Jan. 7, 1930. R. B. HEYS 1,742,991

SUCTION CYLINDER FOR PAPER MAKING MACHINES AND THE LIKE

Filed Feb. 14, 1929 2 Sheets-Sheet 1

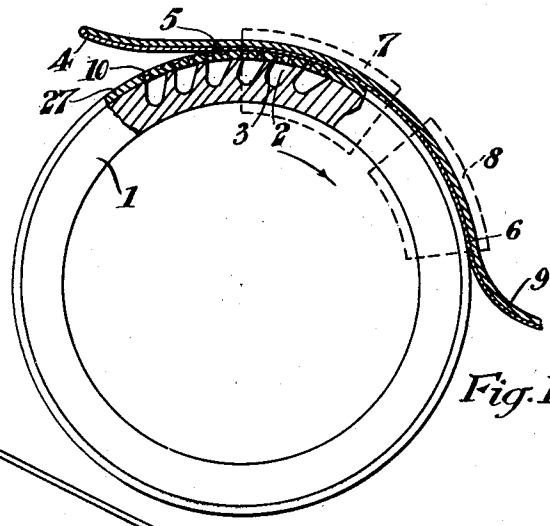


Fig. 1.

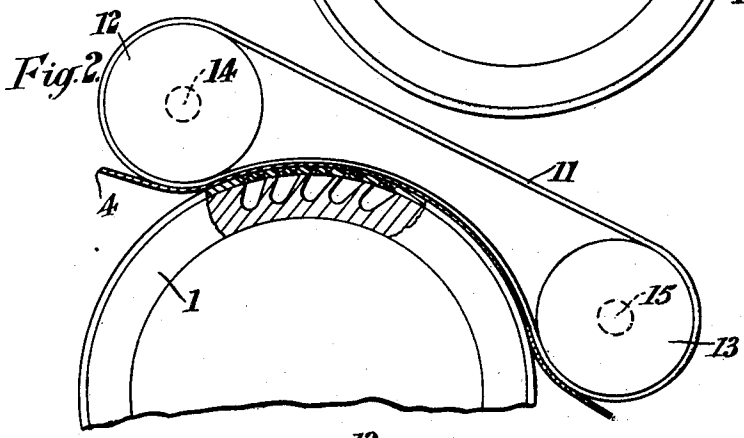


Fig. 2.

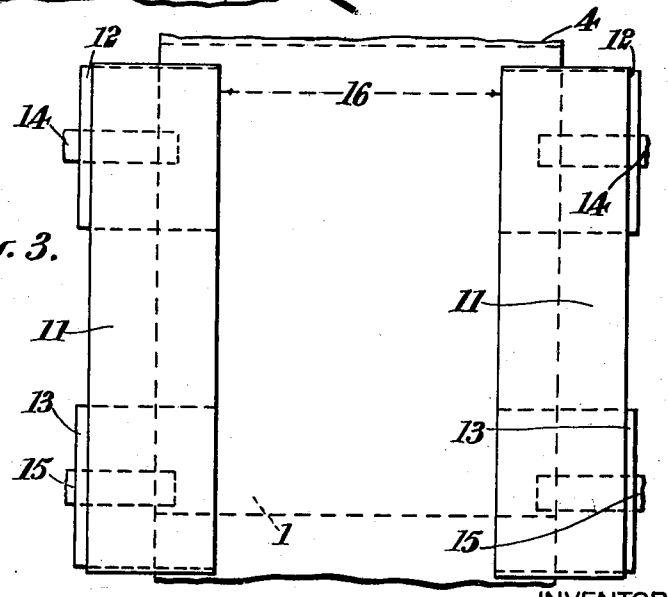


Fig. 3.

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Filed Feb. 14, 1929 2 Sheets-Sheet 2

Fig.4.

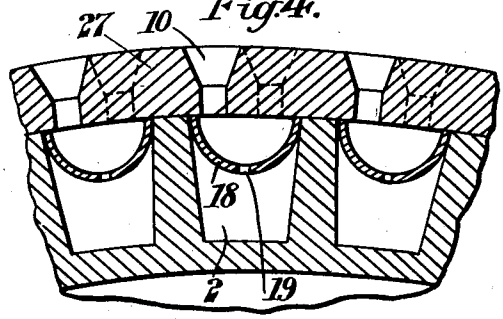


Fig.5

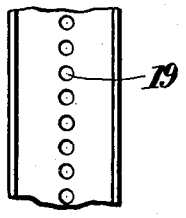


Fig.6.

