April 9, 1963 G. FLEISSNER 3,084,447

TREATMENT PLANT FOR TWO-FACED CELLULOSIC MATERIAL

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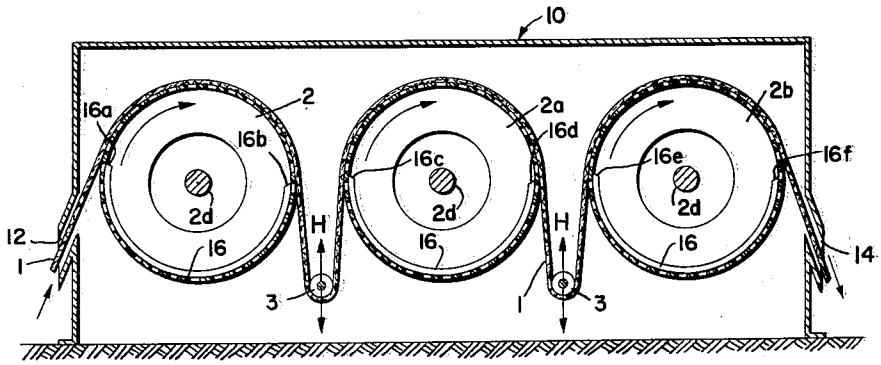


Fig. 1

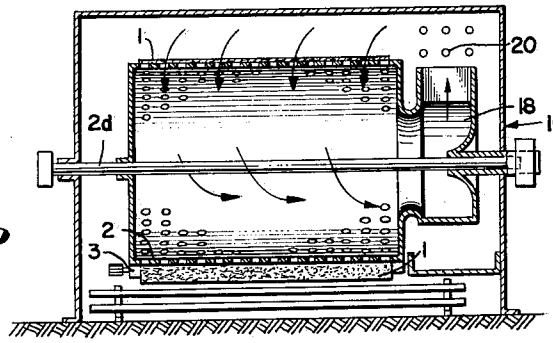


Fig. 2

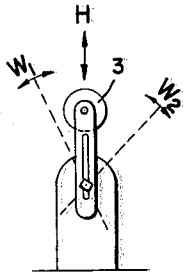


Fig. 5

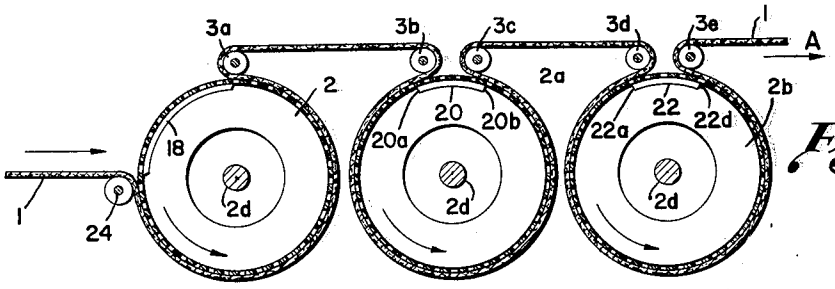


Fig. 3

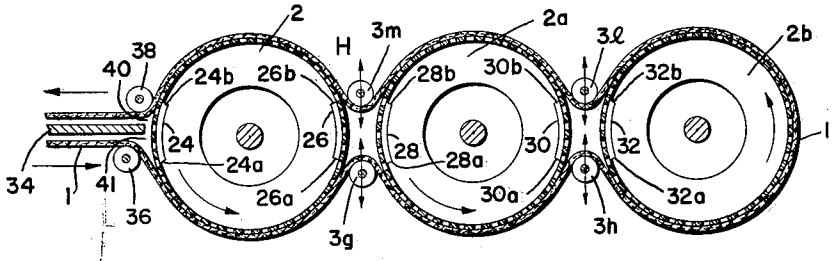


Fig. 4

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TREATMENT PLANT FOR TWO-FACED CELLULOSIC MATERIAL

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This invention relates to a treatment plant for continuously fed two-faced cellulosic material, such as fabrics, carpet or like material, which is either pervious or impervious to gaseous medium, such as drying air and the like.

An object of this invention is to provide means conducive to a highly efficacious and economical treatment plant or sieve drum drier arrangement in particular for drying of fabrics which are either pervious or impervious to air.

