

Oct. 14, 1941.

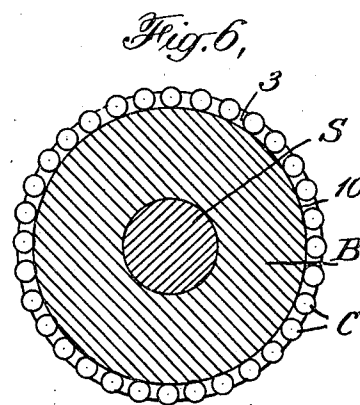
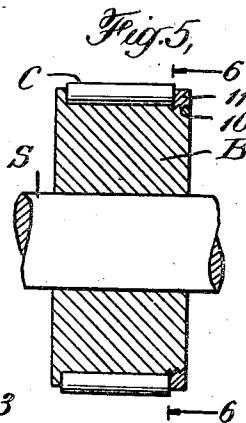
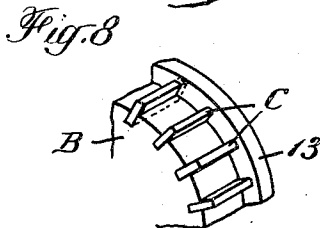
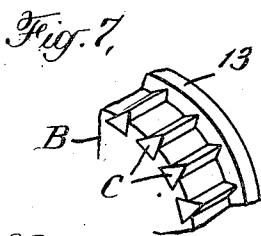
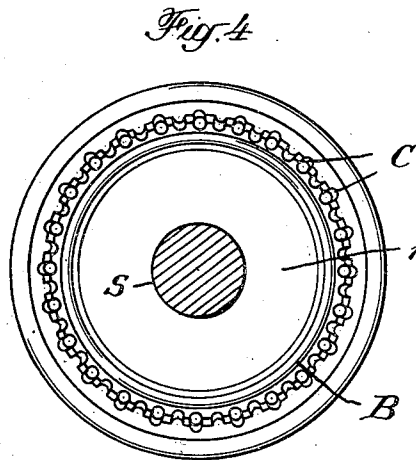
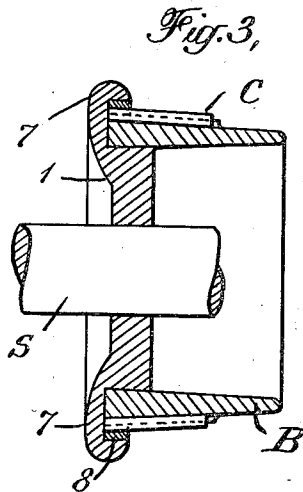
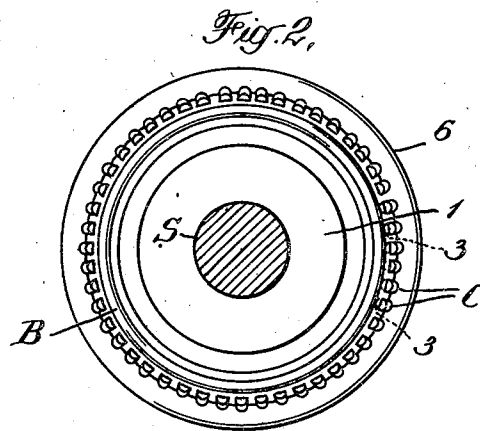
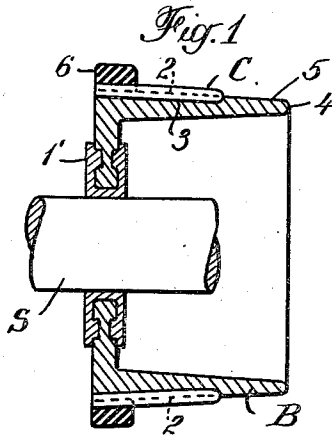
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2,259,202

THREAD CONTROL DEVICE FOR RAYON SPINNING MACHINES

Filed March 16, 1938

2 Sheets-Sheet 1



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THREAD CONTROL DEVICE FOR RAYON SPINNING MACHINES

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2 Sheets-Sheet 2

Fig. 9.

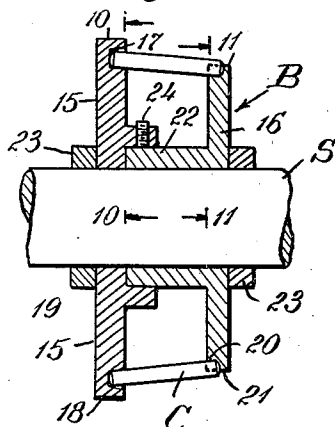


Fig. 10.

