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ROLLER ASSEMBLIES FOR THE PRESSURE TREATMENT OF MATERIALS

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FIG. 1

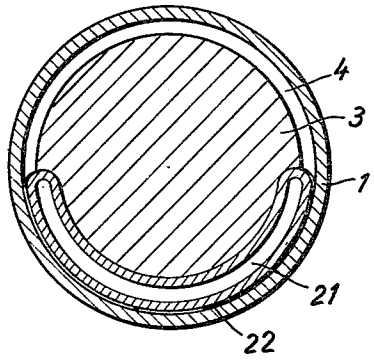
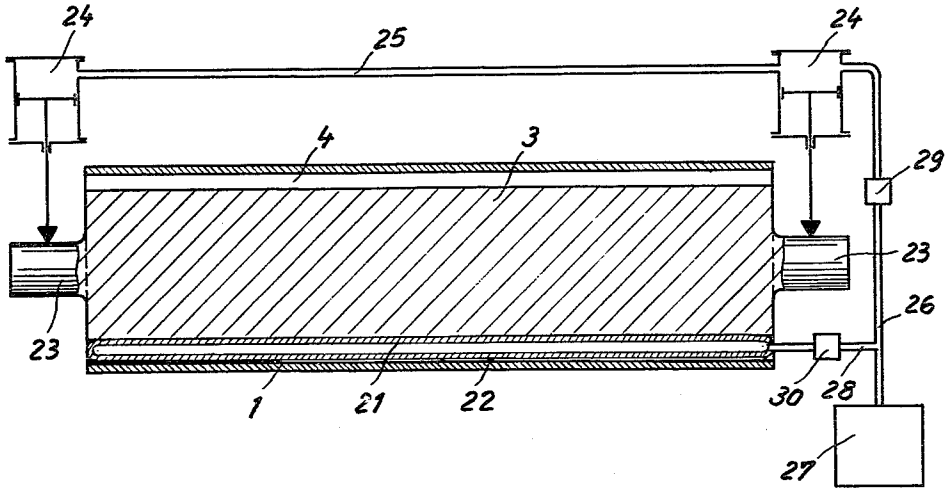


FIG. 2



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ROLLER ASSEMBLIES FOR THE PRESSURE TREATMENT OF MATERIALS

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4 Claims. (Cl. 100—170)

This invention relates to improvements in roller assemblies for the pressure treatment of materials such as the smoothing and embossing of paper and other materials, for the squeezing out of moisture from textiles, for the calendering and drawing out of sheets of plastic and rubber and the like as well as for pressing applications in which the roller consists of a drum or tube-like cylinder adapted for rotation and also forming the roller periphery and a stationary core for taking the load located therein whereby there is a pressure means acting on the inner surface of the cylinder and packings lying on the inner surface of the cylinder as well as on the core for preventing an overflow of the pressure medium from the operative side of the core.

The known rollers for the pressure treatment of material webs on carrying out work undergo bending on the non-operative side, i.e. the side away from the operative portion of the roller which adversely affects the uniform pressure on the whole length of the roller when the roller is pressed via its journals against a counter roller or a support.

Various proposals are already known for obviating this drawback. Thus a curved roller has been proposed. Here there is the drawback that every curvature can only take into consideration a certain pressure whereby for every pressure another roller is necessary.

It has also been proposed to subject the operating roller or rollers to fluid pressure in which the rollers are formed with a core and dividing plates for defining the fluid chamber to which fluid under pressure is admitted and pressure is applied to the ends of the top roller through pistons acting thereon.

According to the invention a tubular roller is mounted to enclose a relative floating core, and to provide a gap between the inner periphery of the tubular roller and the core, an inflated member being provided between the core and the tubular roller over the portion of the periphery subjected to pressure contact.

The invention will be described with reference to the accopanying diagrammatic drawings:

FIG. 1 shows a roller in cross section.

FIG. 2 illustrates in longitudinal section the additional pressure on the journals of the roller core.

The roller or rollers co-operating with the roller 1 shown are not illustrated. The roller 1 consists of a tubular hollow body which need only have a comparatively thin wall thickness and may consist of suitable material such as steel, flexible or elastic material, synthetic material such as, for example, polyamide and superpolyamide. The hollow body 1 is arranged on a stationary rigid core 3, for example, of steel mounted in the machine stand, not shown. The core 3 is of circular cross section and provides around its whole periphery a gap 4 between the hollow cylinder 1. A portion of the core 3 shown in the drawing as on the underside, is reduced to a smaller diameter. An inflatable member 21 of suitable material such as rubber, elastic synthetic material or the like is arranged in the reduced portion of the core 3. The inflatable member is filled with a pressure medium and bears against the inner periphery of the hollow cylinder 1. A bearing sheet 22 is arranged between the inner periphery of the hollow clinder 1 and the inflatable member 21.

