United States Patent

Nykopp

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[54] DRYING CYLINDER

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[52] **U.S. Cl.** **34/124,** 137/625.41

[51] **Int. Cl.** **F26b 11/02**

[58] **Field of Search** 34/124, 125, 119; 165/159, 165/174, 87, 92, 124, 125; 137/625-641; 251/123, 209

[56] **References Cited**

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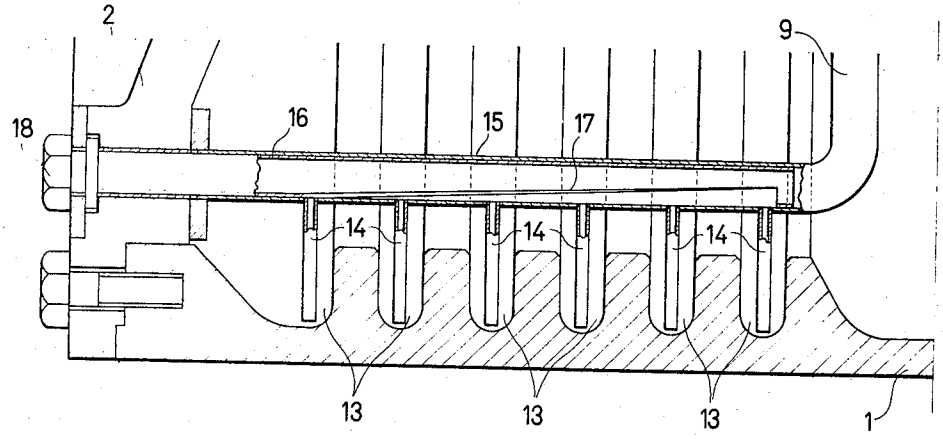
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[57] **ABSTRACT**

A drying cylinder in which the inside of the mantle or at least its end portions have circumferential grooves for collecting condensate. The inlet of a condensate drain pipe is placed in each groove and the pipes have been joined to a common condensate collecting pipe having adjustment means for regulating the amount of condensate from the drain pipes. The condensate collecting pipe is further connected to a condensate draining system of the cylinder.

