

[54] **APPARATUS FOR AND METHOD OF
TREATING A WEB**

[75] Inventor: **James Haythornthwaite**, Joliette,
Quebec, Canada

[73] Assignee: **Scapa Dryers (Canada) Ltd.**,
Joliette, Quebec, Canada

[22] Filed: **Sept. 7, 1971**

[21] Appl. No.: **178,361**

[52] U.S. Cl.**34/23, 34/114, 34/155,**
226/95

[51] Int. Cl.**B65b 17/28, F26b 13/08**

[58] Field of Search.....**34/23, 114, 155,**
34/160; 226/95

[56] **References Cited**

UNITED STATES PATENTS

3,633,284 1/1972 Rodwin34/114

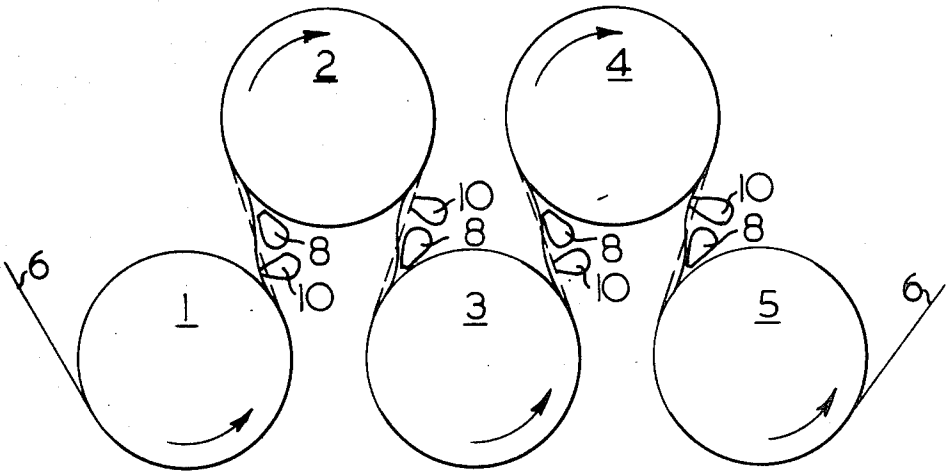
2,777,213	1/1957	Dungler.....	34/160
3,316,657	5/1967	Haywood.....	34/160 X
3,384,973	5/1968	Johansson	34/23
3,406,464	10/1968	Clark.....	34/155 X

Primary Examiner—William F. O'Dea
Assistant Examiner—Peter D. Ferguson
Attorney—Spencer & Kaye

[57] **ABSTRACT**

A web is treated, for example dried, by passing it around a rotary cylinder, and deflecting it by air pressure, positive and/or suction, applied to the web immediately adjacent the junction of the web and the cylinder to cause the web to contact a greater portion of the circumferential surface of the cylinder than it would in the absence of the air pressure.

4 Claims, 8 Drawing Figures



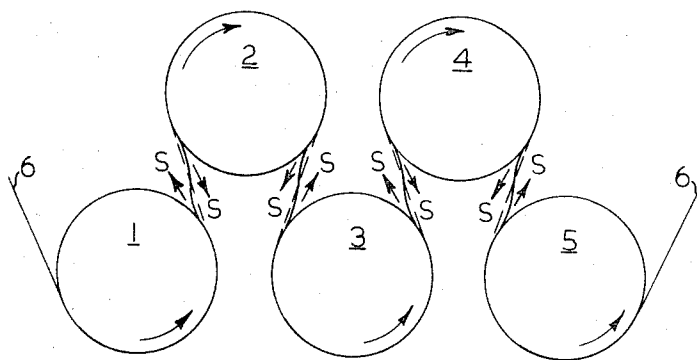


FIG. 1.

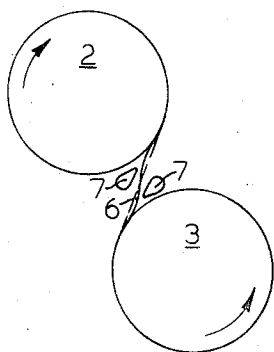


FIG. 2.

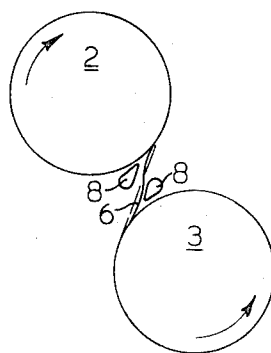


FIG. 3.