As shown in FIG. 2 the journals 23 of the core 3 are under pneumatic or liquid pressure which is exercised via pistons located in the cylinders 24. The cylinders are connected to one another via a common pipe 25 and are connected to a compressed air source 27 or liquid pressure source via the pipe 26. The inflatable member 21 is also connected via the pipe 28 to this compressed air or liquid pressure source. In the pipes 26 and 28 regulating valves 29 and 30 are located which permit of the adjustment of the pressure in the inflatable member 21 and in the cylinder 24 so that these pressures bear a predetermined relation to one another.

The roller 1 exercises on its whole length a uniform pressure on a counter-roller or other support as the pressure of the liquid located in the inflatable member body is transmitted uniformly on all sides without requiring other means to ensure the uniform exercising of the pressure. Any deflections of the stationary core have no influence on the satisfactory contact of the tubular roller on the roller in contact therewith.

The pressure medium may be located in the inflatable member 21 sealed on all sides so that on operation of the roller by the reaction pressure caused by the material web to be treated it is placed under pressure. The inflatable member 21 may however be connected to a separate pressure source as, for example, to an air cylinder to which pressure regulating valves are provided in order to be able to effect a selective adjustment to a predetermined pressure to be maintained.

The core 3 forming approximately a circular surface in cross section is reduced in diameter on the operative side to form a recess for receiving the inflatable member 21. By the contact of the inflatable member 21 on a cylindrical core surface the inflation body is protected as much as possible against damage.

The inflatable member 21 bears against a bearing sheet on the inner periphery of the hollow roller 1. The friction reducing bearing sheet protects the inflatable member 21 on this side from wear and facilitates the rotation of the roller 1. The bearing sheet may be made of synthetic material such as of polyamide or superpolyamide or of bronze.

One advantage of the invention consists of the fact that the roller 1 may be employed as a lower roller instead of as an upper roller. Rollers constructed according to the invention may be employed with other rollers as upper rollers or as lower rollers.

The reduction of the possibility of bending of the tubular roller 1 in its centre portion under the influence of the pressure medium is effected since a greater controlled pressure is exercised in relation to the ends of the roller in that the pressure is maintained in the direction of the counter roller, for example by pneumatic means on the journals of the roller core. This is of particular advantage if with pressure treatment mechanisms with long rollers narrow web materials are to be treated.

The optimum pneumatic pressure on the journals 23 and the pressure via the inflatable member 21 can be brought into predetermined relationship with one another by means of a differential regulator so that there are, for example, uniform pressures along the whole length of the roller. If the pressure on the journals is reduced then the roller bends in the middle and acts like a curved roller without however becoming larger in diameter or in the central portion.

What I claim is:

1. A roller assembly for the application of pressure to surfaces for calendering, drawing and rolling, said roller assembly including a roller having a tubular rotary cyl-

inder, an elongated stationary rigid core substantially coaxial therewith, said core being mounted within and coextensive with said cylinder, said core being spaced from the inner surface of said cylinder, and an arcuate shaped stationary inflatable member mounted on said core to fill a portion of the space between said core and the inner surface of said cylinder, said inflatable member being substantially coextensive in length with said cylinder so as produce a continuous uniform pressure along substantially the entire length of said cylinder.

2. A roller assembly according to claim 1 wherein said core is recessed around a portion of its periphery to receive said inflatable member.

3. A roller assembly according to claim 1 including a bearing sheet disposed between said inflatable member and said rotary cylinder.

4. A roller assembly according to claim 3 including

journals on the ends of said core, and fluid supply means for applying fluid pressure to both said journals and to said inflatable member, said fluid supply means including a fluid supply line having a valve therein to maintain a predetermined relationship between the pressure to said journals and to said inflatable member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,395,915	Specht	Mar. 5, 1946
2,704,392	Schultz	Mar. 22, 1955
2,851,869	Quoos et al.	Sept. 16, 1958
2,871,519	Flint et al.	Feb. 3, 1959
2,908,964	Appenzeller	Oct. 20, 1959

FOREIGN PATENTS

590,531	Germany	Jan. 4, 1934