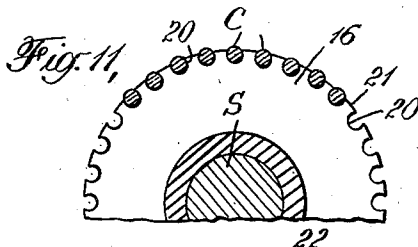
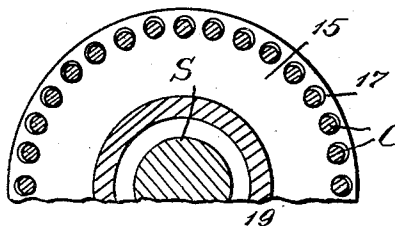


Fig. 12.

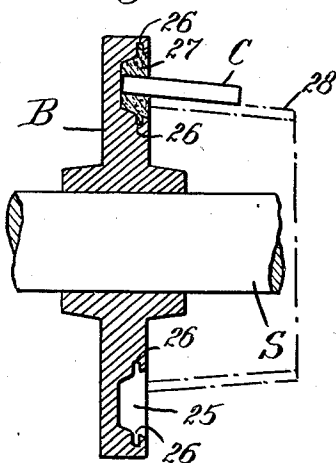


Fig. 13.

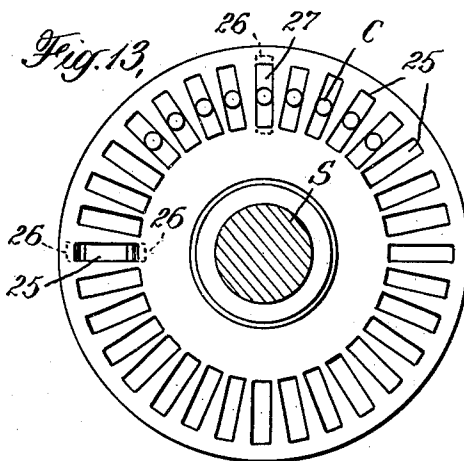


Fig. 16.

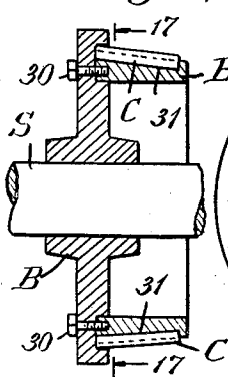


Fig. 17.

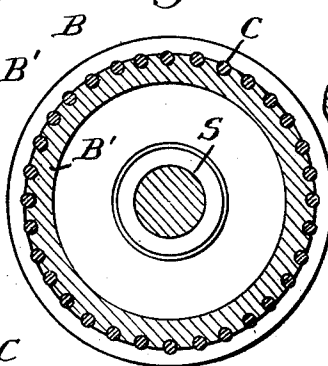


Fig. 14.

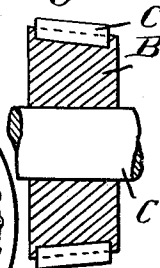
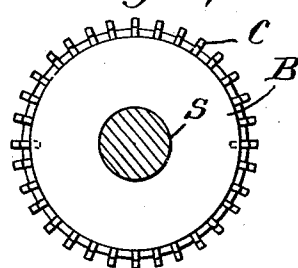


Fig. 15.



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## UNITED STATES PATENT OFFICE

2,259,202

THREAD CONTROL DEVICE FOR RAYON  
SPINNING MACHINESWilfrid B. Cooper, Rome, Ga., assignor to Tubize  
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Application March 16, 1933, Serial No. 196,182

5 Claims. (Cl. 18—8)

This invention relates to rayon spinning and particularly to godets, drawing wheels and pulleys, and has for its object the provision of improved devices of that character. The invention aims to provide an improved godet, drawing wheel or pulley (hereinafter called a control device) having replaceable elements for making contact with or taking the wear of the thread.

