July 31, 1962 E. KUSTERS ETAL 3,046,637

ROLLERS FOR THE PRESSURE TREATMENT OF MATERIAL IN WEB FORM

Filed Oct. 6, 1960

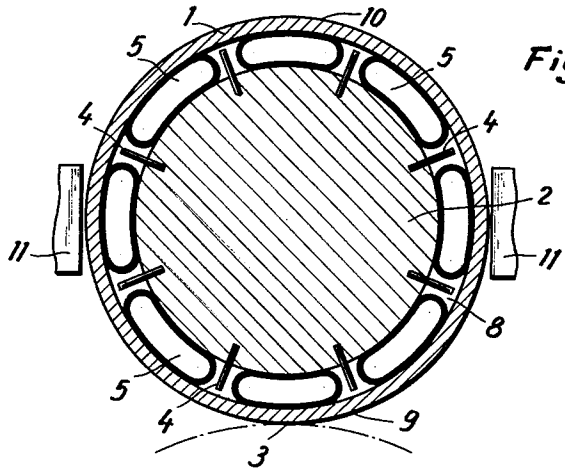


Fig. 1

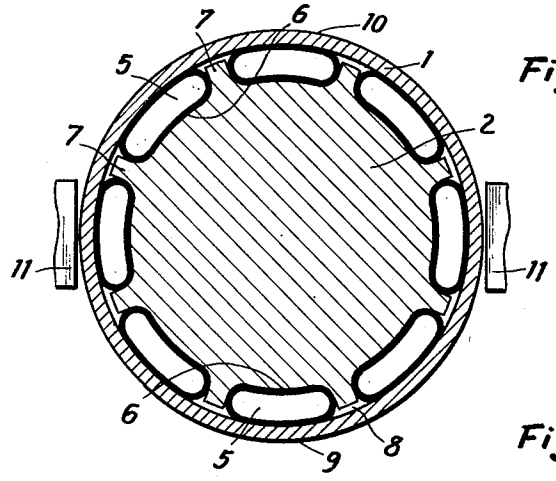
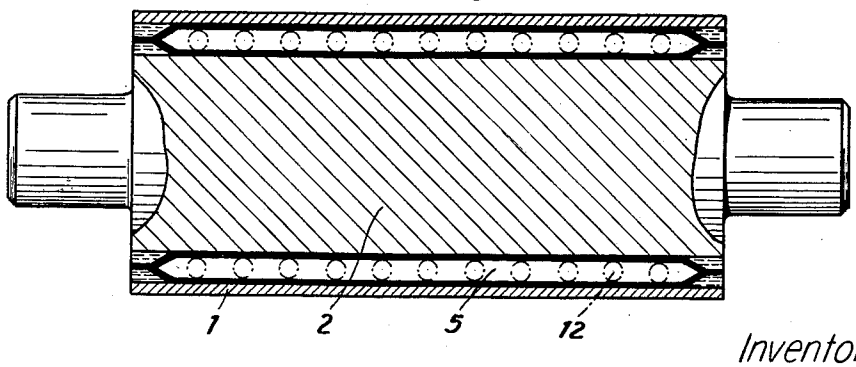


Fig. 2

Fig. 3



Inventors
Eduard Kusters
Valentin Appenzeller
By their attorneys
Howson and Howson

United States Patent Office 3,046,637 Patented July 31, 1962

3,046,637

ROLLERS FOR THE PRESSURE TREATMENT OF MATERIAL IN WEB FORM

Eduard Kusters and Valentin Appenzeller, Krefeld, Germany, assignors to Textilmaschinen Eduard Kusters, Krefeld, Germany, a firm

Filed Oct. 6, 1960, Ser. No. 60,866
Claims priority, application Germany Oct. 9, 1959
3 Claims. (Cl. 29—113)

The invention relates to a roller for the pressure treatment of material in web form such as for the smoothing and embossing of paper and other materials, for the squeezing out of moisture from textiles, for the calendering and spreading of synthetic material, rubber sheets and the like as well as for other pressure treatments of the kind consisting of a hollow cylinder forming the working roller periphery surrounding a core rotating with it and mounted at its ends which are pressure loaded, there being a gap between the core and the inner surface of the cylinder which is divided into chambers parallel to the roller axis to receive a pressure medium.

It is already known to form such roller from a hollow cylinder and a stationary core mounted at its ends which leaves a peripheral gap between it and the inner surface of the hollow cylinder. In this arrangement the space adjacent the portion of the outer cylinder through which pressure is transmitted is separated from the space through which pressure is not transmitted by a packing, and in the former there is a liquid or gaseous pressure medium.

In such construction of roller the roller exercises on its whole length a uniform pressure on a counter roller or other support as the liquid pressure or the pressure of the gaseous medium transmits on all sides a uniform pressure. The pressure loads are taken up by the core without reactions on the hollow cylinder. Any flexions of the core have no influence on the flat contact of the hollow cylinder with its counter surface.

