United States Patent

Nichols

[15] **3,702,503**

[45] **Nov. 14, 1972**

[54] **MATERIAL DRYING APPARATUS**

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[73] Assignee: **Mill Industries Inc.**

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[52] **U.S. Cl.**.....**34/114,** 34/130

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

[58] **Field of Search**.....34/114, 115, 119, 123, 124, 34/125, 133, 134, 48, 160

[56] **References Cited**

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3,089,252	5/1963	Daane et al.	34/160 X
3,214,845	11/1965	Huffman	34/160 X

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[57] **ABSTRACT**

Material drying apparatus for uniformly drying moist, moving material, such as a paper web. The apparatus includes an inner fixed tubular conduit having at least two rows of apertures extending in a substantially axial direction along the conduit and having an inlet at one or both ends for passing a hot gaseous medium, such as hot air. A plurality of individually rotatable outer sleeve members are axially disposed around and along the inner conduit, and each of the outer sleeve members has at least two rows of apertures for selective movement into communication with predetermined ones of the inner conduit apertures whereby the hot gaseous medium passes through the communicating apertures to dry the material and whereby the passage of the hot gaseous medium is excluded by the sleeve members having apertures not in communication with respective apertures of the inner conduit.

13 Claims, 6 Drawing Figures

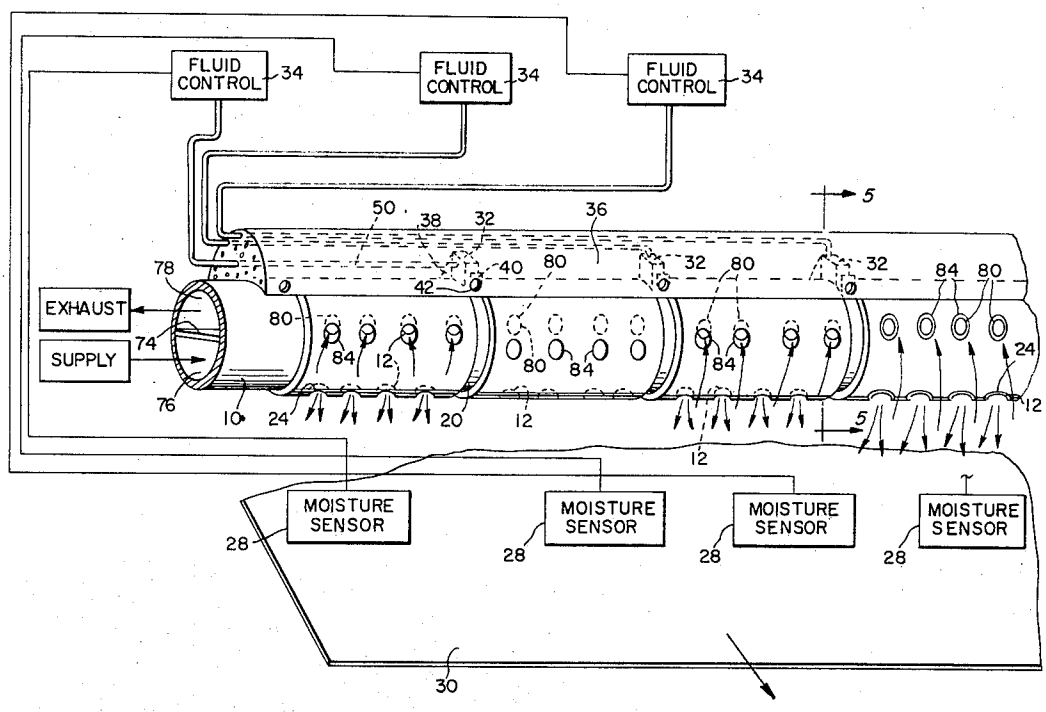

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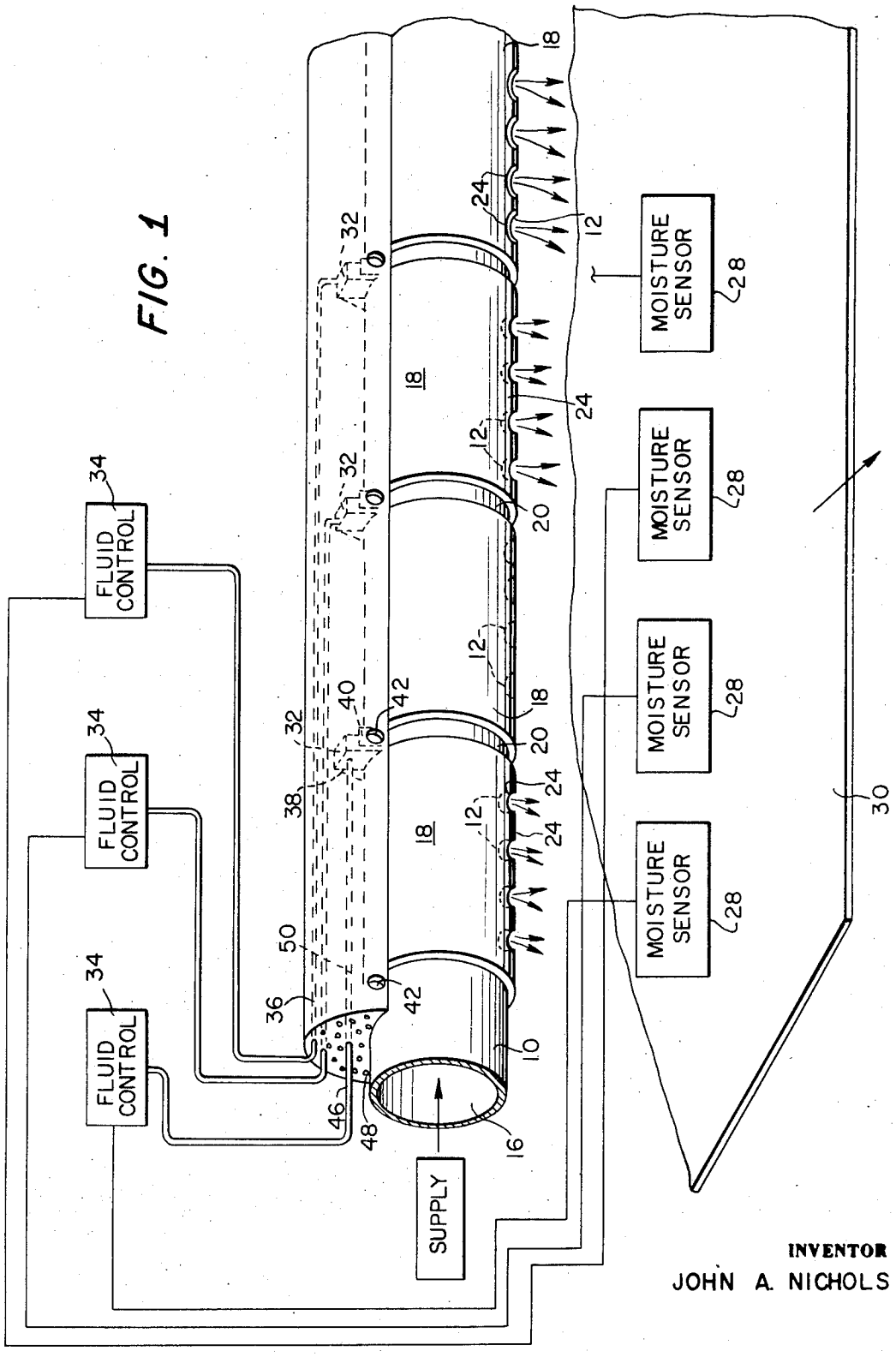
FIG. 1



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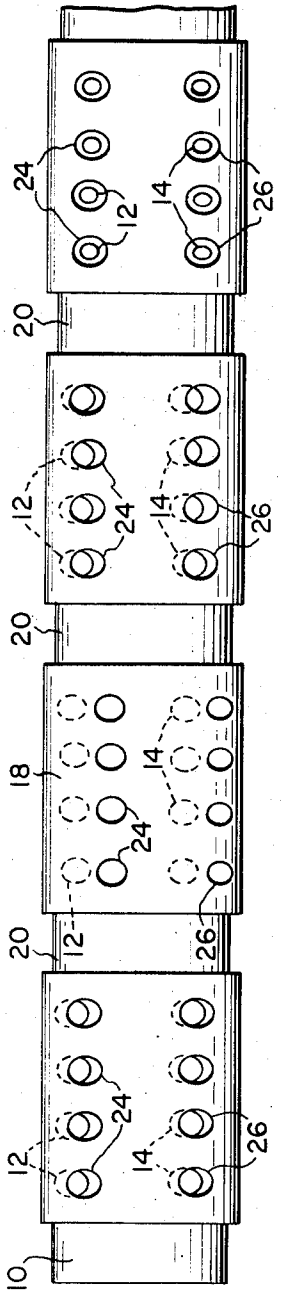