Conventional treatment plants or driers generally consist of a plurality of drums with perforated surfaces having cover plates therein, so that the material fed onto successive drums usually travels, for example, from the surfaces of the upper portions of a first rotating drum to the surface of the lower portion of a successive rotating drum.

The material departs from or is lifted off the first drum at a location where the respective cover plate breaks the suction on the material to be treated and the material is then fed onto the successive drum at a location where the suction commences or becomes effective.

In treating various types of materials, it is often undesirable that suction be applied on one surface of the material, while suction can be readily applied on the other surface thereof for treatment operations.

Therefore, it is another important object of the invention to provide means resulting in a construction of a rapidly working treatment plant so arranged that only one surface of the material being treated engages a plurality of successive drums.

Various types of material such as pile fabric, carpet and like cellulosic or woven materials are deleteriously affected by suction being applied on the surface thereof. In addition, when treating carpet material having a latex backing or the like, great care must be had that the latex backing does not adhere to the drums and to achieve this result cover plates are advantageously placed within said drums at predetermined locations so that the looping angle of the material is determined at locations where the material separates from the drums, which is the same location, as where the ends of the aforesaid cover or shutter plates are located.

Furthermore, this treatment plant is adapted for handling various other types of materials whereby the material may be fed for contact with treatment drums at only one surface thereof.

A further object of the invention is to provide means contriving a very efficient arrangement equipped with deviation means for the material so coordinated to and disposed with respect to the drums that only one surface of the material being treated engages the drums.

A very important feature of the invention is that said deviation means employed are rotatable idler rollers of very small circumferential area relative to the effective drier drum surface, so that the material engaging the surface of the deviation rollers is in contact therewith for a very short time, whereby adhesion to the deviation rollers is positively eliminated and any deleterious effect to the face of the material by the rollers is absolutely reduced to a minimum. Because of this arrangement the upper or pile surface of a carpet does not come into contact with the surfaces of the sieve or suction drums and therefore

this arrangement is ideal for the purposes of achieving satisfactory treatment of the material.

A further object of the invention is to provide means envisioning an arrangement of perforated drums under suction action wherein deviation rollers may be used to direct material so that only one surface thereof engages the treatment drums. However, if other types of material are to be employed which may allow for both faces thereof engaging the drums, then the deviation rollers may be readily eliminated and the material passed through from one drum to another.

In carrying out a preferred embodiment of the invention, at least one deviation roller is provided between the two adjacent drums so that the material is fed from the upper portion of one drum onto the upper portion of the successive drum or from the lower portion of one drum to the lower portion of the succesive drum.

Rotatable deviation means or rollers are so arranged as to achieve ideal looping angles or angles of grip for the material entrained about the drums and rollers and according to a desirable form of the invention two deviation rollers are employed which are spaced relatively far from each other and located adjacent the surfaces of the respective drums so that the material is fed directly onto a first of the rollers from one drum and fed directly from a second of the drums onto a successive drum. In order to achieve a suitable looping angle or angle of grip, the material may be, for instance, guided on the lower side of a plurality of drums and is then guided back along the upper side of the drums.

The drums are preferably arranged in a housing which also contains the deviation rollers, the housing being provided with an inlet and an outlet for the fed material to be treated. Feed means in the form of conveyors or rollers may be readily provided for feeding material onto and pulling it out of the housing.

Roller deviation means may be resiliently or elastically mounted or journalled and means may be provided for individually moving or positioning the deviation rollers relative to the drum units.

These, together with various ancillary objects and features of the invention which will become apparent from the following description, are attained by this treatment plant, preferred embodiments of which have been illustrated in the accompanying drawing by way of example only.

In the drawings:

FIG. 1 is a schematic elevational view of a treatment plant with housing shown in section, the plant being constructed in accordance with the concepts of the present invention;

FIG. 2 is an end elevational view of the invention with an end wall thereof removed, illustrating the manner in which suction may be introduced into the drums;

FIG. 3 is a schematic illustration of a modified arrangement of the drums without a housing;

FIG. 4 is a schematic arrangement of a further modification of the treatment drums; and

FIG. 5 is an end elevational view of a support for deviation roller.