3 Claims, 2 Drawing Figures



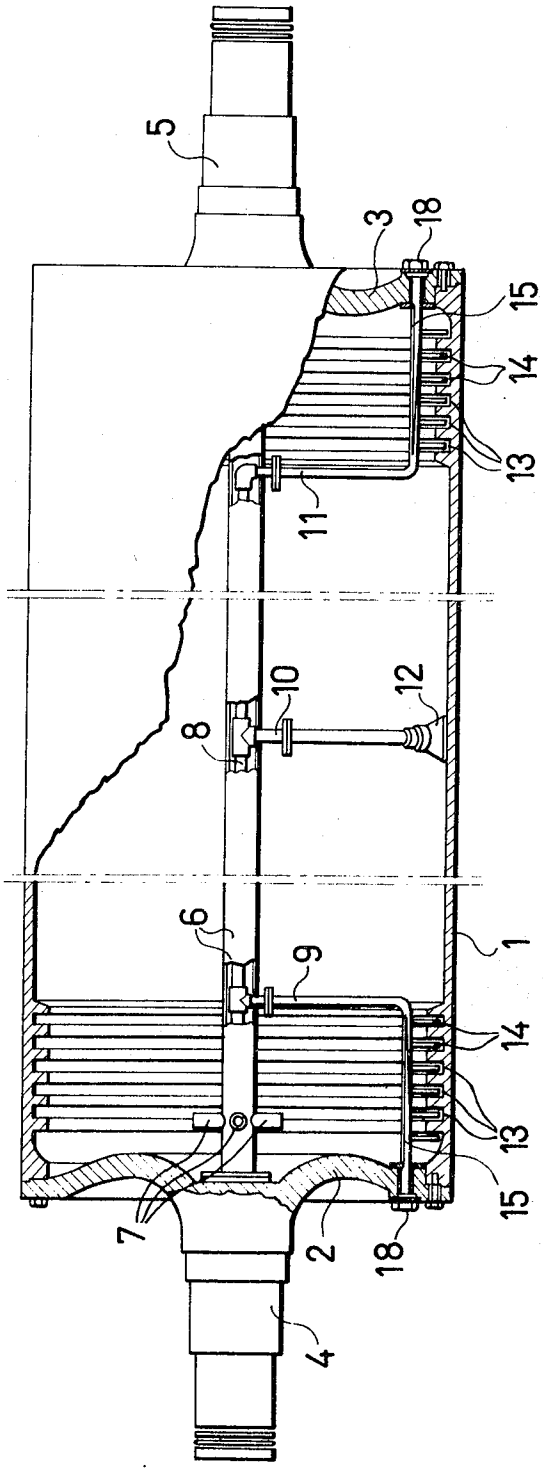


Fig. 1

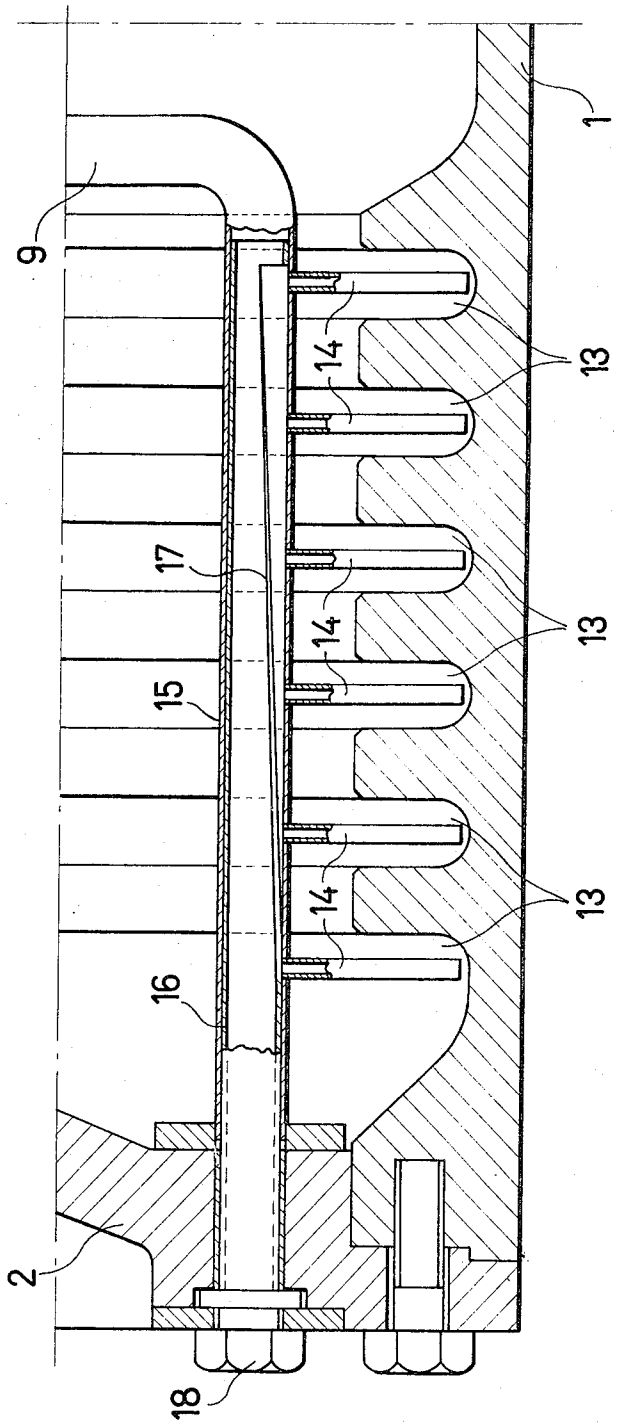


Fig. 2

DRYING CYLINDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to drying cylinders, and particularly to drying cylinders of paper, pulp and other equivalent machines, in which on the inside of the cylinder mantle at least in its end portions condensate collecting circumferential grooves have been provided.

2. Description of the Prior Art

It is well-known that the drying cylinders of paper machines, for instance, are heated by conducting steam into them, and the condensate from which is removed by means of one or several condensate drains. However, it has been found that e.g. a paper web in its passage through the drying section of a paper machine, which consists of several cylinders of the said kind, usually dries at faster rate on its margins than in the center. Endeavours have therefore been made to retard the drying of said marginal parts and to improve the drying of the central parts of the web. In attempts to render the drying more efficient in the central parts of the web, for instance, air has been blown into the pockets in the dryer section of the paper machine, directing the air flow particularly towards the central parts of the paper web. However, this is a cumbersome solution; it requires a blower for each pocket, in addition to which the system has to be monitored continuously.

SUMMARY OF THE INVENTION

In accordance with this invention each groove is provided with a vertical condensate drain pipe having its lower end in the groove. The upper end of the condensate drain pipes emerges into a condensate collecting pipe connected to a condensate draining system of the cylinder for withdrawing condensate from the grooves. There is also means for regulating the quantity of condensate withdrawn through each condensate drain pipe.

