

Dec. 16, 1958

B. BACKLERT ET AL

2,864,176

WEB-GUIDING APPARATUS

Filed April 4, 1957

2 Sheets-Sheet 1

FIG. 1

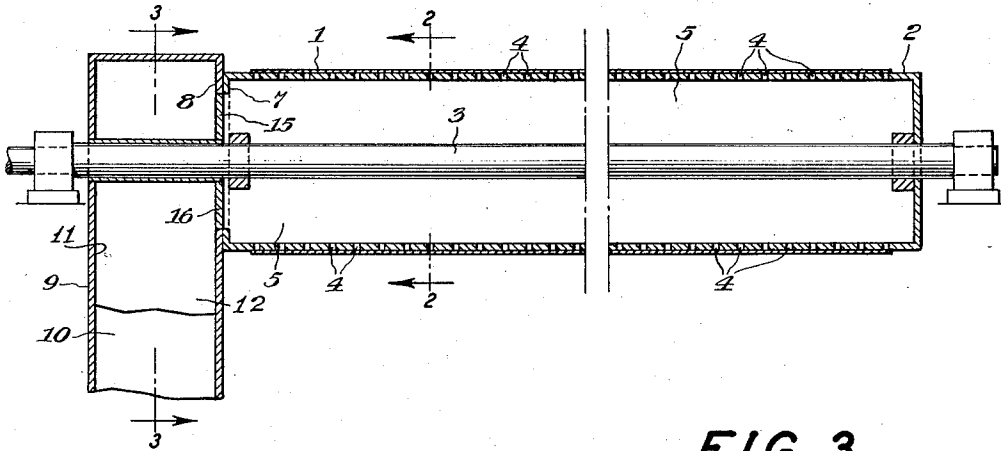


FIG. 2

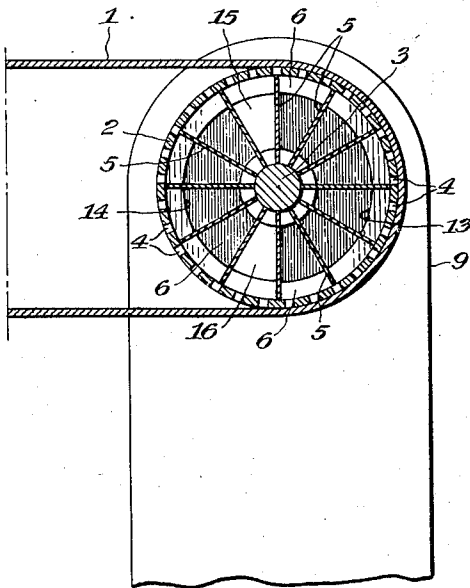
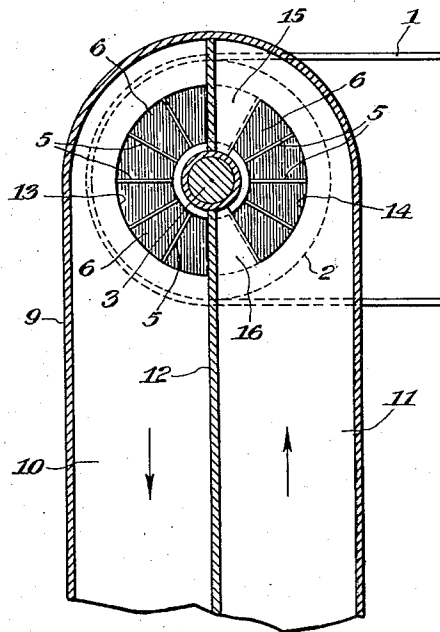


