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Sukenik

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[54] **METHOD OF FABRICATING A COMPOSITE ROLL**

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[52] **U.S. Cl.** ..... **29/148.4 D,** 29/120, 29/132, 29/419, 29/421 R, 65/253, 117/97, 117/99, 264/257

[51] **Int. Cl.** **B21d 53/26**

[58] **Field of Search** ..... 29/148.4 D, 419, 421 R, 29/120, 130, 132; 117/94, 97, 98, 99; 264/101, 257; 65/253; 198/127 R

[56] **References Cited**

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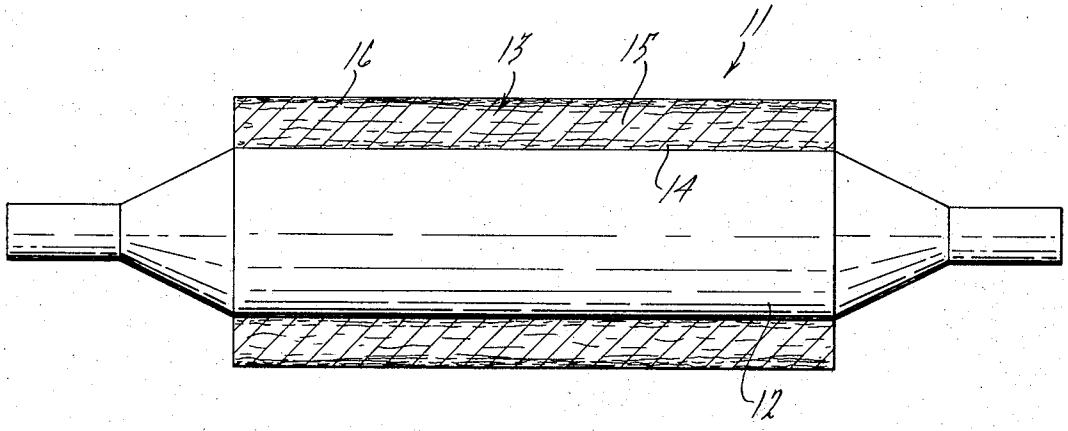
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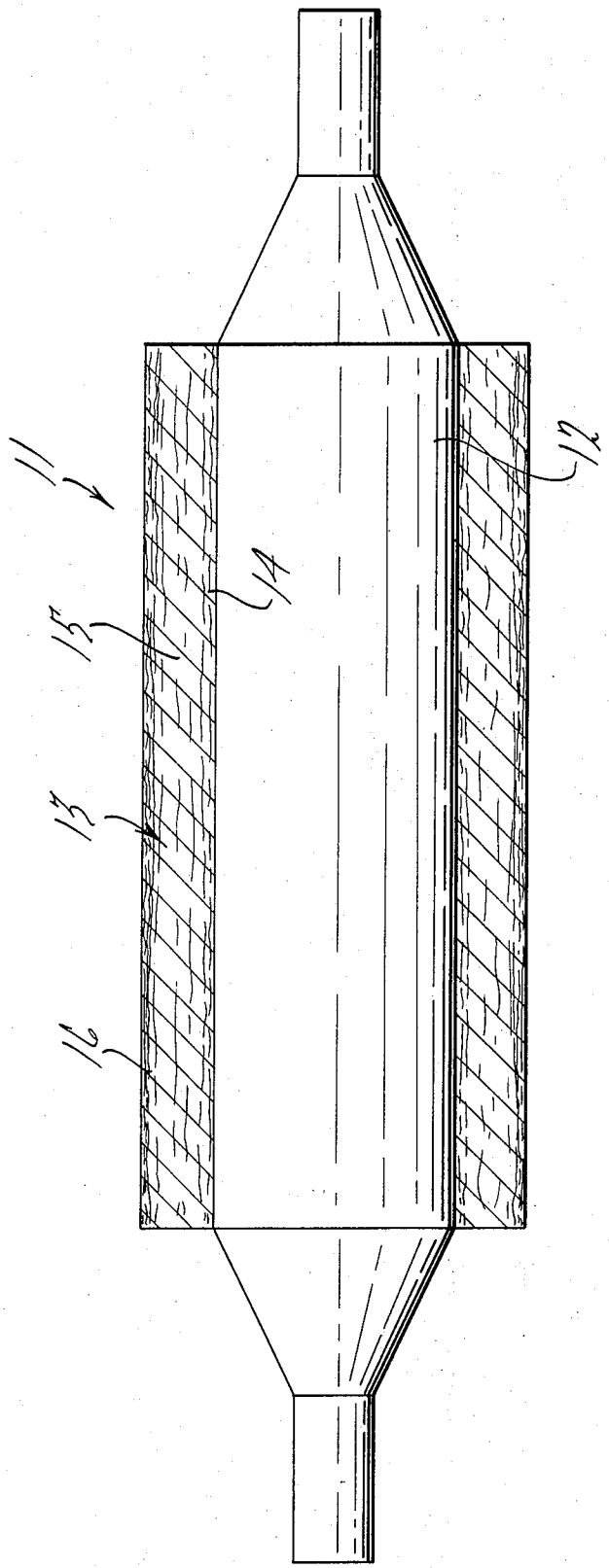
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[57] **ABSTRACT**