In the spinning of rayon, the thread is subjected to various spinning effects, which are generally known, in its passage over godets, drawing wheels or pulleys. It is difficult, if not practically impossible, to obtain uniformity of spinning effect when the smoothness of the thread-contacting surfaces of the control device varies appreciably during the useful life of the device. Moreover, control devices which become rough, injure the filaments and impair the value of the thread. Rayon thread, especially pigmented rayon thread, has the property of wearing the surfaces of the control devices over which it passes, in normal spinning operations, as a result of either or both, corrosion and abrasion. The materials used or suggested heretofore for control devices are worn or corroded away, usually as a result of the slippage of the thread, or the corrosive solutions remaining on the thread. Certain materials become progressively smoother during use, while others become progressively rougher. In certain spinning operations the thread is passed successively over a plurality of drawing-wheels or godets and is subjected to various tension effects such as step by step stretching or stretching in certain stages and contraction in other stages. In such operations the thread is permitted to slip, for example, as much as 40 percent., on the surface of the control device. In order that the stretch or contraction effect accompanying a given amount of slippage be uniform, it is necessary that the smoothness of the thread-contacting surface of the control device remain substantially unchanged for a considerable period. Unless the thread is uniformly stretched it will not have uniform properties, such as uniformity of denier, uniformity of dyeing affinity, etc. In order to produce such uniformity it is necessary that all of the thread of a particular type undergoing production at a given time uniformly stretched. It is, accordingly, necessary that each control device used in producing a given type of thread induce the same stretch effect to the thread to obtain uniformity of thread type. It is extremely difficult to obtain uniform stretch, for example, on all the machines of a given plant at the present time because of the variable char-

acter of the thread-contacting surfaces of the control devices. In certain other spinning operations, for example, the thread may be subjected to what is known as "minus-tension" spinning or slip-spinning in which the thread is passed from the spinnerette over a godet or drawing wheel and then to a bobbin. The thread travels at a lower speed than the peripheral speed of the godet and there is a slippage of the thread on the contact surface of the godet. While uniform smoothness of the contact surface is necessary or desirable in the various spinning operations from a standpoint of the properties imparted to the thread, excessive roughness of contact surface is decidedly objectionable in all instances because of filament breakage and thread injury.

This invention aims to overcome the aforementioned difficulties and to provide improved control devices which have thread-contacting surfaces of easily maintained uniform or unimpaired smoothness. A control device embodying the features of the invention comprises a rotatable base member upon which thread-contacting elements are mounted so as to provide a succession of abrasion resistant ridges extending in the longitudinal direction of the device. The base member may be merely a hub and it may resemble generally a conventional godet, drawing wheel or pulley, as the case may be. The base member is provided with means for mounting any desired number of contact elements, preferably in spaced relation on the periphery of the base member, the exterior surfaces of which are concentric with the shaft upon which the base member is mounted. The invention has for an object the provision of a control device having detachably mounted thereon a plurality of thread-contacting elements of special form and composition. The elements may be formed to fit certain mounting means of the base member and are adapted to be changed when necessary to present a new surface to the thread as a result, for example, of excessive wear, or of any impairment in the surface smoothness which might cause rupture of the delicate filaments.

In a preferred construction, the contact elements are made of materials the surface characteristics of which do not change appreciably during use. Such materials are relatively expensive and extremely difficult to form except in small pieces of simple shapes. The most desirable materials are either too expensive or too difficult to make in the large and intricate forms of present control devices. The base member

may be made, for example, of glass, molded plastics, such as "Bakelite," vulcanized rubber and corrosion resistant metals.

The contact elements may be held in position in the base member in specially formed openings, such as slots, by suitable gripping means, or held by or imbedded in a thermoplastic cement, or the like.

These and other novel features of the invention will be best understood from the following discussion taken in conjunction with the accompanying drawings, in which—

Fig. 1 is a longitudinal cross-section of a godet or drawing wheel embodying the invention;

Fig. 2 is a front-end elevation of the godet of Fig. 1;

Fig. 3 is a longitudinal cross-section of another godet or drawing wheel embodying the invention;

Fig. 4 is a front-end elevation of the godet of Fig. 3;

Fig. 5 is a longitudinal cross-section of a pulley embodying the invention;

Fig. 6 is a view along the line 6—6 of Fig. 5;

Fig. 7 is a fragmentary perspective of one form of contact element mounting;

Fig. 8 is a fragmentary perspective of a godet showing another form of contact element and its mounting;

Fig. 9 is a longitudinal sectional view of another form of godet or drawing wheel embodying the invention;

Fig. 10 is a view along the line 10—10 of Fig. 9;

Fig. 11 is a view along the line 11—11 of Fig. 9;

