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 [73] Assignee **General Electric Company**

[56]

References Cited

UNITED STATES PATENTS

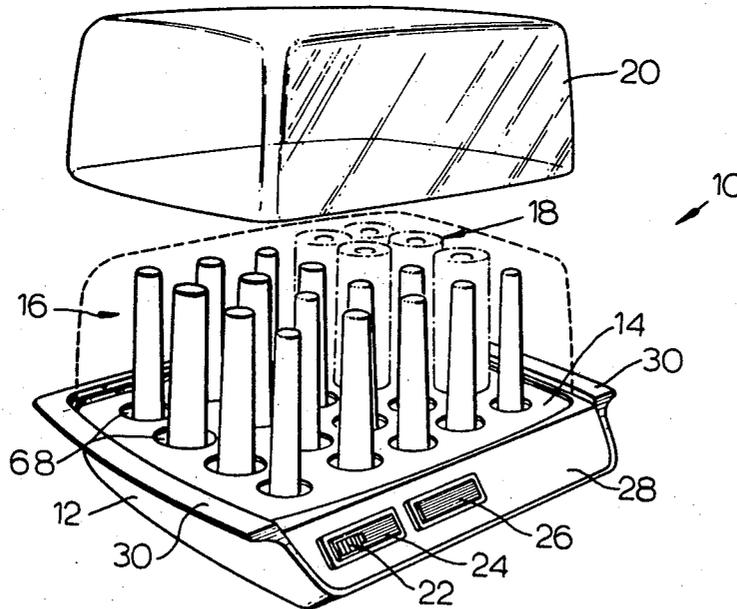
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3,417,219	12/1968	Bailey.....	219/10.61
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[54] **HEATER ROLL TEMPERATURE DETECTOR APPARATUS**
 5 Claims, 1 Drawing Fig.

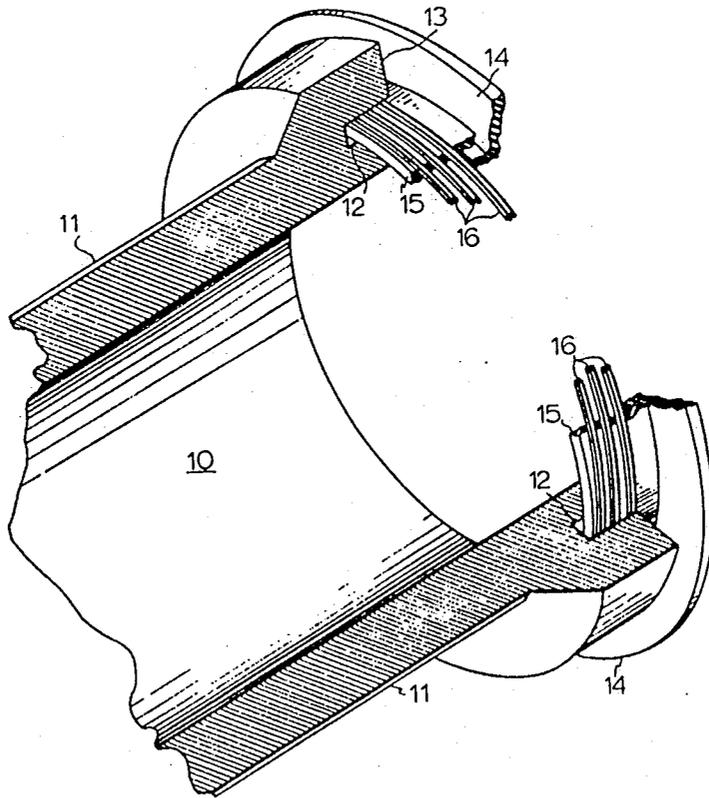
[52] U.S. Cl..... 219/505, 469, 471
 [51] Int. Cl..... H05b 1/02, B21b 27/06
 [50] Field of Search..... 219/10.61, 469, 471, 505; 338/316

ABSTRACT: A temperature sensor for a rotating heater roll having an annular slot cut into an end face of the roll including a non-inductive winding of temperature-responsive resistance wire upon a stationary rim inserted completely within the slot in non-contacting relationship whereby the heat of the roll affects the winding to change its resistance to control and regulate the source of heat provided for the roll.