With continuing reference to the accompanying drawing, wherein like reference numerals are used to designate similar parts throughout the various views, reference numeral **10** generally designates a housing having an inlet **12** and an outlet **14**. The material is fed through the inlet **12** onto a series of successive drums **2** (three drums being depicted in the drawing), it being noted that in some cases it may be desirable to only employ two drums while in other cases even more than three drums may be utilized.

As shown in FIG. 1, two deviation means in the form of rollers **3** are employed with each roller being disposed

between successive drums. The drums are rotatable about their axes 2*d* and the rollers 3 forming the deviation means are likewise rotatably journalled within the confines of the housing. Any suitable means, such as threaded screws or conventional adjustment members may be used to permit adjustment of the position of the deviation rollers 3 with respect to each other and for locking the deviation rollers in their selected position relative to the drums.

Within each drum there is arranged at least one cover or shutter plate 16 which serves as a baffle for preventing suction from becoming effective on the respective surface portion of the drum 2 which the cover plates underlie. It is further noted that each of the drums may be separately provided as is desired with a blower or fan 18, and other suitable (heating or cooling) means, such as indicated at 20, may, if desired, be provided for ensuring the proper degree of suction prevailing in the drums.

Thus, when the material, such as a continuous band or carpet material, is fed onto the treatment drums 2 through supply opening 12, the suction will pull the material onto the upper surface at a location 16*a* of the first drum 2 with the material leaving said drum at a location 16*b* to be directed to the second drum 2*a* and being applied thereto at a location 16*c*, thence leaving the second drum 2*a* at a location 16*d* for further application to the succeeding drum 2*b* at location 16*e*. The material leaves the drum 2*b* at a location 16*f* and then passes through the outlet 14. At the location 16*b* where the material leaves the first drum 2 there is no suction so that there is little likelihood of adhesion of the material to the drum.

In the case where the material being treated is a latex backed carpet, the vortices induced at the location 16*b* by the end of the cover plate 16 will be sufficient to break any bond of the latex backed material with the surface of the drum.

The looping angle or angle of grip of the material 1 about each of the deviation rollers 3 is selected by suitable adjustment and positioning of the rollers, whereby the material engages the rollers 3 for an extremely short duration so that the pile surface of the carpet or the like is not adversely affected. Roller 3 may be displaced in up or downward direction direction according to arrows H and/or in angular directions according to arrows W_1 or W_2, respectively. Each roller 3 is supported on a slotted standard by means of a set screw threadingly engaging a base.

It is noted that the material 1 engages only the upper surface of the drums 2 in the present embodiment.

Referring now to the form of the invention as is shown in FIG. 3, the drum 2 is provided with a first cover plate 18 while the succeeding drums are provided with other sized cover plates 20 and 22, respectively.

The cover plate may be so arranged that the material is fed through the inlet opening of a housing (not shown) and thence about a roller 24 and around about three quarters of the first drum 2, from whence it is immediately delivered to deviation roller 3*a* which is located above first drum 2 and spaced a considerable distance from the next deviation roller 3*b* located above second drum 2 and adjacent location or end 20*a* of cover plate 20 at which location the material is fed onto said second drum 2*a*, and thence entrained about almost all of said second drum circumference until it reaches end or location 20*b* of said cover plate 20 from where the material is fed onto a deviation roller 3*c* located in the proximity of deviation roller 3*b* and spaced considerably from the next deviation roller 3*d* located adjacent one end 22*a* of cover plate 22. The next idler roller 3*e* is likewise located above third drum 2 and adjacent the other end 22*d* of cover plate 22.

The material fed into the third drum 2*b* and leaving same at location 22*d* is then directed in accordance with arrow A for further treatment.

The cover plates 18, 20 and 22 of different lengths are so arranged that they cause a cessation of the suction draught at the aforesaid critical locations of the departure of the material from the respective drums.

In FIG. 4 there is disclosed a further modification in which the first two drums 2, 2*a* are each provided with two cover plates 24, 26; 28, 30. The last roller 2*b* is provided with only one cover plate 32 located opposite cover plate 30. These cover or shutter plates may have any required lengths for the purpose intended and in accordance with the texture etc. of material to be treated.

The embodiment shown in FIG. 4 may be modified in view of the embodiments shown in FIGS. 1 and/or 3 without departing from the spirit and underlying concept of this invention.