Fig. 12 is a longitudinal sectional view of another form of control device in accordance with the invention;

Fig. 13 is a front-end elevation of the godet of Fig. 12;

Fig. 14 is a longitudinal sectional view of a pulley embodying the invention;

Fig. 15 is a front-end elevation of the pulley of Fig. 14;

Fig. 16 is a longitudinal sectional view of still a different form of control device of the invention; and

Fig. 17 is a view along the line 17—17 of Fig. 16. As shown in the drawings, the control device of the invention comprises a base member B which may be made of glass, molded or machined plastics, such as acid resistant "Bakelite," vulcanized rubber, corrosion resistant metal, or the like, and is suitably provided for mounting upon a shaft S. On the periphery of the base member, a plurality of contact elements C are mounted. The contact elements are preferably in the form of rods, bars or plates and are preferably detachably or replaceably attached to the base member. I have found that fused ceramic materials of a porcelainous nature made of or containing high percentages of titanium oxide are especially advantageous. Ceramic products of this nature made by the American Lava Company having the following identifying names and approximate compositions: Body C192, SiO<sub>2</sub> 1.62, Al<sub>2</sub>O<sub>3</sub> 0.43, TiO<sub>2</sub> 97.76, Na<sub>2</sub>O 0.04, K<sub>2</sub>O 0.11; and Body H190, SiO<sub>2</sub> 6.32, Al<sub>2</sub>O<sub>3</sub> 8.0, TiO<sub>2</sub> 89.3, MgO 2.91, Na<sub>2</sub>O 0.02, K<sub>2</sub>O 0.11, BaO 0.33, SO<sub>3</sub> 0.17, are especially important and advantageous for the purposes of this invention. These products are especially suited for contact elements used in the spinning of rayon thread pigmented with hard or abrasive material, such as titanium oxide. I have also found that ceramic materials containing high percentages of titanium oxide may be

used as guides or pulleys in all places on a spinning machine where its properties of resistance to corrosion, long wear and uniform smoothness are factors determining the use of the material.

Figs. 1 and 2 show a godet, or drawing wheel, of the double-type (i. e., comprising contiguous tapered ridged and smooth surfaces) in which the base member B is preferably formed of one of the non-metallic materials, hereinbefore mentioned, and is attached to a metal hub 1 adapted to be mounted upon or attached to the shaft S. The periphery 2 is tapered or conical in form and has a plurality of evenly spaced recessed portions or grooves 3 thereon which are formed to accommodate contact elements C in the form of rods. The front end portion 4 has a smooth peripheral surface 5 and the exterior edges or surfaces of the contact elements C preferably project above the smooth surface 5. The contact elements are held in position within the grooves by means of a ring 6 which may be formed of metal or plastic material, or an elastic rubber band. In using the device shown in Figs. 1 and 2, the thread is passed over the portion which is studded with the contact elements and as the elements become worn the ring 6 may be removed thereby making it possible to turn the contact elements to a new position without removing them, or replacing the worn elements with an entirely new set of elements.

Figs. 3 and 4 illustrate a godet, or drawing wheel, embodying features similar to that illustrated in Figs. 1 and 2, comprising a base member B of molded or plastic material mounted upon a metallic hub 1. The hub is formed to provide a flange 7 having a recess 8 therein and the base member is pressed into or attached in the recess. In this construction, the ends of the contact elements C extend into the recess and are completely enveloped in a suitable cement such as "Bakelite" or sulphur. Any thermoplastic cement or material may be used and when the contact elements become worn or otherwise impaired the hub may be heated to soften the cement, thereby making it possible to turn each element to a new position or to replace it with a new element. It is important that the cement be impervious to the effect of the usual spinning solutions.

Figs. 5 and 6 illustrate a conventional type pulley having a base member B mounted upon the shaft S, the exterior or cylindrical portion of which is studded with a plurality of evenly spaced contact elements C in the form of rods. The mounting means in the base member are holes 3 which are formed either by boring or molding, and the longitudinal centers of the holes are so positioned with respect to the cylindrical surface of the body member that the inserted contact element projects thereabove. The holes do not extend completely through the base member and this forms an abutment for the contact elements at one end of the base member. The opposite end has an annular recess 10 into which is screwed or otherwise fastened a ring member 11 which abuts against the opposite ends of the contact elements thereby securing them in position.