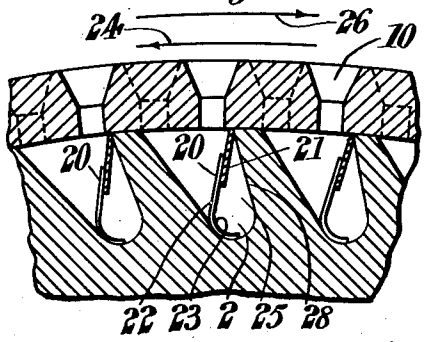


Fig.7

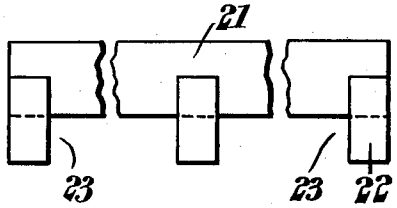
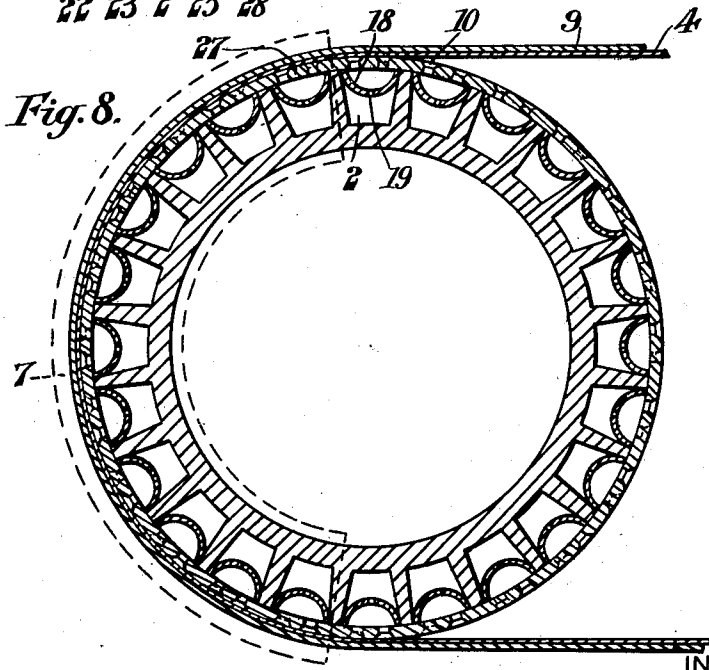


Fig.8.



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UNITED STATES PATENT OFFICE

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SUCTION CYLINDER FOR PAPER-MAKING MACHINES AND THE LIKE

Application filed February 14, 1929, Serial No. 339,956, and in Great Britain February 11, 1928.

This invention relates to suction cylinders, or rolls, of machines for making paper, paperboard, mill-board and the like of the type described and claimed in the specification of my U. S. Patent No. 1,591,921, issued July 6th, 1926, hereinafter referred to as the main patent.

According to the main patent, a suction cylinder or roll, which is adapted to abstract moisture from pulp or other material carried by a band passing over part of its periphery, is provided with longitudinal channels, into which the moisture passes and which periodically communicate with a recess or recesses in an end cover or covers connected with a suction device in order to abstract the moisture therethrough, and means are provided for retaining in the longitudinal channels any liquid which may remain there after said channels have passed the recess or recesses in the end cover, or covers, in order to prevent such liquid from wetting the pulp or other material on the next revolution of the cylinder or roll.

The object of the present invention is to provide various improvements in or modifications of the above device.

The present invention consists in an improved suction cylinder or roll of the type described and claimed in the specification of my U. S. Patent No. 1,591,921 in which the suction cylinder or roll is rotated at high speed, and the trailing sides of the longitudinal channels, instead of being substantially radial, are directed inwardly and rearwardly behind the radius so as to form pockets, which provide the means for retaining any liquid that may remain in the longitudinal channels after they have passed the said recess, or recesses, said liquid being retained in the pockets due to the high speed of rotation.