The regulating means may be a turnable tube inside the condensate collecting pipe and provided with oblique cuts for opening and closing the drain pipe openings into the collecting pipe.

The advantage of the invention is that the surface temperature of the drying cylinder in its marginal part can be regulated.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 presents, partly in axial section, a drying cylinder fitted with an arrangement according to the invention, and

FIG. 2 shows on enlarged scale the marginal part of the drying cylinder, with its grooves and condensate draining system.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawings, the reference numeral **1** indicates the mantle of the drying cylinder, **2** and **3** are end plates integrally fixed to the mantle, and **4** and **5** are axle pins projecting from the end plates. Through the axle pin **4**, steam is conducted into the drying cylinder along the steam pipe **6**, which has steam distribution apertures **7** at both ends. Enclosed inside the steam pipe **6** runs the condensate drain pipe **8**, from which three branch pipes **9**, **10** and **11** branch off and which pass through the wall of the steam pipe **6**; of these, the pipe indicated by reference numeral **10** has been connected to a prior known device **12**, which removes condensate from the interior surface of the drying cylinder mantle **1**, The condensate drain pipe **8** and the branch pipes **9**, **10** and **11** constitute the condensate draining system of the cylinder.

The branch pipes **9** and **11** have been connected to a condensate drainer according to the present invention, including condensate collecting grooves **13** provided in the marginal parts of the mantle **1** and which run circumferentially to the mantle, of which grooves there are six in each end portion of the cylinder in the embodiment illustrated by the drawing. When condensate accumulates in these grooves, it delays the transfer of heat from inside the cylinder to the outer surface of its mantle, thus retarding the drying of the paper web in contact with the outer mantle surface opposite to the grooves. It is obvious that the rate of heat transfer is inversely proportional to the amount of condensate in the grooves; it follows that the heat transfer into the paper web which is being dried can be separately adjusted opposite each groove, as desired, by adjusting the amount of condensate present in each groove. For this reason, the branch pipes **9** and **11** of the condensate draining system have been angulated to pass over the grooves **13** and fixed to the end plates **2** and **3**, respectively. Since the design is identical for both branch pipes, it shall only be described with reference to the branch pipe **9**, which has been depicted in FIG. **2**.

From the branch pipe **9**, a condensate drain pipe **14** has been carried close to the bottom of each groove **13**. Within the part **15** hereafter called the common condensate collecting pipe of the branch pipe **9** lying above the grooves **13** another, adjustment tube **16** has been fitted, which has been provided with at least one oblique cut **17**. When the adjustment tube **16** is turned by the nut **18** fixed to its end piercing the end plate **2**, the ports of the condensate drain pipes **14** opening into the common condensate collecting pipe **15** can be gradually closed in sequence from the outer rim towards the central part of the cylinder until all ports have been closed. When the nut **18** is turned in opposite direction, the pipes **14** will be opened in inverted sequence. In the event that in the adjustment tube **16** two oblique cuts have been provided which form an angle with each other and both deviate from the axial direction of the tube, two different adjustment schedules are possible. It is to be understood that the number of such oblique cuts may even be greater than two, but their number is mostly restricted to two, owing to excessive weakening of the wall of the adjustment tube with increasing number of oblique cuts.

It is thus possible, with the aid of the adjustment tube **16**, to make the amount of condensate present in the grooves **13**, for instance, to decrease from the margin of the mantle towards its central part, or vice versa.

It is obvious that, in order to enable the adjustment to be made also during operation, the mechanism serving to turn the adjustment tube **16** may also be made remote-controlled; this being a technical arrangement which can be solved by any person skilled in the field in numerous ways, and since it does not constitute the actual object of the present invention, no more detailed description of it shall be presented in this connection.

The adjustment tube may also be provided with perforation at appropriate spacing, the adjustment being accomplished by moving this tube axially.

What is claimed is:

1. In a drying cylinder, said cylinder having:

a plurality of circumferential condensate collection grooves on the inner surface of the mantle of said cylinder;

a plurality of condensate removing means inside said cylinder, each condensate removing means having an inlet and an outlet, each said inlet communicating with a groove;

a common condensate collection means communicating with each outlet of said condensate removing means; and

an outlet control means disposed within said common condensate collection means for separately controlling the amount of condensate passing through each respective outlet.

2. The drying cylinder as defined in claim **1** wherein said outlet control means comprises a turnable adjustment means disposed within said common condensate collection means.

3. The drying cylinder as defined in claim **1** wherein said common condensate collection means is cylindrically shaped and said outlet control means comprises a turnable cylinder disposed within said collection means, said turnable cylinder having an oblique cut therethrough.

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