The invention may be further so modified that the material is fed into the drier at one end and discharged therefrom at the opposite end.

It will be further noted that the drums may be driven individually or from a single motor drive imparting rotation to the drums in one or in opposite directions, respectively.

In regard to the embodiment of FIG. 4 it is stated as follows:

A separator plate 34 is located adjacent the outlet opening 40 of the housing and the material 1 fed first through the inlet opening at 41 and thence over a roller 36 from whence it is delivered onto the first drum at a location 24*a*. The material leaves this drum at a location 26*a* and is fed onto the second drum at a location 28*a*. The material then passes from the second drum 2*a* at a location 30*a* onto a third drum 2*b* at a location 32*a* where it is entrained substantially about the entire peripheral area of the last mentioned drum except that part covered by the relatively small cover plate 32.

In passing from one drum to another, successive deviation rollers 3*g* and 3*h* are employed and other deviation rollers 3*l* and 3*m*, located directly above the deviation rollers 3*g* and 3*h*, permit the material to be fed from the last drum at a location 32*b* to the intermediate drum 2*a* at a location 30*b* and from the intermediate drum at a location 28*b* onto the first drum 2 at a location 26*b*.

The material is then fed from the first drum at a location 24*b* about roller 38 and thence to the outlet which is located at the same side of the housing as is the inlet.

Thus it can be seen that there has been provided a plant for treating and, in particular, drying of material at full width and having two opposed faces; comprising, in combination, a plurality of rotatable treatment drums having perforated circumferential contact surfaces for said material, adjacent drums being spaced a predetermined distance from each other, respective means establishing suction draught in each of said drums, whereby material in touch with said contact surfaces engages the latter for being subjected to said suction draught, fixed cover means of predetermined lengths and conformed to the inner surface of each drum to make said suction draught ineffective at predetermined locations of said drum contact surfaces and to the extent of the length of said cover means, and material deviation roller means disposed for idle rotation adjacent said drums, said deviation rollers being of a considerable reduced diameter relative to the diameter of each of said drums and being so disposed that the looping angle of the material passing over the contact surface of each drum is at a maximum, while one of said material faces is trained over said drums but for the extent of the corresponding lengths of said cover means, whereas the contact of the other face of said material with said deviation roller means is reduced to a minimum.

It will be noted that in certain cases the arrangement of idler rollers or deviation means 3, 3*a*, 3*b*, 3*m*, 3*g* in accordance with FIGS. 1, 3, 4 may be variously arranged to comply with practical requirements and depending upon the nature, texture etc. of the goods to be treated.

Various changes and modifications may be made with-

out departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. A device for treating material by air flow therethrough comprising a plurality of laterally adjacent peripherally perforated drums having their axes substantially in a common diametric plane, means for rotating said drums in the same direction of rotation, means for applying a suction to the interior of each drum, a first set of deviation rollers arranged in substantially a common diametric plane to one side of the common diametric plane of said drums, one roller of said first set being arranged in advance of the leading drum and each other roller of said first set being arranged between adjacent drums, a second set of deviation rollers arranged in substantially a common diametric plane to the opposite side of the common diametric plane of said drums, one roller of said second set being arranged in advance of the leading drum each other roller of said second set being arranged between adjacent drums, each roller of said second set being arranged in aligned spaced relation to a roller of said first set, whereby an entering web of material may be led around said one roller of said first set and over corresponding substantially one-half peripheries of each drum except the last, the material, in passing between adjacent drums, being reversed around the other rollers of said first set, the material passing substantially completely around the periphery of the last drum and then over the corresponding substantially other half peripheries of each other drum and, in passing in the reverse direction between adjacent drums, being reversed around the rollers of the second set and exiting around said one roller of the second set, only one selected surface of the material engaging the drum peripheries, and the material being transported around the drums solely by said suction within said drums, the other surface of the material engaging the deviation rollers.

2. A device for treating material, as claimed in claim 1, including a substantially flat partition extending toward the leading drum and between said one rollers, the entering web of material passing over one surface of said partition and the exiting web of material passing over the opposite surface of said partition.

3. A device for treating material, as claimed in claim 2, including suction interrupting baffle means overlying the inner surface of each drum through an angular extent equal to the distance between the associated rollers of said first and second sets.

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