FIG. 4

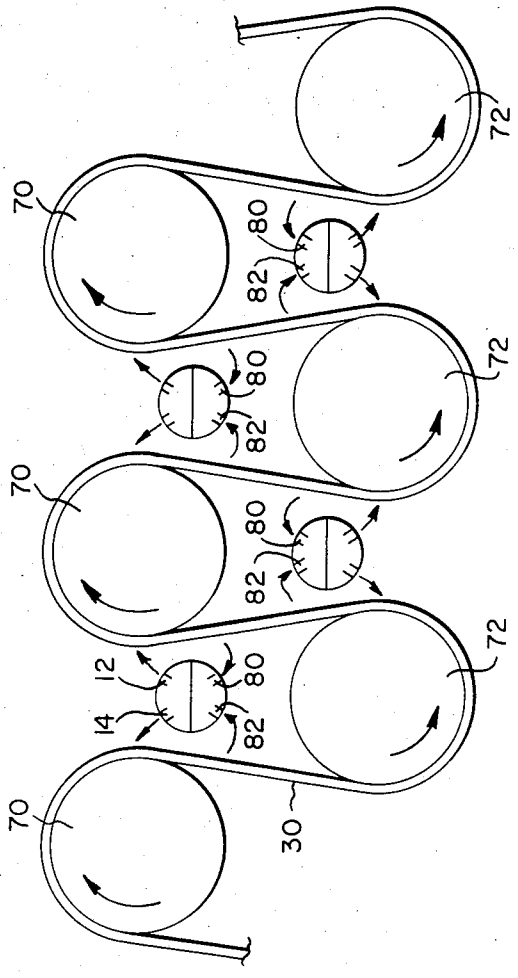

FIG. 2

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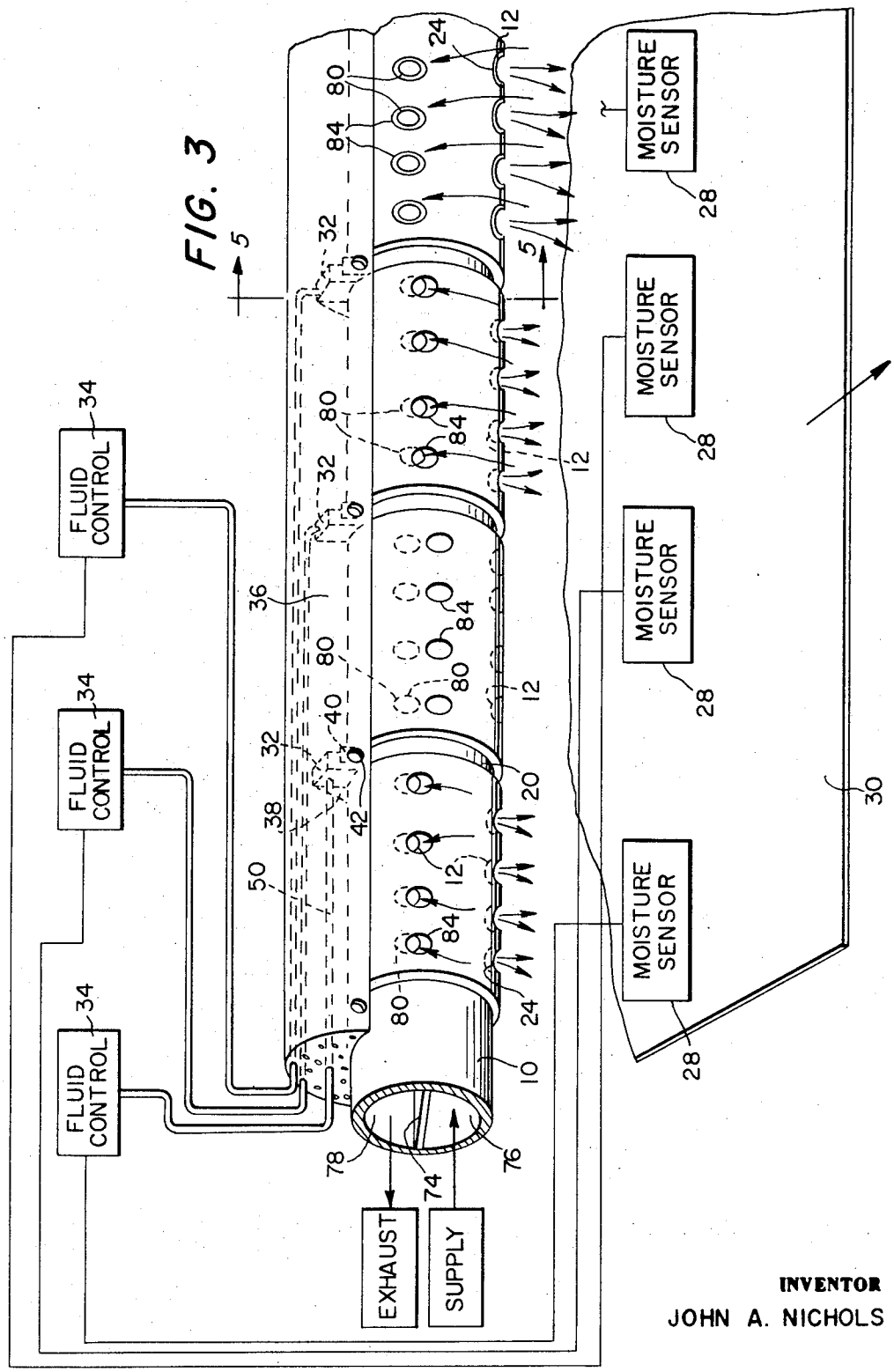
FIG. 3



