Feb. 11, 1958 A. KUNZLE 2,823,292

DEVICE FOR THE CONTINUOUS HEAT TREATMENT OF TEXTILE YARNS

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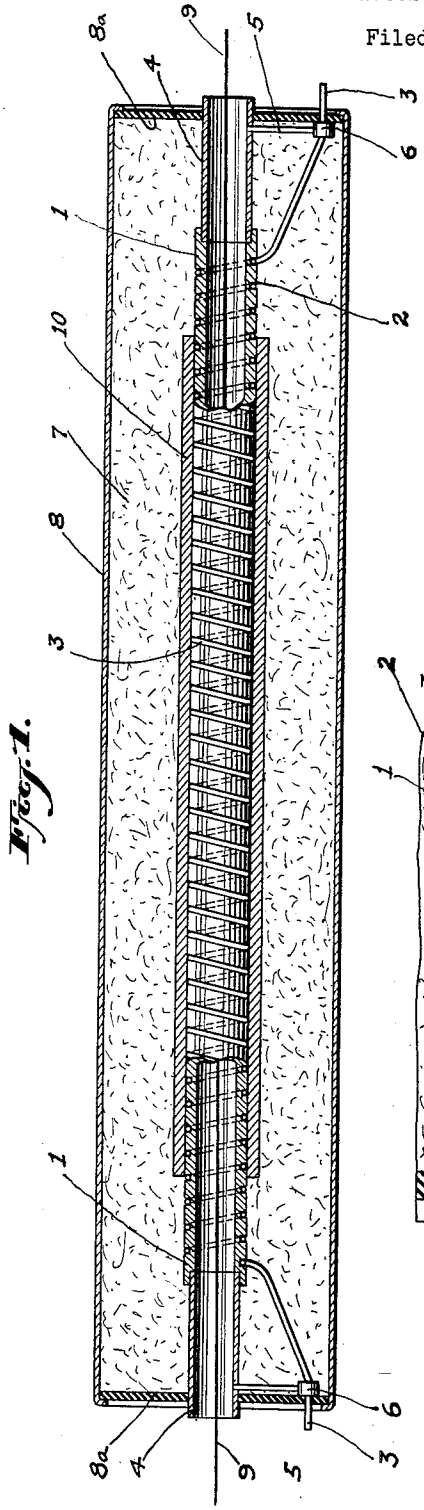


Fig. 1.

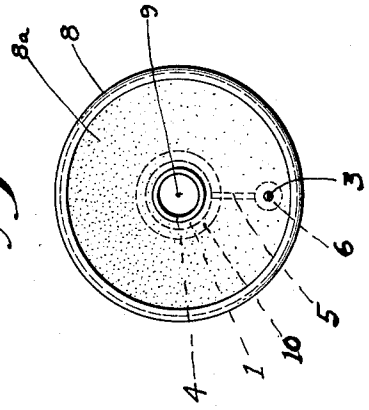


Fig. 2.

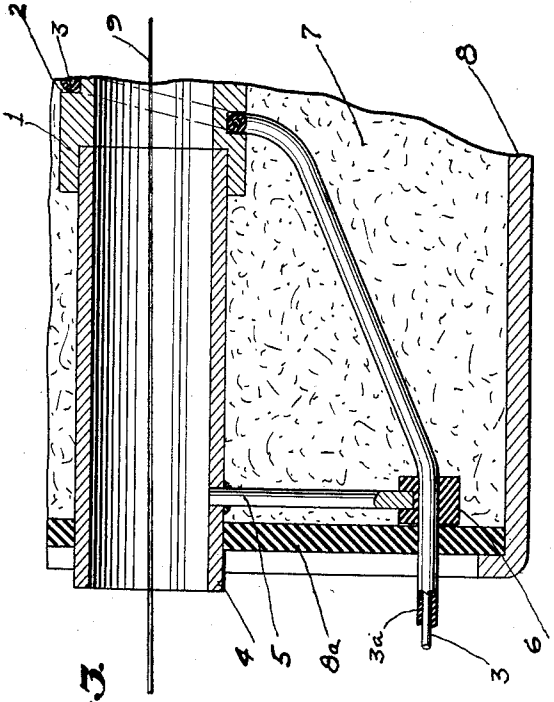


Fig. 3.

INVENTOR.
AUGUST KUNZLE.
BY
Ward, Neal, Hamilton,
Crime & McElhannon
ATTORNEYS.

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DEVICE FOR THE CONTINUOUS HEAT TREATMENT OF TEXTILE YARNS

August Kunzle, Wattwil, Switzerland, assignor to Heberlein Patent Corporation, New York, N. Y., a corporation of New York

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1 Claim. (Cl. 219—36)

This invention relates to a device for the continuous heat treatment of textile yarns, especially such that consist completely or partially of synthetic organic textile fibres. The invention is particularly useful in the fixation of the mechanical deformations of synthetic yarns which have been given a very high twist, which is removed after the fixation.

