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3,439,487

SPINNING CHAMBER ROTOR

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Fig. 1

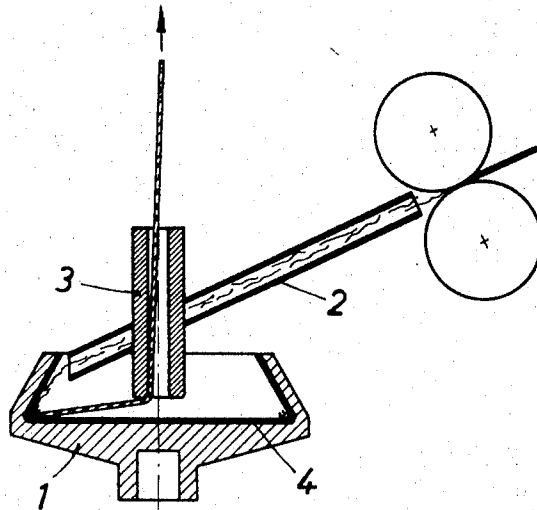


Fig. 2

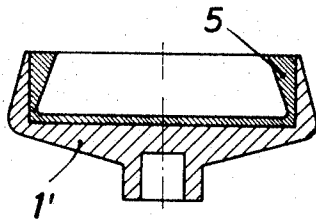
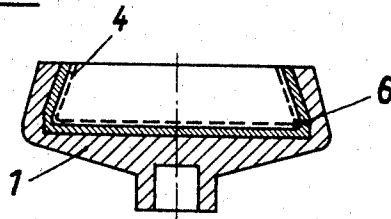


Fig. 3



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SPINNING CHAMBER ROTOR

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12 Claims

ABSTRACT OF THE DISCLOSURE

The upper end of a spinning machine rotor forms a cup-shaped spinning chamber. The rotor body is made of a lightweight material having mechanical properties suitable for high-speed rotation, such as an aluminum alloy or a rigid plastic, for example, styrol resin. The cup interior forming the fiber collection surface is lined with material which has good spinning properties for fiber supplied to the cup, such as brass, chromium, nickel, Teflon, hardened gold, or a liquid coating such as varnish or enamel. If the rotor body material and the lining material are not compatible for forming a strong bond, an intermediate layer compatible to both materials may be interposed between the rotor body and lining. The lining may be a preformed insert or may be a layer applied to or formed in the rotor cup.

It has been found that thread or yarn spun in a high-speed rotary spinning chamber frequently has inadequate tensile strength. Various suggestions have been made for using separators and for modifying the construction of the sliver supply tubes and the spinning chamber in order to increase the tensile strength of the finished thread. However, none of the known proposals has resulted in any distinct improvement in thread strength.

In addition it is necessary in order to maintain an economic level of production to rotate the spinning chambers at high speeds. Consequently, the spinning chamber should be made from materials having good mechanical properties which will resist deformation or rupture when operating at continuous high speeds while being of relatively low specific weight. In general, plastic materials fulfill such requirements quite well. Furthermore spinning chamber rotors of plastic material are sufficiently lightweight to minimize the power required to drive them. However, plastic material has the important disadvantage of creating static electricity which has an adverse effect on the tensile strength of the spun thread and in some cases the static electricity is sufficient to disrupt the spinning process entirely.

Consequently, it is a principal object of the present invention to provide a spinning chamber having a fiber collection channel which has good spinning properties for the fibers being spun in order to increase the tensile strength of the finished thread.

It is an important companion object to provide a lightweight undeformable spinning chamber.

An additional object is to increase the productivity of a spinning machine over that which can be obtained from spinning machines using conventional spinning chamber rotors.

FIGURE 1 is an axial section through a spinning chamber rotor of the present invention, with parts broken away, including associated fiber supply and thread withdrawal means in section.

FIGURE 2 is an axial section through a modified spinning chamber rotor with parts broken away.

FIGURE 3 is an axial section through a different form

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of spinning chamber rotor with parts broken away. Loosened fibers are supplied by means of a feeding pipe 2 to the spinning chamber rotor, from which said fibers after forming a fiber ring are finally drawn off through a yarn outlet pipe 3 as a twisted yarn.

While steel has been used for the major portion or body 1 of the spinning rotor, it has a relatively high specific weight which is not desirable for the high rotational speeds required. Aluminum alloy and many plastics are sufficiently lightweight while providing a spinning rotor which will retain its shape or form during sustained high-speed rotation. As has been mentioned previously, however, plastic material has undesirable effects on the characteristics of the spun thread. Similarly, even highly polished aluminum does not provide a collection channel surface in which thread can be spun having high tensile strength.