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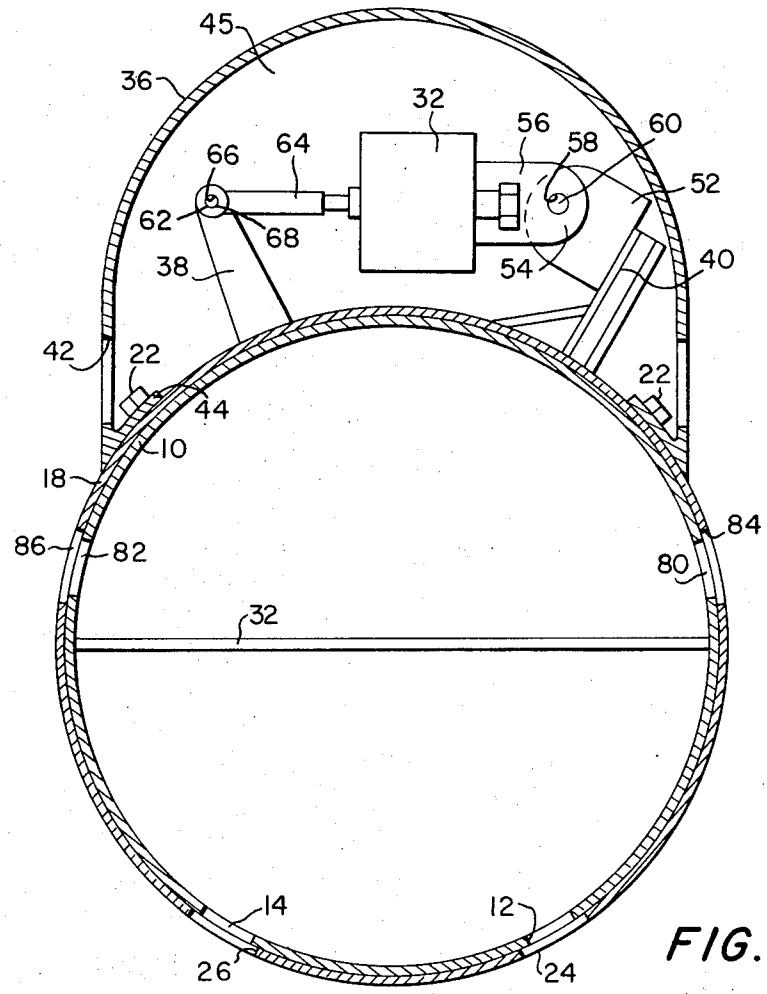