This known roller can be modified in such a manner that with a rotating core the gap between the core and the outer cylinder is divided into chambers parallel to the axis of the roller of which chambers those turned towards the line of contact of the cylinder with its counter surface at any time are under pressure which originates from a suitable source whilst the chambers located on the opposite side turned away are not subjected to pressure. A suitable control is provided for the distribution of the pressure.

According to the present invention a roller of the kind referred to has a core rotating with the hollow cylinder, the gap between the core and the cylinder is separated into chambers formed by pockets containing tubes of resilient material adjacent to one another and arranged parallel to the axis of the roller. The said tubes are filled with a fluid (liquid or gas) and adapted to be connected to a source of pressure through pressure distributing means which as the roller rotates successively connects the tubes in the vicinity of the part of the roller through which pressure is applied to a co-acting surface, i.e., the effective side or line of the roller, to a source of pressure.

The tubes are preferably of heat proof or heat resistant material such as rubber or a synthetic resin and are deformable in cross section. In some cases they may be of thin metal. The tubes are preferably self supporting which in the case of rubber or synthetic resin tube can be attained by means of a fabric insert. They have a flat edge and flat sides turned towards the core and the hollow cylinder respectively.

The tubes may each be closed at each end whereby if the pressure loading is effected through the journals of

the rotating core a pressure is then only produced in the tubes on the side in the part of the roller in the vicinity of the surface with which it co-acts.

An additional cushion may be formed by elastic hollow bodies, for example, of spherical shape arranged in the tubes.

The space containing the tubes may be filled with a heat resistant synthetic oil preferably flowing through it. This oil may be heated during its circulation and so heat the roller.

The invention is illustrated diagrammatically in the accompanying drawings which show two embodiments thereof. In these drawings

FIG. 1 shows in cross section a roller in which the core has peripheral pockets parallel to the roller axis for receiving the tubes, the pockets being formed by radial bridge pieces;

FIG. 2 shows in cross section a further embodiment in which the core has peripheral pockets parallel to the roller axis, the side walls of the pockets being formed integrally with the core, and

FIG. 3 shows a longitudinal section of a roller in which spherical hollow bodies are provided.

The hollow cylinder forming the working roller periphery is indicated at **1** and the core rotating with it is indicated at **2**. The core is mounted at its ends which are pressure loaded at right angles to the surface **3** with which the roller co-operates. A gap **8** is formed between the core **2** and the inner surface of the hollow cylinder **1**.

In the embodiment of the invention shown in FIG. 1 the gap **8** is divided into pockets parallel to the axis of the roller by bridge pieces **4** projecting radially from the periphery of the core **2**, the depth of the bridge pieces being less than the width of the gap **8** and tubes **5** of flattened or oval shape in cross section are located in the pockets.

In the embodiment shown in FIG. 2 the pockets are formed by longitudinal side walls **7** formed integrally with the core **2**, the depth of these walls being less than the width of the gap **8**.

The tubes **5** are filled with liquid or gas and are connected to a source of pressure through a distributing device which as the roller rotates successively puts the tubes **5** in the part **9** of the roller in the vicinity of the co-acting surface **3** into communication with the source of pressure whilst cutting off the pressure from the tubes in the remaining part **10** of the roller.

As shown in FIG. 3 each tube **5** is preferably closed at each end and may contain a number of spherical hollow bodies **12** of resilient material of less diameter than the depth of the tube which serves to prevent distortion of the tube beyond desired limits.

The cylinder **1** may be guided perpendicularly to its axis by guides **11** at each end thereof.

The pressure supplied to the tubes **5** may be varied according to the purposes for which the roller is required, but usually a pressure of about one atmosphere is found to be satisfactory.

We claim:

1. A roller for the pressure treatment of web material comprising a hollow cylinder forming the working periphery of the roller and a core adapted to rotate coaxially with the cylinder but separated therefrom by an annular space and pressure-loaded toward the effective side of the roller, there being a series of pockets in the periphery of the core and parallel to the axis of the roller, in combination with closed elastic tubes in the axial pockets having no connection with each other, each containing a fluid filling and adapted to exert pressure across the annular space against the cylinder when located in the vicinity of the effective side of the roller; whereby when

a tube is on the side opposite to the effective side of the tube it exerts no pressure on the cylinder and all the pressure of the core is transmitted to the web material.

2. A roller according to claim 1 in which there is a plurality of hollow spherical bodies of resilient material in each tube adapted to prevent distortion of the tube beyond desired limits.

3. A roller according to claim 1 in which the annular space between the hollow cylinder and the core where the tubes are located is filled with a heat-resistant synthetic oil.

References Cited in the file of this patent

UNITED STATES PATENTS

725,971	Kling	Apr. 21, 1903
1,232,053	Lawrence	July 3, 1917