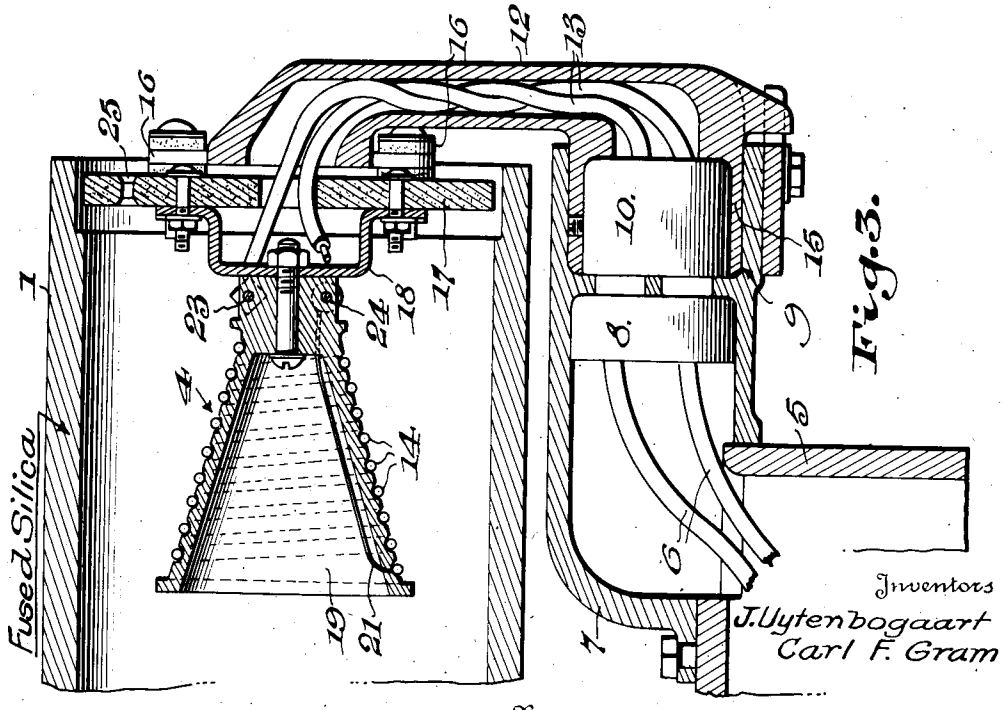


Fig. 3.

Inventors
J. Uytenbogaart
Carl F. Gram

By Thomas H. Byron Attorney

Patented June 10, 1941 2,244,745

UNITED STATES PATENT OFFICE

2,244,745

APPARATUS FOR DRYING YARN

Johannes Uytenbogaart, Wassenaar, Netherlands, and Carl F. Gram, Elizabethton, Tenn., assignors to North American Rayon Corporation, New York, N. Y., a corporation of Delaware

Original application August 11, 1937, Serial No. 158,496. Divided and this application August 31, 1938, Serial No. 227,832

3 Claims. (Cl. 34—110)

The present invention relates to the heating of rotating surfaces but more specifically has for its object to provide a heating element for thread conveying rollers whereby yarn or thread conveyed on such rollers may be uniformly and thoroughly dried during their passage thereover.

The device is particularly adapted for use in machines used in the continuous production of artificial silk. In machines such as these the filaments are extruded through a precipitating bath and conveyed to rollers over which they pass in an approximately helical path. The filaments may be given the different wet-treatments necessary while on the rollers such as desulphurizing, deacidifying, etc. and immediately thereafter, and while still on the same rollers or when passed to other rollers, dried.

For the continuous manufacture of artificial filaments groups of rollers, two or more, may be employed. The rollers are so arranged in their relation to one another that the thread is automatically conveyed in an approximately helical path from one end of the said rollers to the other end thereof. Apparatus such as the above described is disclosed and illustrated in a copending application, Serial No. 730,662, filed June 14, 1934, and entitled, Process for treating artificial filaments and apparatus therefor, which issued September 6, 1938, as Hartman et al. Patent No. 2,129,274.

In this copending application, above identified, is disclosed a pair of rollers at an angle, one to the other, and both rollers rotating on axes which are at an angle to the horizontal. The drying of the filaments takes place on the upper roller at its upper end. A gas flame is used to heat the rotating rollers at a point with which the filaments are not at the moment of application of the heat, in contact. This method of heating has proven quite satisfactory in those localities where gas is available. In this invention, however, it is proposed to use an electrical heating element for the drying of the threads.

Heretofore, where any electrical elements have been used for heating the interior of rotating surfaces a great disadvantage has resulted due to the fact that a rotating contact must be used. With such contacting means the passage of current therethrough is not uniform and they have the additional drawback that wear quickly results and replacement of the worn contacts must be made. Further, during the wearing process the flow of current becomes even more irregular, resulting in yarn which has not been uniformly dried, a serious consequence particularly in the manufacture of artificial silk.

Another feature of applicants' invention resides in so designing the heating element that the greatest amount of heat contacts the thread immediately after the after-treatment and while the threads contain the greatest amount of moisture. As the threads pass along the heating zone decreasing heat is applied as the threads lose their moisture thus resulting in a more uniformly dried thread. A further advantage of this idea of decreasing the heat as the moisture content of the filaments decreases is that it is less likely that damage will result to the threads which because of a decreasing moisture content become more susceptible to heat damage. Also by reducing the temperature drop, or better, maintaining a fairly constant decrease in temperature throughout the drying zone, less internal strains in the filaments result.

It is therefore one object of the present invention to devise a heating element for rotating surfaces which does not rotate with the surface thus heated.