The present invention also consists in an improved suction cylinder or roll of the type described and claimed in Patent No. 1,591,921 in which an endless flexible belt (preferably of rubber) running over auxiliary rollers is provided at one or both ends of the suction cylinder or roll, and is adapted to make contact with the suction roll over the arc of its periphery subjected to suction in order to confine the width over which the suction is applied to correspond with the width of the pulp or other material carried by the band.

The present invention also consists in an improved suction cylinder or roll of the type described and claimed in Patent No. 1,591,921 in which curved or bent strips of metal or other material are inserted into the mouths of the longitudinal channels where they open out on to or towards the periphery of the suction roll, their curved or bent portions projecting into the channels, and holes being provided in the central zones of the curved or bent strips to allow the moisture from the wet pulp to flow therethrough to the inside of the channels, while the curved or bent strips will act as traps to prevent excess water being returned to the periphery of the suction roll.

The present invention also consists in an improved suction cylinder or roll of the type described and claimed in Patent No. 1,591,921 in which a plurality of recesses are provided which successively communicate with the said longitudinal channels to abstract moisture therefrom, the amount of suction applied being different for the different recesses.

The present invention further consists in an improved suction cylinder or roll of the type described and claimed in Patent No. 1,591,921 in which the channels are divided by longitudinal partitions, which extend towards the interior of the channels, and are provided with holes or recesses towards the interior of the channels, so that moisture from the wet pulp may flow through said holes or recesses during the suction period, but the partitions will act as traps to prevent the excess water being returned to the periphery of the suction roll after the suction period.

Various constructional forms of the present invention are diagrammatically indicated in the accompanying drawings in which:—

Figure 1 is a sectional elevation diagrammatically indicating one form of improved suction roll.

Figure 2 is a sectional elevation diagrammatically indicating another form of the invention comprising flexible belts for confining the width of the suction area.

Figure 3 is a plan view of the structure shown in Figure 2.

Figure 4 is a sectional elevation of part of the suction roll according to another modification of the invention.

Figure 5 is a plan view of one of the curved or bent strips shown in Figure 4.

Figure 6 is a sectional elevation of part of the suction roll according to a third form of the invention.

Figure 7 is a front view of one of the partitions shown in Figure 6.

Figure 8 is a sectional elevation of the improved suction roll shown in Figures 4 and 5, as fitted in a machine in which the pulp carrying band passes over the rear half of the drum.

Referring to Figure 1, the suction cylinder or roll 1 rotates in a clockwise direction as indicated by the arrow and is formed with a plurality of longitudinal channels 2 having trailing sides 3 directed inwardly and inclined rearwardly behind the radii of the cylinder to form pockets. These channels preferably extend substantially parallel with the axis of the cylinder, but need not necessarily do so.

The pulp carrying band 4 enters into contact with the roll at a point 5 on its upper surface and leaves said roll at a downwardly moving point 6 thereof.

The spaces 7 and 8 (shown dotted) diagrammatically indicate the positions of end recesses, which are located in an end plate of the cylinder as in the main patent and which are under suction and with which the longitudinal channels 2 successively communicate.

The apparatus works in the following manner:—As the longitudinal channels 2 pass the suction recesses 7 and 8, they are subjected to the action of suction, which withdraws moisture from the pulp 9 carried by the band 4 through holes 10 in the peripheral cover 27 of the roll and thence through the longitudinal channels 2. These holes 10 are staggered and register with the channels 2. After each longitudinal channel 2 has left the last suction recess 8, the excess moisture therein is retained in the pocket formed by the trailing side 3 by reason of the high speed of rotation of the roll and due to inertia. Such excess moisture will thereby be prevented from flowing back through the holes 10 in the peripheral cover 27 so as to moisten the pulp on the next or any succeeding revolution of the roll.

Preferably the suction applied by the first recess 7 is greater than that applied in the subsequent recess 8 and in consequence thereof there is less tendency to open up the pulp as it is being dried. More than two suction recesses may be provided, and then the suction applied in the first recess is preferably greater than that applied in any subsequent recess. If desired however only one suction recess need be provided.