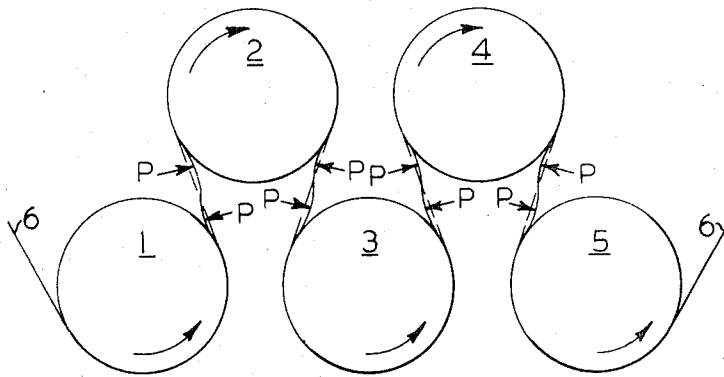


FIG. 4.

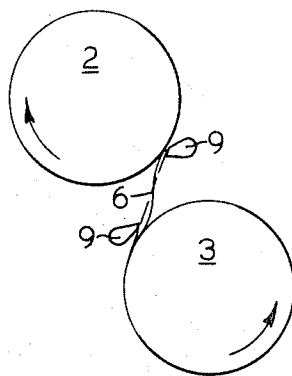


FIG. 5.

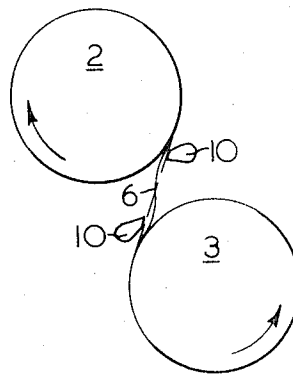


FIG. 6.

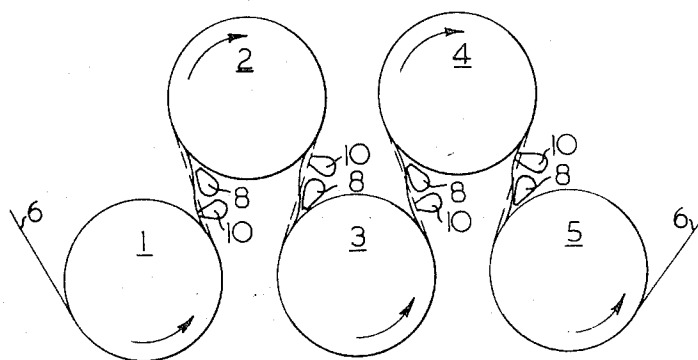


FIG. 7.