Another object of the present invention is to devise a stationary heating element for the interior of rotating cylinders which may quickly and easily be removed and replaced without the necessity of stopping production operations.

Still another object of the present invention is to devise a heating element and method which will dry the threads uniformly and with less danger of damage caused by heat treatment.

These and other objects will in part become obvious and will in part be pointed out in the following specification and appended claims when taken in conjunction with the attached drawings, in which:

Fig. 1 is a side elevation of a portion of a pair of spaced cylinders with the filaments passing thereover and the novel heating element comprising the invention illustrated in operative position;

Fig. 2 is an end elevation of the part shown in Fig. 1,

Fig. 3 is an enlarged vertical section taken on the line 3—3 of Fig. 2.

Fig. 4 is a side elevation of the novel heating element per se and,

Fig. 5 is an end elevation of the said novel heating element.

In the drawings, in which like numerals of reference indicate like parts, 1 and 2 refer to the cylinders over which the filaments 3 pass in an approximately helical path.

The cylinder 1 has extending therein the heating element 4. The cylinders 1 and 2 are rotated by any suitable driving mechanism (not shown).

Adjacent the cylinder 1 is mounted a support 5 which serves the double purpose of carrying the power conduit wires and supporting the heating element 4. Mounted on the support 5 is a bracket member 7 which carries the power outlet receptacle 8 and has formed therein in axial alinement with said power outlet 8 a socket 9.

The heating element 4 comprises a hollow bracket arm 12 which carries connecting wires 13. At one end of the bracket 12 is formed a socketed extension 15 which carries a plug 10 having the usual contact members 11. The support 5, bracket member 7, and bracket arm 12 comprise stationary supporting means positioned between cylinders 1 and 2, and having a portion extending to a position opposite the unsupported end of cylinder 1.

The socketed extension 15 carrying the plug 10 is removably mounted in the socket 9 of the bracket 7 thereby forming the electrical contact and mounting means.

Formed at the opposite end of the bracket 12 are radial supporting arms 16 on which is mounted an insulating disc 17 insulated from the arms 16 which may be of asbestos and forms a heat shield 17. The shield 17 fits within the inner circumferences of the hollow cylinder 1 and out of contact therewith. This heat shield acts to keep the heat within the cylinder thereby decreasing the amount of heat lost.

Mounted on the shield disc 17 is a bracket 18 to which is bolted at 20 the conical support 19 of the resistance coil 14.

The ends 21 and 22 of the resistance coil 14 are attached to terminals 23 and 24 to which one end the connecting wires 13 are attached. The other ends of the wires 13 lead into the plug 10.

A peep-hole 25 is bored in the disc 17 so that the operator of the machine may ascertain at any time, without removal of the heating element, whether the element is operating.

As hereinbefore pointed out, the heating element support 19 is tapered so that at one end there is a greater heat intensity than at the other end of the heating zone, and the heating element 4 extends lengthwise within the cylinder 1 in generally coaxial alinement with its axis of rotation.

The threads 3 as they begin to pass over the heated portion of the cylinder 1 are in wet condition and therefore less susceptible to heat. As the filaments pass along the heated portion of the roller and gradually lose their moisture content there is less need for heat and the threads are less protected.

By tapering the heating element as illustrated in the drawings the source of heat is nearer to the wall of the cylinder and the coil is longer at that point where the threads are carrying the greatest amount of moisture, and the threads therefore receive the greatest amount of heat. As the threads pass along the heated surface of the cylinder, due to the tapering of the heating element inwardly, less heat is emitted and reaches the cylinder thus decreasing the heat of drying as the threads decrease in moisture content.

The rotatable cylinder 2 cooperating with cylinder 1 containing the heating element 4 constitutes means for directing or advancing the threads progressively along the heated cylinder surface in the direction of the smaller end of the tapered heating element.

By decreasing the amount of heat as the threads or filaments lose their moisture content a more advantageous drying results with less chance of damage to the filaments.

It is to be understood that the form of the invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention, or the scope of the subjoined claims.

From the foregoing description, taken in connection with the accompanying drawings it is thought the complete construction, operations and advantages of the invention will be clear to those skilled in the art to which it relates.

This application is divisional of application of Johannes Uytenbogaart et al., Serial Number 158,496, entitled "Process and apparatus for drying yarn," filed August 11, 1937.

What is claimed is:

1. Apparatus for drying a continuous length of yarn, thread, or the like, comprising, in combination, a rotatable cylinder, a tapered heating element disposed lengthwise within the rotatable cylinder and in generally coaxial spaced relation thereto, and means for directing the yarn, thread, or the like over the said rotatable cylinder and progressively along its surface from one end toward the other and in the direction of the smaller end of the tapered heating element.

2. An apparatus for use in the continuous drying of yarn, thread, or the like, comprising, in combination, a pair of spaced rotatable cylinders, and a stationary tapered heating element extending into one of said cylinders in axial alinement with the axis of rotation thereof, said cylinders being arranged to move the yarn, thread, or the like, along the cylinders in an approximately helical path advancing toward the smaller end of the tapered heating element.

3. An apparatus for use in the continuous drying of yarn, thread, or the like, comprising, in combination, a pair of spaced rotatable cylinders having adjacent unsupported ends, stationary supporting means positioned between said cylinders and having a portion extending to a position opposite the unsupported end of one of said cylinders, and a conical heating element mounted by its smaller end on the portion of said supporting means opposite the end of one of said cylinders and extending lengthwise within that cylinder in coaxial spaced relation thereto, said cylinders being arranged to move the yarn, thread, or the like, in an approximately helical path toward their unsupported ends.

JOHANNES UYTENBOGAART.
CARL F. GRAM.