Referring to Figures 2 and 3, endless belts 11 of flexible material (preferably rubber) are provided at each end of the suction roll 1 in order to confine the width over which the suction is applied to correspond with the width of the pulp or other material carried by the band. These endless belts 11 are shown as passing over auxiliary rollers 12 and 13 which are rotatably mounted upon axles represented by 14 and 15 (see Figure 3).

The endless pulp carrying band 4 is indicated in Figures 1 and 3 and the pulp carrying portion thereof extends across the width 16 indicated in Figure 2. When it is desired to change the width of paper being made the auxiliary rollers 12 and 13 are slid along their axes 14 and 15 in order to vary the width 16 as desired.

If desired only one endless flexible belt may be provided, arranged at one end only of the suction cylinder.

Referring to Figures 4 and 5, a bent or curved strip 18 is inserted into the mouth of each of the longitudinal channels 2 where the said channel opens on or towards the periphery 27 of the suction roll.

The bent or curved portion of the strip projects into the channel 2, and holes 19 are provided in or near the centre of the strip in order to allow the moisture from the wet pulp to flow therethrough to the inside of the channel, when said channel passes the end recesses and is acted upon by suction. After passing beyond the suction recesses, however, the bent or curved strip acts as a trap to prevent excess water being returned to the periphery of the suction roll.

Referring to Figures 6 and 7 the longitudinal channels 2 are divided by partitions 20 extending the length of the channels and towards the interior of the channels. In the drawings each partition consists of a plate 21 with strips 22 bolted or otherwise secured thereto in such a way as to provide holes or open spaces 23 towards the interior of the longitudinal channel. These holes or open spaces 23 act to allow water to pass therethrough when the longitudinal channel is under suction.

After the channel has passed beyond the area where suction is applied, then the partition 20 will act as a trap to prevent the escape of moisture from flowing back on to the periphery of the roll.

When intended to be rotated at high speed the paper making machine will be so constructed that this roll will be rotated in the direction of the arrow 24 so that the excess water will tend to collect in the pocket 25 due to the force of rotation of the cylinder and to the inertia of the liquid. The side 28 in Figure 6 is then the trailing side and is

directed inwardly and rearwardly behind the radius, as shown in the drawing.

In the case of suction rollers rotating at low speed however, the direction of rotation will be as shown by the arrow 26, in which case the pocket 24 will be below the partition 20 after passing the suction applying area and therefore the excess water will tend to collect therein. The side 28 in Figure 6 is then the leading side and is directed inwardly and forwardly in front of the radius, as shown in the drawing.

In all the constructions shown the arc of contact between the pulp carrying band and the suction roll may extend from close to the lowest point of the roll to near the highest point. Figure 8 shows for example such an arrangement as applied to the improved suction roll illustrated in Figures 4 and 5. Alternatively said arc of contact may extend from close to the highest point of the roll to a downwardly moving point as indicated in Figure 1.

What I claim is:

1. A high speed suction cylinder having longitudinal channels located adjacent its periphery and subject to suction for a limited period, said channels being inclined inwardly and from the radii of the cylinder, forming pockets to catch and retain, by force of rotation of said cylinder, surplus liquid remaining in said channels after the suction period.

2. A suction device, comprising a rotatable suction cylinder having adjacent its periphery a plurality of longitudinal channels, said channels being inclined inwardly and from the radii of the cylinder to form pockets, a cylinder end formed with a plurality of recesses therein cooperating successively with said channels, each of said recesses having a different amount of suction applied thereto.

3. A suction device, comprising a rotatable suction cylinder having adjacent its periphery a plurality of longitudinal channels, said channels being inclined inwardly of the cylinder and rearwardly behind the radii of the cylinder to form pockets, a cylinder end formed with a plurality of recesses therein cooperating successively with said channels, each of said recesses having a different degree of suction applied thereto, the greatest suction being applied to the recess first encountered by a given channel during rotation of the cylinder.

4. A suction cylinder having longitudinal channels inclined inwardly of the cylinder and from the radii of the cylinder, said channels being subject to suction for a limited period and containing longitudinal partitions extending into the interior of the channels, said partitions having openings therein toward the interior of the channels in order that liquid may flow through said openings during the suction period said partitions acting as traps to hold surplus water from the periphery of the suction cylinder after the suction period.

In testimony whereof I have signed my name to this specification.

ROLAND BLYTH HEYS.