A roll cover is made by preparing a slurry of fibers and radially depositing these fibers on a cylindrical member such as a screen, building up a sleeve which may be mounted on a mandrel. The concentration of fibers in the slurry may be tailored to suit requirements, so that a sleeve may be formed with fiber concentrations which vary in a radial direction.

13 Claims, 1 Drawing Figure




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METHOD OF FABRICATING A COMPOSITE ROLL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to rolls used to carry products such as glass, aluminum, brass, copper and steel through lehrs, furnaces or ovens. Such products may be subject to marking while passing over the rolls if the latter are improperly designed.

2. Description of the Prior Art

Glass lehr and furnace roll designs for this function have utilized asbestos discs compressed axially under high forces and then machined on their outer diameter. Due to the hazards which attend the use of asbestos, it is desirable to develop alternate constructions.

The following patents were discovered in a search on this general subject:

3,515,531 — Shorr et al.
2,788,957 — Lindquist
2,300,528 — Sherts
1,593,567 — Byrnes
2,794,240 — Allen
3,670,381 — Schoffmann
1,732,042 — Fox
2,313,227 — De Bats
2,326,044 — Littleton
3,141,756 — Griffen
3,404,973 — Nedelec
3,492,109 — Robinson et al.
1,273,310 — Baker
2,062,317 — Joseph

BRIEF SUMMARY OF THE INVENTION

It is the general object of the invention to provide a novel and improved roll for carrying markable products through lehrs, furnaces or ovens, and a method of manufacturing such a roll which permits the use of materials other than asbestos.

It is another object to provide an improved method of this nature which permits various rolls to be made with properties best suited for their particular applications.

Briefly, the construction of this invention comprises a cylindrical body and a sleeve of pressure formed fibrous material. The sleeve may be formed of ceramic fiber or mixtures of ceramic and metallic wool materials. One method of this invention comprises making a slurry of fibers containing various inorganic or organic binders, placing a cylindrical screen in the slurry and creating a vacuum within the screen so that the fibers in the slurry are deposited thereon and interlace themselves to build up to any desired thickness. The tubular section so manufactured can be mounted on the roll body without any significant axial compression to accomplish an equivalent or improved result as compared with asbestos covered rolls. The fiber concentration in the slurry may be varied during the course of deposition to create sleeves with various fiber densities or with densities which vary in a radial direction.

BRIEF DESCRIPTION OF THE DRAWINGS

The FIGURE shows a roll carrying a vacuum deposited sleeve made according to the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The roll is generally indicated at **11** and comprises a

body **12** of cylindrical shape which may be of steel, stainless steel or other suitable material. Mounted on this body is a sleeve generally indicated at **13.** The material of this sleeve may be ceramic fibers such as "Kaowool" manufactured by Babcock & Wilcox Company, "Fiberfrax" manufactured by Carborundum Company, quartz, amorphous silica, mineral wool, glass, or metallic wools. Alternatively, these fibers may be mixed with metallic wool for strength and resiliency. Sleeve **13** may be secured to body **12** by any suitable means such as a bonding adhesive, pins, keys, collars or set screws. Sleeve **13** may be made up of axially adjacent sections instead of as one continuous member.