It is known to use small metal tubes, for the accomplishment of such heat treatments, which contain a hot gaseous medium, for example, hot air or hot inert gases, the yarn being passed through the tube in an axial direction. The heating of the gaseous medium is accomplished advantageously by electrical means, for example by an electrical resistance coil surrounding the metal tube or by introducing the tube itself into an electrical circuit as a resistance and its entirety wrapped in an insulation layer. The previous customary heating devices of this type have, however, the disadvantage that a very unfavorable temperature distribution over the length of the tube exists, in that in its center it will be the hottest and towards the ends of the tube, due to heat conductivity, a strong temperature drop takes place. Further, irregularities in the winding of the heating wire also effect irregularities in the temperature distribution. This lack of uniformity and irregularities in temperature distribution throughout the length of the tube is especially disadvantageous in heat setting synthetic yarns as a step in the production of stretch yarns.

An object of the present invention is to overcome the foregoing disadvantages and to provide a heating device with an even temperature distribution over the length of the entire tube and the smallest possible temperature drop at the tube ends.

Another object of the invention is to provide a device for the continuous heat treatment of textile yarns, especially those that consist entirely or partially of synthetic organic fibres.

A further object of the invention is to provide a device especially useful for the heat fixation of yarns of polyamide fibres, for example, yarns produced from hexamethylene diamine and adipic acid or from epsilon-Caprolactam. Other synthetic organic yarns also come into consideration, for example, those having a polyvinyl base or those of polyester. Further, also ply yarns or blend yarns made of such synthetic fibres and other natural or artificial fibres especially cellulosic fibres can be subjected to the heat fixation.

Further objects and advantages of the invention will more fully appear from the following description taken in connection with the accompanying drawings, illustrating a presently preferred embodiment of the invention, in which:

Fig. 1 is a longitudinal sectional view showing an embodiment of the invention;

Fig. 2 is an end view of the device shown in Fig. 1; and

Fig. 3 is an enlarged fragmentary, longitudinal, sectional view of one end of the device shown in Figs. 1 and 2.

Referring to the drawings, the present embodiment of the invention comprises a steel tube **1** which is provided on its outer surface for its entire length with a helical groove **2**, in which is inserted an electrical resistance heating wire **3**, made of chrome-nickel-steel of about 0.5 mm. thickness and covered with suitable insulation material **3a**, for example, asbestos. In the present embodiment the tube **1** is about 50 cm. in length, about 1½ cm. O. D. and about 4 mm. wall thickness. Through the insertion of the heating wire **3** in the helical groove **2** a precision winding is achieved by which any irregularities in the temperature distribution over the length of the steel tube **1** are very extensively diminished. On to the ends of the steel tube **1**, coaxial tube-like attachments such as **4** are rigidly secured. The tubular extensions **4** are made of a material having poor heat conductivity and in the present embodiment these are made of chrome-nickel-steel having a length of about 5 cm. and a wall thickness of about 0.3–0.5 mm. The tube attachments **4**, instead of being made of chrome-nickel-steel, may be made of a ceramic material.

Adjacent the outer end of each of the tubes **4** there is rigidly secured the inner end of a chrome-nickel-steel rod such as **5** whose outer end carries an insulating bushing **6** through which passes a terminal end of the heating wire **3**. A coaxial copper tube **10** surrounds the steel tube **1** and has an inner diameter of about 1.5 cm. so as to provide a tight fit on the steel tube **1**. The copper tube **10** has a length of about 40 cm. and a wall thickness of about 3 mm. Instead of the copper tube **10**, a tube of another metal with good heat conductivity may also be used. The steel tube **1** extends then on both ends about 5 cm. beyond the copper tube. An insulation layer **7**, such as rock wool, is evenly pressed together and surrounds the steel tube **1** and the tube attachments **4**. The insulation **7** has a radial thickness of about 5 cm. and is held in position by a suitable metal jacket **8** having ends such as **8a** provided with axial holes in which the outer ends of the tubes **4** are tightly disposed. The ends **8a** are spaced outwardly beyond the rods **5** and are preferably made of insulating material such as sheet asbestos. The textile yarn **9** which is to be handled, traverses the steel tube **1** in an axial direction. For the insulation layer, instead of rock wool, another evenly pressed together fibre insulation material can also be used.

Having thus described my invention with particularity with reference to the preferred apparatus, and having referred to some of the possible modifications thereof, it will be obvious to those skilled in the art, after understanding my invention, that other changes and modifications may be made without departing from the spirit and scope of my invention, and I aim in the appended claim to cover such changes and modifications as are within the scope of the invention.

What I claim is:

A device for the continuous heat treatment of textile

yarns comprising a metal tube whose outer surface is provided with a helical groove over substantially its entire length, an electrical resistance heating wire disposed within said helical groove and electrically insulated therefrom, coaxial tube-like members secured to the opposite ends of said tube respectively and extending outwardly therebeyond, said tube-like members consisting of material with poor heat conductivity, a coaxial tube made of metal with good heat conductivity such as copper, said metal tube carrying said heating coil being disposed within said coaxial tube, and a layer of heat insulating material surrounding said metal tube, helical resistance wire, tubular extensions and coaxial tube.

References Cited in the file of this patent

UNITED STATES PATENTS

1,530,199	Opperman	Mar. 17, 1925
1,870,619	Flanzer	Aug. 9, 1932
2,208,113	Bonney et al.	July 16, 1940

FOREIGN PATENTS

154,300	Great Britain	Nov. 22, 1920