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3,601,580



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HEATER ROLL TEMPERATURE DETECTOR APPARATUS

BACKGROUND OF THE INVENTION

The high degree of heat regulation required in synthetic fiber heat processing equipment requires greater and greater precision in control of the heat supplied to the heated rolls over which the synthetic filaments are normally processed in contact with the roll's lateral surface. Since the roll may rotate at very high speeds the matter of measuring the temperature of the roll and transferring the measurement to the stationary control apparatus becomes a difficult problem.

Before the requirement for very close temperature control became necessary in such processing equipment thermocouples and thermistors placed in the proximity of the rotating roll were sufficient; however, as the requirement for closer heat regulation arose in view of the ever more heat sensitive synthetic materials from which the filaments were drawn, innovations were introduced for more accurately measuring the roll temperature. One such arrangement is shown in United States Patent 3,273,101 wherein an annular slot is cut into one face of the rotating roll and a heat stationary probe-like sensing element is inserted within the slot but not in contact with it, leads from the sensing element being connected with the heater control circuit, which may be via electric resistance devices placed inside the roll, or via induction heating of the roll by an internal winding energized by alternating current, both types of heating rotating rolls being well understood in the art. United States Patent 3,435,171 shows a similar adaptation in connection with an inductively heated metal fiber heating roll, or godet.

United States Patent 3,484,581 illustrates another arrangement whereby the temperature of the roll is provided by a temperature-responsive resistance winding integral with one end of the heater roll, its leads being brought out to a stationary control circuit via slip rings and the like.

Limitations are placed upon heat control by the above-noted illustrations, however, in that sudden changes in temperature, brought about as the fiber filaments contacting the roll are processed, are improperly reflected into the heat control circuits, particularly where such changes are very slight, since the probe-like sensors have only a small percentage of their areas in close proximity to the roll, and the slip ring arrangements introduce errors in the contacting brushes that may be more than equal to the changes being measured.

A still further arrangement is illustrated in United States Patent 3,417,219 wherein the heat sensor may be made integral with the roll and its leads fed to a rotary transformer winding rotating with the roll so that a cooperating stationary winding inductively related to the first said winding may reflect such temperature changes without encountering the losses introduced by slip ring construction. However, rotary transformer apparatus is expensive and requires careful design considerations when used with inductively heated rolls.

SUMMARY OF THE INVENTION

The present invention eliminates the deficiencies and disadvantages noted above in providing a simple, highly accurate, temperature sensor arrangement for a synthetic fiber heat processing roll by incorporating a continuous thermal sensitive winding constantly related to the heated roll throughout its entire lateral surface as it rotates by providing an annular slot cut into one face of the roll into which an annular, non-inductive, temperature-responsive resistance winding is inserted, the winding being carried by a stationary mounting rim extending into the slot.

DETAILED DESCRIPTION OF THE INVENTION

The drawing illustrates the invention in the showing of a partial sectional view of a cylindrical heater roll 10, which as it is rotated contacts synthetic fiber filaments being processed upon its lateral surface 11. At one end of the roll 10, preferably its open end which normally abuts the fixed support from which the roll is rotated by a shaft (not shown) extending internally of the roll and connected therewith at the closed end of the roll, an annular slot 12 is cut into the face 13. A ring 14, which is stationary in respect to the roll 10, having a rim 15 throughout its circumference, is provided with a winding 16 of one or more complete turns of temperature-responsive resistance wire. The resistance wire may be iron, nichrome or platinum, the latter being preferred in view of its more linear response in change of resistance under varying temperature, and the winding is preferably made by joining two lengths of wire together (electrically) at their ends and winding the two wires together upon the rim 15 to provide a non-inductive winding, thereby avoiding any electrical interference when the roll 10 may be inductively heated by an internal winding (not shown) excited with alternating current. The free ends of the winding 16 are brought out and connected with the control circuit for regulating an electrical source of heat provided to the heater roll 10, the circuit following conventional regulated power supplies well known in the art.

What is claimed is:

1. Temperature sensing apparatus for a rotating heater roll including an annular slot cut into one face of said roll, a stationary circumferential member inserted into said slot in non-contacting relationship, and a temperature-responsive resistance winding extending into said slot upon said member for detecting changes of temperature of said roll.

2. The invention according to claim 1 wherein the said winding comprises a plurality of complete turns of platinum wire.

3. The invention according to claim 1 wherein the said winding is non-inductive.

4. The invention according to claim 1 wherein the said winding is centrally located within the said slot.

5. The invention according to claim 1 wherein the said winding is located completely within said slot.

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