One method of manufacture of sleeve **13** is as follows: A slurry is prepared of fibers and various inorganic or organic binders. A cylindrical screen having an outside diameter approximating the diameter of body **12** is placed in this slurry of fibers. A vacuum is created inside the screen so that the fibers are deposited on the screen and interlace themselves, being built up to any desired thickness. After the proper thickness is attained, the screen is removed from the slurry and the sleeve allowed to dry. Alternately, the fibrous tubular section can be removed while wet and allowed to dry on another mandrel or the roll mandrel. The outside surface of the sleeve may be machined if desired, or could be mounted on the body without subsequent machining. The latter construction would minimize marking and make less critical any out-of-round condition of the parts.

If desired, the slurry concentration could be tailored to create concentric discrete zones of varying fiber concentration. For example, zone **14** adjacent body **12** could have a fiber mix which has superior resiliency to take up radial expansion of body **12** when it is subjected to heat during operation. Intermediate zone **15** could have a fiber mix with the desired insulating value and nominal strength. The fiber mix of outer zone **16** could provide strength, insulative qualities and abrasion and scratching resistance. The sleeve may alternately be formed by other methods of radial deposition of the slurry fibers. For example, instead of creating a vacuum inside the screen, pressure could be applied to the slurry, so that the pressure differential causes deposition. The fibrous material could be propelled against the screen with sufficient velocity to accomplish interlacing and bonding, for example by air deposition or "gunning." The slurry could, in other words, comprise a gaseous fluid.

After the sleeve has been formed by any of the above methods, it could be subjected to a subsequent wet rolling operation to provide densification and concentricity.

Another alternative method is to form the fibrous sleeve on the inside of a tubular screen to provide maximum density to the outer fibers.

In some cases, the cylindrical screen could be left in place as a reinforcing element when the sleeve is mounted on the roll mandrel.

I claim:

1. A method for manufacturing a composite roll supporting a markable product such as glass, aluminum, brass, copper or steel in a lehr, furnace or oven, said method comprising the steps of providing a rigid cylindrical roll body, preparing a slurry of fibers containing a binder, providing a cylindrical screen member, depositing the slurry of fibers on said screen member by

radial movement of said slurry whereby the fibers interlace themselves and are built up to form a sleeve of a desired thickness, and mounting and securing the sleeve about the circumference of the roll body.

2. The method according to claim **1**, in which the sleeve is dried before it is mounted on the roll body.

3. The method according to claim **1**, in which the sleeve is removed from said screen member while still wet and mounted on the roll body to dry.

4. The method according to claim **1**, with the further step of subjecting the sleeve to a wet rolling operation to provide densification and concentricity.

5. The method according to claim **1**, in which the screen member has an outside diameter approximating the diameter of the roll body and the fibers are deposited on the outside of the screen member.

6. The method according to claim **1**, in which the sleeve is formed on the inside of the screen member to provide maximum density to the outside fibers.

7. The method according to claim **1**, in which the screen member is left in place on the inside of the sleeve and placed on the roll body as a reinforcing element.

8. The method according to claim **1**, in which the radial deposition is accomplished by means of a pressure differential maintained between the slurry and the other side of the screen.

9. The method according to claim **1**, in which the slurry is propelled against the screen member with sufficient velocity to accomplish the interlacing and building up of the fibers.

10. The method according to claim **1**, in which the slurry comprises a gaseous fluid.

11. A method for manufacturing a composite roll useful for supporting a markable product such as glass, aluminum, brass, copper or steel in a lehr, furnace or oven, said method comprising the steps of providing a rigid cylindrical roll body, preparing a slurry of fibers containing a binder, placing a cylindrical screen in said slurry having an outside diameter approximating the diameter of said roll body, creating a vacuum inside said screen whereby the fibers are caused to interlace themselves on the screen to a desired thickness, drying the sleeve thus created, and mounting and securing the sleeve about the circumference of the roll body.

12. The method according to claim **11**, said method also including the steps of tailoring the slurry concentration to obtain concentric layers of material in said sleeve of varying fiber concentrations.

13. The method according to claim **11**, including the further step of machining the outer surface of said sleeve.

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