On the other hand, materials which have good properties for spinning thread, such as brass, for example, are not sufficiently strong or rigid to be suitable for the rotor. In the spinning rotor shown in FIGURE 1, the rotor body 1 is made of an aluminum alloy while the interior of the cup-shaped spinning chamber has a lining 4 of brass.

The relative hardness of a material is not a characteristic quality for material exhibiting beneficial spinning properties because, while brass is relatively soft, chromium, a relatively hard material, has been found to be a suitable lining material for the spinning chamber. This unexpected result may be explained by the fact that the friction characteristics of the lining material influence the deposition of the fiber in the collection channel.

Other materials which have been found to have desirable qualities for lining the fiber collection surface of the spinning chamber are polytetrafluoroethylene sold under the trademark Teflon, nickel, hardened gold, varnish, enamel and smooth ceramics.

An important consideration in selecting a particular plastic for the rotor body 1 or in selecting an aluminum alloy instead of plastic is the ease with which the lining 4 can be bonded to the body material. Among the plastics which are suitable for the body 1, certain styrol resins can be readily coated with the lining material by electrostatic deposition, for example, ABS-polystyrenes, several of which are sold under the trademarks Novodur PM2C, Cycloc EP 3510 or Terluran KR2540. If desired a plastic rotor body 1 can be strengthened by fiber glass reinforcing strands being embedded in the resin. The particular lining material is selected not only according to its forming and/or bonding qualities, but also according to the particular fiber which it is intended will be spun in the spinning chamber.

The coating 4 can be applied to the spinning chamber interior by any suitable method such as by electroplating, spraying, anodizing, japanning, spinning a foil onto the surface, or centrifugal sintering, but preferably is injected into the spinning chamber as a foil.

Instead of applying a coating directly onto the spinning chamber interior, a preformed insert 5, as shown in FIGURE 2, can be set into the spinning chamber. In this instance, the inner annular wall of the rotor body defining the insert-receiving cavity is cylindrical and the undercut wall of the spinning chamber is formed in the insert 5 only. The insert can be formed by pressing, extruding, deep-drawing using a collapsible die, blow-molding, die-casting, centrifugal casting or laminating, depending upon the type of material of which the insert is made. In order to assure that there will be no slippage of the lining insert 5 relative to rotor 1', the rotor insert-receiving cavity may be shrunk after the insert is put in place, or the insert may be adhesively bonded in the rotor cavity. A suitable adhesive is epoxy resin, one of which for example, is sold under the trademark Araldit.

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If the lining material selected cannot readily be preformed as an insert 5 and also will not readily adhere to the preferred rotor material, an intermediate layer 6, shown in FIGURE 3, of a material which has an affinity for the lining material can be interposed between such rotor and lining. The lining 4 is then applied to the intermediate layer. Layer 6 can be applied as an intermediate coating, as shown in FIGURE 3, or it could be a preformed insert, such as the insert 5 shown in FIGURE 2.

The lining material is preferably a metal or a cermet, but it can also be a nonmetal such as a ceramic or Teflon. The lining can be a single layer or it can be applied in multiple layers, particularly if the lining is a coating electroplated in the cavity of a plastic rotor.

We claim:

1. In a spinning machine having a rotary spinning chamber for spinning fiber, a spinning rotor having a body of lightweight form-sustaining material and including an annular wall defining a spinning chamber cavity in one end portion thereof, the cavity wall having a lining of material different from that of the rotor which has good spinning properties.

2. The spinning rotor defined in claim 1, in which the lining is a preformed insert.

3. The spinning rotor defined in claim 2, in which the insert is adhesively bonded to the cavity wall.

4. The spinning rotor defined in claim 1, in which the lining is a coating.

5. The spinning rotor defined in claim 1, in which an

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intermediate layer of material having an affinity for the rotor body material is interposed between the rotor cavity wall and the lining.

6. The spinning rotor defined in claim 5, in which the intermediate layer is a preformed insert and the lining is a coating.

7. The spinning rotor defined in claim 1, in which lining material is injected into the cavity as a foil.

8. The spinning rotor defined in claim 1, in which the lining material is brass.

9. The spinning rotor defined in claim 1, in which the rotor material is an aluminum alloy.

10. The spinning rotor defined in claim 1, in which the rotor material is an electroplatable plastic.

11. The spinning rotor defined in claim 1, in which the lining material is chromium.

12. The spinning rotor defined in claim 1, in which the lining material is selected from the group consisting of brass, chromium, polytetrafluoroethylene, nickel, hardened gold, varnish, enamel and smooth ceramics.

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