FIG. 3



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FIG. 4

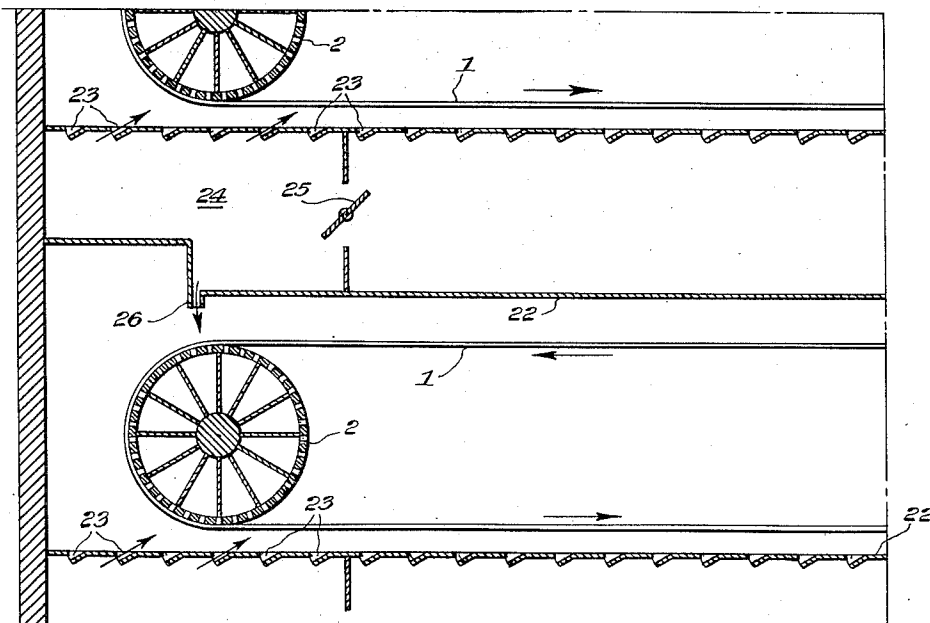
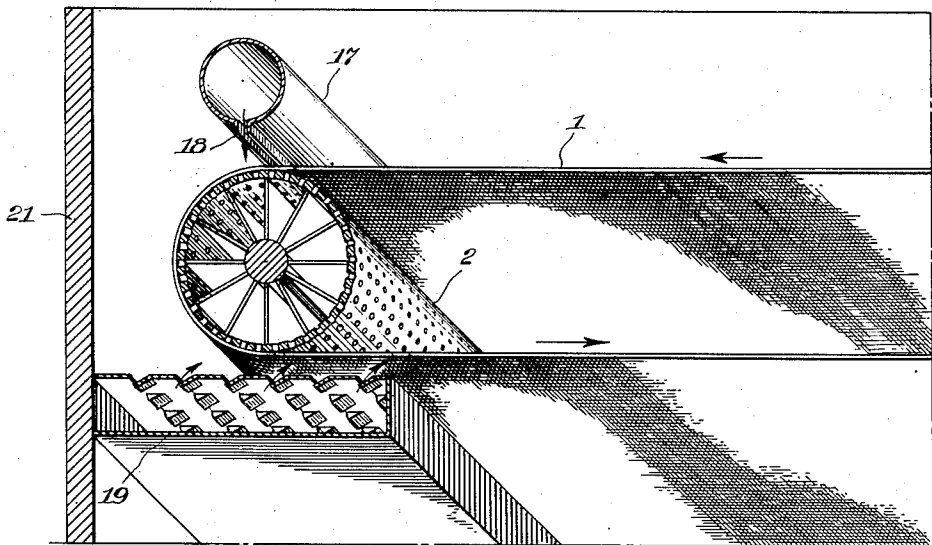


FIG. 5

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WEB-GUIDING APPARATUS

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Application April 4, 1957, Serial No. 650,731

Claims priority, application Sweden April 7, 1956

6 Claims. (Cl. 34—122)

The present invention relates to apparatus for treating web material in a plurality of parallel runs having a turning roll disposed between the runs at each of the turning points for the web. More particularly, the invention relates to an arrangement for automatically guiding the material while threading the same through the apparatus, the turning rolls of the apparatus being in the form of perforated cylinders and including a device for connecting the interior of the cylinders with a source of vacuum.

When drying or other treating of material webs of for instance cellulose, paper or fabric, the web is guided in zigzag runs through the treatment chamber for the purpose of saving space. Apart from the fact that the web is conducted mechanically through the chamber by means of a number of endless transporting means or is conducted air-borne through the chamber, i. e. by blowing a gaseous medium towards the lower side of the web, there is a need of rotating rolls, so called turning rolls, for transferring the web from one transport passage or run to another. During the threading of the web, the turning rolls are positively driven and can be perforated and exposed to vacuum, whereby the web is sucked against the roll and follows the same, but after about half a turn, the end of the web must again be released from the roll. For a similar purpose there are rotary vacuum rolls with stationary partitions therein dividing the surface of the roll so that vacuum is only obtained within the desired part of the circumference. In such cases a sufficient sealing between the stationary partitions and the rotating roll may be obtained as the length of the roll as a rule is relatively short. In the present case, however, the length of the roll is great in relation to the diameter of the roll (8:1 or more). It is difficult to obtain a sufficient sealing between the surface of the roll and the partition due to said length, and furthermore because no braking friction worth mentioning can be allowed. This is due to the fact that when the drier is running, the turning rolls are driven only by the web and thus it must be possible to disconnect the positive drive to the turning roll. The present invention relates to a new and improved arrangement in apparatus of the above mentioned kind, wherein the aforementioned drawbacks will be eliminated.