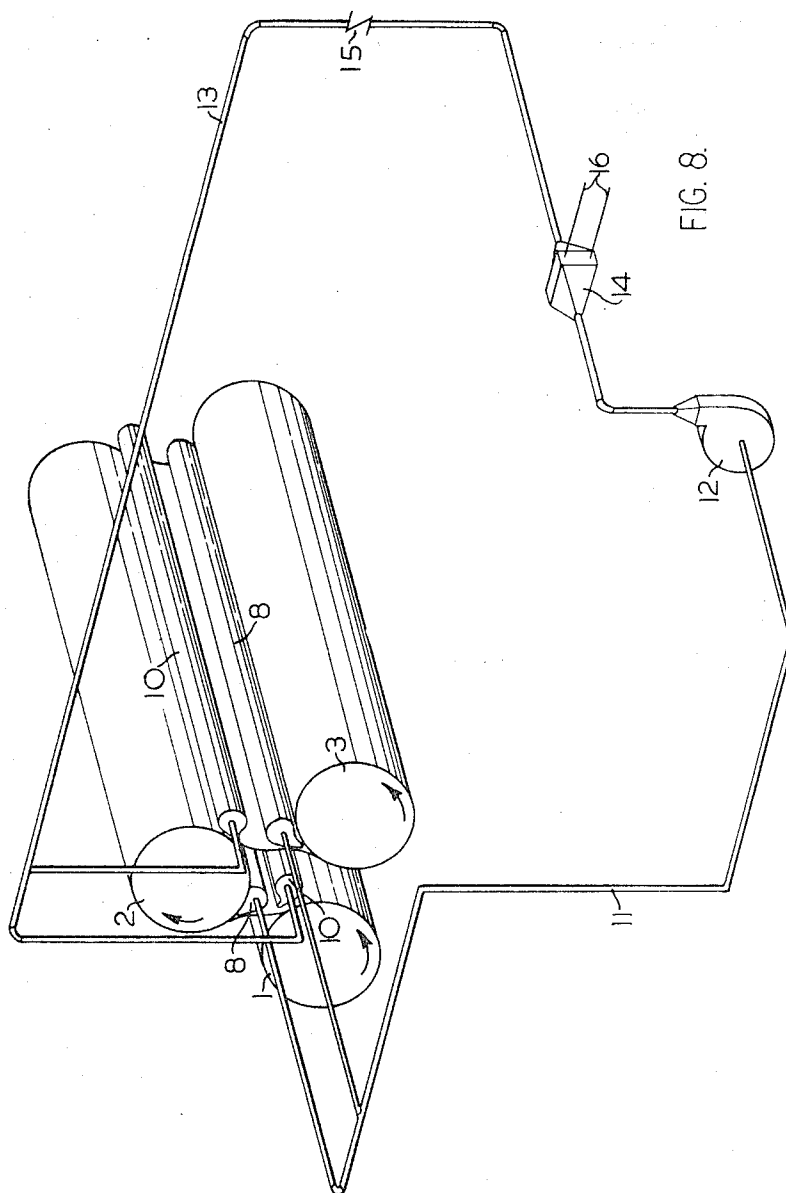


FIG. 8.

APPARATUS FOR AND METHOD OF TREATING A WEB

This invention relates to apparatus for and a method of treating a web by passing a web around one or more rotary cylinders.

In papermaking for example, the paper web is passed around one or more rotary cylinders for drying purposes. Usually a drying felt is also passed around the drying cylinder, with the paper web between the felt and the cylinder, to press the web against the cylinder to obtain close contact between the cylinder and the web.

According to this invention, the web is deflected by air pressure applied immediately adjacent the junction of the web and a cylinder, so as to cause the web to contact a greater portion of the circumferential surface of the cylinder than would be the case if the air pressure was not applied. The increased contact between the cylinder and the web enables the treatment, for example the drying, to be carried out more effectively. In paper drying, the increase in drying efficiency may in fact be such that the dryer felt can be omitted.

The air pressure may be applied to the web as it approaches the cylinder and/or as it leaves the cylinder.

The air pressure may be negative, i.e., suction, applied in the throat between the web and the cylinder. The suction may be produced by an appropriately shaped foil suitably positioned in the throat, the suction being produced by the air flow around the foil caused by the motion of the web and the cylinder. Alternatively, the suction may be produced by a suction bar positioned in the throat, with suction being applied to the interior of the suction bar from an external source, and the suction bar having aperture means directed towards the web so that the web is sucked against the cylinder.

Alternatively or additionally, the air pressure may be positive and applied to the web on the opposite side thereof to the cylinder. In this case, the pressure may be produced by a foil positioned immediately adjacent the junction of the web and the cylinder on the opposite side of the web to the cylinder, the air pressure being produced by the air flow around the foil caused by the motion of the web. Alternatively, the air pressure may be produced by a pressure bar positioned immediately adjacent the junction of the web and the cylinder on the opposite side of the web to the cylinder, the air pressure being supplied to the interior of the pressure bar from an external source, and the pressure bar having aperture means directed towards the web so that the web is forced by the air pressure into contact with the cylinder.

Both positive air pressure and suction may be applied to the web. In this case, the air sucked into the suction bar may subsequently be ejected from the pressure bar. The air may be heated before it is ejected from the pressure bar to increase the drying efficiency.

The rate of air sucked or blown may be adjustable to vary the tension in the web and obtain optimum conditions. In particular, the rate of air sucked or blown may be separately adjustable at different positions along the width of the web to cater for varying conditions across the web.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, of which:

FIG. 1 is a side view of paper drying apparatus using suction,

FIGS. 2 and 3 are side views of part of the apparatus of FIG. 1 showing different suction producing means,

FIG. 4 is a side view of paper drying apparatus using positive air pressure,

FIGS. 5 and 6 are side views of part of the apparatus of FIG. 4 showing different positive air pressure producing means,

FIG. 7 is a side view of paper drying apparatus using suction and positive air pressure, and

FIG. 8 is a perspective view of paper drying apparatus using suction and air pressure.