Fig. 7 is a fragmentary perspective of a godet or drawing wheel in which the base member B has an end flange 13 and slots of triangular cross-section for inserting therein triangularly formed contact elements C. Fig. 8 is a view similar to that of Fig. 7 and illustrates contact elements C in the form of flat plates inserted edgewise in

correspondingly formed slots on the peripheral surface of the base member B.

The control device illustrated in Figs. 9, 10 and 11 has a base member in two sections 15 and 16. Section 15 has an annular row of holes 17 into which the ends of the contact elements C are inserted, a flange 18 and a hub recess 19. Section 16 has an annular row of holes 20 which intersect the peripheral edge 21, in which the contact elements C may be inserted, and a hub extension 22. In assembling the device, the contact elements are slipped into the holes 17 and 20 and the hub extension 22 is slipped into the hub recess 19. After the various elements are assembled as shown in Fig. 9, the locking members 23 are fastened to the shaft as by means of a set screw (not shown). When the device is loosely mounted on the shaft, the sections may be held together as by the set screw 24.

The control device illustrated in Figs. 12 and 13 comprises a base member B of very simple construction having a plurality of annularly spaced slots or recesses 25 preferably of the same width as the contact elements C. Each slot is provided with one or more extensions 26. The contact elements are inserted in the slots 25 and a suitable cement 27 poured into each hole. The cement enters the extension 26 and is thus prevented from being displaced or slipping out. In this construction the contact elements are supported as cantilevers and they may be arranged so that the exteriors embrace either a cone or a cylinder. To aid in assembling the elements, a suitably shaped mask or frame 28 may be spaced concentrically with the shaft S and the contact elements C supported thereon until the cement is poured into the recesses and hardened. The mask is, of course, removed when the device is ready for use.

The control device of Figs. 14 and 15 is a pulley of very simple construction comprising a base member B in which the contact elements C are embedded. The contact elements are preferably flat plates and may be molded in the base member or fitted into slots.

Figs. 16 and 17 illustrate a control device in which the base member B has an annular recess into which a detachable part B' may be inserted and secured as by the stub bolts 30. The part B' has a plurality of spaced slots 31 in which the contact elements C are securely mounted by any of the means hereinbefore described. In changing or removing the contact elements the entire part B' is removed from the part B. In this construction all of the contact elements may be removed in operation without removing the entire control device from the apparatus.

The various slots and grooves for mounting the contact elements and the contact elements themselves may be of any suitable cross-sectional

forms. The rods may, for example, be square, triangular, circular or rectangular in cross-section and the grooves may be of similar forms. The rectangular or flat plates are especially advantageous because they may be worn completely through to the base member without changing width. This is important because where the width increases with wear, the thread-contacting surface increases and the tension on the thread is correspondingly increased. In the case of rectangular contact elements or flat plates such as those shown in Figs. 8 and 14, the thread-contacting surfaces are preferably arcuate, the curve preferably corresponding to the curve of the thread as it passes over the godet.

While the contact elements may be held in position in the slots, grooves or recesses, by means of cement or support members, such as rings or elastic bands, it is contemplated that they may be held in the slots, grooves or recesses merely by reason of the tightness of the fit.

I claim:

1. A control device for the spinning of rayon thread which comprises a base member adapted to be mounted upon a shaft, a plurality of contact elements in the form of rods made of a ceramic material containing titanium dioxide as its principal constituent, and means for mounting the contact elements in spaced relation on the base member and concentric with the shaft, whereby the contact elements form a plurality of thread-contacting surfaces.

2. A control device for the spinning of rayon thread which comprises a base member, and a plurality of contact elements secured to the base member and arranged to form a thread-contacting surface, said contact elements being formed of a solid ceramic material the major portion of which is titanium dioxide.

3. A control device for the spinning of rayon thread which comprises a base member, a plurality of contact elements each of which is securely mounted in a recess in the base member in such a manner that a surface of each contact element is exposed, the exposed surfaces forming a contact surface for the rayon thread, said contact elements being formed of a solid ceramic material consisting largely of titanium dioxide.

4. A control device according to claim 3 in which the contact elements contain more than about 89 per cent by weight of titanium dioxide.

5. A control device for the spinning of rayon thread which comprises a base member arranged to be mounted upon a shaft, said base member having a thread-contacting surface formed of a ceramic material containing a high percentage of  $\text{TiO}_2$ , said ceramic material having the property of effectively resisting the abrasive action of rayon thread and of maintaining surface uniformity.

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