The apparatus made in accordance with the present invention is characterized by a turning roll between the transport passages or runs at each of the turning points for the web, in combination with devices for blowing a gaseous medium against the web, the devices being arranged in pairs adjacent each turning roll. The rolls, in accordance with the teaching of the prior art, are formed as a hollow perforated cylindrical shell and are connected at at least one of their ends to a suction and/or a pressure chamber. The medium from one of the blowing devices is directed towards the turning roll close to the point where the web at first comes into contact with the roll, and the medium from the other blowing device is supplied at the point where the web

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leaves the roll and is directed toward the web obliquely forwards in the intended transport direction.

According to a preferred embodiment of the invention each turning roll is provided with a number of radial partitions dividing the roll into a number of equal sector-shaped, lengthwise extending separate channels with their ends open towards the suction and pressure openings in the chamber wall which confront against the roll. Furthermore the openings in the wall confronting against the end of the turning roll are separated by sealing plates for the radial partitions of the roll, the openings being in the form of two sectors situated substantially opposite each other and having a center angle at least of the same size as the center angles of the sector-shaped channels of the roll.

The invention can be carried out in apparatus having a blowing box underlying the horizontal runs of an air-borne material web to supply gaseous medium to support the same. Such an embodiment is characterized in that the devices for blowing gaseous medium against the web at the turning rolls consist of nozzles arranged in the walls of a chamber which is formed as an extension of the blowing box. The chamber is connected to the blowing box by means of a damper-regulated opening.

The invention will now be described more in detail with reference to the accompanying drawings, in which Fig. 1 illustrates a longitudinal section through a roll in accordance with the invention.

Fig. 2 illustrates a cross section through the turning roll along the line 2—2 in Fig. 1.

Fig. 3 illustrates a cross section along the line 3—3 in Fig. 1.

Fig. 4 illustrates a perspective view partially in section through a part of a treatment chamber provided with a turning roll according to the invention and with devices for blowing a gaseous medium against the web.

Fig. 5 illustrates a longitudinal section of a modification in which the material web is air-borne.

In the drawings, reference number 1 designates a web-like material and reference number 2 a turning roll for this web, which turning roll is formed as a cylinder having perforations 4 and supported by a shaft 3. According to the invention the turning roll is provided with a number of radial partitions 5, dividing the roll in a number of equal sector-shaped, lengthwise extending, separate channels 6. The turning roll, at at least one of its ends is equipped with a flange 7 having machined surfaces and sealing against a corresponding surface 8 of a hood 9. By means of a partition 12 the hood is divided into a suction chamber 10 and a pressure chamber 11. Said chambers are provided with openings 13 and 14 in the chamber wall facing the end of the turning roll in such a manner that the channels of the roll during its rotation can be caused to communicate alternatively with the suction and pressure chambers respectively. The apparatus can be modified so far that only a suction chamber is present, which connects with the channels whose cylindrical surfaces are covered by the web, whereas the opposite situated channels are directly connected with the surrounding atmosphere. Reference numbers 15 and 16 designate two sealing surfaces arranged between the openings 13 and 14 respectively, with which surfaces the radial partitions 5 of the roll are in contact. The sealing surfaces consist of two sector-shaped plates situated substantially opposite each other and having a centre angle at least of the same size as the channels of the roll. By this arrangement always at least one radial partition will bear against each of the surfaces during the rotation of the roll and thus prevent the possibility of any of the channels connecting simultaneously with both the suction and the pressure chambers.

In Fig. 4 the reference number 1 likewise designates the material web and reference number 2 the turning roll for said web. Reference number 17 designates a device for blowing a gaseous medium towards the turning roll close to the point where the web at first comes into contact with the roll. In the embodiment illustrated in Fig. 4, said device is designed as a tube parallel to the turning roll and provided with a lengthwise extending slot 18 or, if desired, a corresponding series of holes (not shown). Reference number 19 designates a device in form of a blowing box arranged at the opposite side of the turning roll, the side of said box facing the roll being equipped with a number of eyelid-shaped perforations for blowing a gaseous medium obliquely forwards towards the web in the intended direction of movement of the web. Reference number 21 designates a wall in the treatment chamber for the web. During the threading of the web the devices 17 and 19 are connected with a fan (not shown in the drawing) or a similar device for supplying a gaseous medium thereto.