Referring first to FIG. 1, the drying section of paper-making apparatus includes a series of rotary drying cylinders 1 to 5 over which the paper web 6 successively passes. No drying felt is used. Immediately adjacent each junction of the web 6 and cylinder (except the first and last junctions), suction indicated by arrows S is applied between the web 6 and the cylinder to deflect the web into greater contact with the cylinder. The straight path which the web 6 would follow in the absence of the suction is shown in dotted lines. It will be seen that the application of suction causes the web 6 to engage a greater proportion of the circumferential surface of each cylinder than would otherwise be the case. The amount of suction required for optimum performance in any particular set of circumstances can readily be ascertained by routine trial and experiment.

FIG. 2 shows how the suction can be obtained by appropriately shaped stationary foils 7 positioned between the web 6 and cylinders, immediately adjacent the junctions thereof, and extending across the width of the web. The suction is caused by air flow around the foils 7 which results from the motion of the cylinders and the web 6.

FIG. 3 shows how the suction can be obtained by suction bars 8 positioned between the web 6 and the cylinders, immediately adjacent the junctions thereof, and extending across the width of the web with aperture means directed towards the web 6. The suction bars 8 are connected to an external source of suction (not shown) which applies suction to the interior of the suction bars 8.

FIG. 4 is similar to FIG. 1, but shows the application of positive air pressure, indicated by arrows P, instead of suction, the positive air pressure being applied to the web immediately adjacent its junctions with the cylinders on the opposite side of the web 6 to the cylinders. FIG. 5 shows the positive air pressure obtained by foils 9 positioned immediately adjacent the junctions of the web 6 and the cylinders, on the opposite side of the web 6 to the cylinders. The positive air pressure is produced by the flow of air around the foils 9 caused by the movement of the web 6. FIG. 6 shows the positive air pressure being obtained by pressure bars 10 which are similar to the suction bars 8, except that they are on the opposite side of the web, and positive air pressure is applied to them.

FIG. 7 is similar to FIGS. 1 and 4, but shows the use of suction and positive air pressure, the suction being applied as the web 6 contacts a cylinder, and the positive air pressure being applied as the web 6 leaves a cylinder. Such an arrangement is shown in more detail in FIG. 8. The two suction bars 8 shown are connected by ducting 11 to the intake of an air blower 12, whose outlet is connected by ducting 13 to the two pressure bars

10 shown via a heat exchanger 14 and a damper controller 15.

Thus, air sucked into the suction bars 8 is subsequently ejected from the pressure bars 10, after first being heated in heat exchanger 14. Hot fluid from any convenient source flows through the heat exchanger 14 through lines 16. The damper controller 15 is adjustable to vary the rate of air flow in the system. If desired, the suction bars 8 and pressure bars 10 may be equipped with adjustable slides to vary the size of the apertures therein differently from place to place across the width of the web 6.

It is also possible to apply suction and positive air pressure immediately adjacent to the same junction, for example by a suction bar 8 on one side of the web and a pressure bar 10 on the opposite side of the web 6.

Since no drying felt is necessary, all the usual accessories needed for driving the felt are not required. Also, no pockets are produced between the web and a felt, and consequently pocket ventilators are not required. Thus, the drying apparatus is simplified and reduced in cost, and the drying of the web is improved both at different stages in the apparatus and also across the width of the web at any stage.

I claim:

1. A method of treating a web including passing the

web around a rotary cylinder, and deflecting the web by air pressure applied to the web immediately adjacent the junction of the web and the cylinder to cause the web to contact a greater portion of the circumferential surface of the cylinder than it would in the absence of the air pressure, the air pressure being suction applied between the web and the cylinder and positive air pressure applied on the opposite side of the web to the cylinder.

2. A method according to claim 1 wherein the positive air pressure is air from the suction subsequently pressurized.

3. A method according to claim 1 wherein the web is a paper web and the cylinder is a drying cylinder.

4. Apparatus for treating a web including a rotary cylinder around which the web is passed, and means for applying air pressure to the web immediately adjacent the junction of the web and the cylinder to deflect the web and cause the web to contact a greater portion of the circumferential surface of the cylinder than it would in the absence of the air pressure, the pressure applying means applying suction between the web and the cylinder and applying positive air pressure to the web on the opposite side thereof to the cylinder.

* * * * *

30

35

40

45

50

55

60

65