In the modification illustrated in Fig. 5 the reference number 1 likewise designates the material web and reference number 2 designates the turning roll for said web. In this case, the web is air-borne by blowing a gaseous medium towards the web by means of a blowing box 22 designed for instance in accordance with the Swedish patent specification 135,206 which corresponds to U. S. Patent 2,678,237. In this case the devices designated 17 and 19 respectively in Fig. 4 are replaced by devices formed in a chamber 24 which is an extension of the blowing box 22. A damper-regulated opening 25 connects the chamber 24 with the blowing box 22 during the threading of the web for blowing a gaseous medium towards the turning rolls through the openings 26 and 23 respectively for the above mentioned purpose.

What we claim is:

1. In a conveyor system for transporting a continuous open-width web ziz-zag in at least two spaced parallel runs, apparatus for changing the direction of travel of the leading free end portion of the web and guiding the same from the first run to the second run comprising in combination, a hollow turning roll mounted between the runs at one end thereof with its axis substantially parallel to said runs for transferring the leading end of the web from the first to the second run, said roll comprising a perforated cylindrical shell, means to drive said roll during transfer of said leading end, a pair of devices for blowing jets of gaseous medium against the web, the first of said devices being positioned to direct a jet of medium toward said roll substantially radially thereto at the point where the web initially contacts the roll in its travel from the first run, the second of said devices being positioned at the point where the web leaves the roll and operable to direct a jet of medium towards the web obliquely forward in the direction of travel of the web in the second run, suction means to apply suction to at least a segment of the interior of said cylindrical surface as it travels from said first to said second device to engage and support the web thereon, and means to remove the suction from the segment as it travels from the second to the first device.

2. Apparatus according to claim 1 including pressure means associated with said suction-removing means to supply a gaseous medium under pressure to a second segment of the interior of said cylindrical shell intermediate said second and first devices to positively disengage the leading free end portion of said web from said perforated shell upon passage thereof beyond said second device to afford travel of said leading free end portion into said second run.

3. Apparatus according to claim 2 wherein the turning roll is provided with a number of radial partitions

dividing the interior of the roll into a number of equal sector-shaped lengthwise-extending separate channels open at at least one end, a chamber wall slidably engaging said partitions at said one end and defining two openings operable to communicate with said channels during rotation of said roll, said openings being separated by sealing surfaces engaging the radial partitions of the roll in the form of two sector-shaped wall portions disposed substantially diametrically opposite each other, each wall portion having a center angle of at least the same size as the channels of the roll and operable to register therewith, whereby upon rotation of said roll each channel communicates alternately with said openings, said pressure means being connected to one of said openings and said suction means being connected to the other of said openings whereby upon rotation of said roll, the channels are connected alternately to pressure and suction.

4. Apparatus according to claim 3 wherein said chamber wall constitutes part of a double chamber having a partition therein for separating the same into a pressure chamber and a suction chamber respectively, said openings being positioned on opposite sides of said partition means of the double chamber.

5. In a conveyor system for transporting a continuous-width web zig-zag in at least four spaced parallel runs, apparatus for changing the direction of travel of the leading free end portion of the web and guiding the same from the first run to the second run and from the third run to the fourth run comprising in combination two hollow turning rolls, each comprising a perforated cylindrical shell, the first of said rolls mounted between the first and second runs at one end thereof with its axis substantially parallel to said runs for transferring the leading edge of the web from the first run to the second run, the second of said rolls mounted between the third and fourth runs at said one end thereof with its axis substantially parallel to said runs for transferring the leading end of said web from the third run to the fourth run, means to apply suction to at least a segment of the interior of said shell of each roll to engage and support the web thereon, means to drive each roll during transfer of said leading end, a pair of blowing devices for each roll for blowing jets of air against the web adjacent each turning roll, the first of said devices being positioned to direct a jet of air toward said roll substantially radial thereto at the point where the web first comes into contact with the roll, the second of said devices being positioned at the point where the web leaves the roll and operable to direct a jet of air towards the web obliquely forward in the direction of travel of the web in the succeeding run, an air supply box intermediate said second and third runs having a perforated upper side underlying the second run for providing a cushion of air supporting said run, an extension chamber connected through an opening to said air supply box and disposed intermediate said first and second turning rolls, and a damper in said opening to regulate the same, said first blowing device associated with said second turning roll consisting of nozzle means in a wall of the extension chamber directed substantially radially to said second roll.

6. Apparatus according to claim 5 wherein the second blowing device of the first roll comprises oblique openings in the upper wall of said extension chamber for directing jets of air obliquely forward in the direction of travel of the web in the second run.

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