FIG. 5

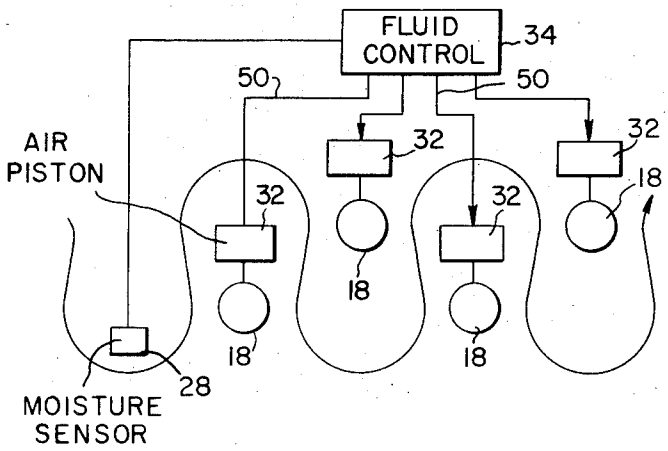

FIG. 6

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MATERIAL DRYING APPARATUS

This invention relates to material drying apparatus and more particularly to apparatus for uniformly drying a paper web.

Numerous drying devices have been developed for removing moisture from paper webs in paper machine drying sections. In a conventional paper machine drying section the moisture-containing paper web follows a serpentine path around a plurality of drying cylinders arranged in tiers. The cylinders in one tier are offset relative to the cylinders in the other tier, and the drying cylinders are heated so that when the traveling paper web is moved against the heated cylinders moisture is evaporated from the web.

As the web moves from one tier of cylinders to the other it comes out of contact with the cylinders, and the positions of the traveling web between the tiers of cylinders form moisture-containing pockets. The presence of moisture in these pockets results from evaporation from the web and creates a condition of high humidity that frequently impedes the drying of the web and which often results in moisture being retained in the web in an undesirable and uneven manner.

Various devices have been used in attempts to remove moisture from these pockets and to uniformly dry the paper web. For example, U. S. Pat. No. 2,825,979 discusses an adjustable air-flow dryer whereby the drying profile across the moving paper web is varied. Although this arrangement has proved satisfactory under some conditions of service, the dryer is variable only to decrease the flow of drying air at the outer transverse edges of the web or at the center of the web. Thus, the flexibility of this dryer has been found to be limited, and a large number of different drying profiles across the web are not obtainable by use of this device.

Another paper drying apparatus is described in U. S. Pat. No. 3,110,575, wherein hot air is introduced into pockets formed by a paper web between drying-cylinders and wherein moisture-laden air from the pocket is withdrawn. Although this arrangement has also proved satisfactory under some service conditions and is capable of varying the hot air supply profile across the paper web, the apparatus is not located within the pockets of the drying machine where the greatest concentration of moisture exists and is not capable of varying the exhaust profile across the web. Thus, the amount of exhaust pull of moisture-laden air remains constant over all transverse portions of the web regardless of the amount and transverse location of heated air supplied. This frequently results in undesirable transverse movement across the web of moisture-laden air and nonuniform drying of the web may result because air having a high humidity as a result of initially being adjacent to an unusually moist transverse portion of the web will often be drawn across the web to be exhausted adjacent to a dryer part of the web where the volume of air supplied is not so great and the load on the exhaust is also not so great. The highly humid air from the wettest web areas is then drawn to the dryer web areas to be exhausted which results in increasing the moisture content of the dryer web areas. This, of course, is undesirable since the purpose is to dry the web and not to rewet those areas that have already been dried.

Furthermore, the hot air in the apparatus of U.S. Pat. No. 3,110,575, is not forced directly against the web as it moves around the drying cylinders within the pocket but is passed through felt material prior to entering the pocket. Each device located between respective pairs of the drying cylinders also has only a single row of outlet apertures or ducts so that the heated air is directed toward only one of the drying cylinders. Thus, because heated air is not projected directly against the paper web as it moves about each of the cylinders in a cylinder pair, the maximum drying of the paper web is not accomplished and the uniformity of drying is not as accurate as might be desired.

It is, therefore, an object of the present invention to provide a simply constructed drying mechanism for uniformly drying a moist paper web as it moves in a serpentine path through the drying section of a paper machine.

Another object is to provide a paper web drying mechanism that constantly monitors the moisture content of the paper to provide accurately controllable uniform drying of the web.

Still another object is to provide a paper web drying mechanism having a variable air supply and a variable air exhaust across the web to uniformly and quickly dry the web.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages are realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

To achieve these objects, the present invention provides an inner fixed tubular conduit having at least two rows of apertures extending in a substantially axial direction along the conduit and having an inlet at one end for passing a hot gaseous medium. A plurality of individually rotatable outer sleeve members are axially disposed around and along the inner conduit, and each of the outer sleeve members has at least two rows of apertures for selective movement into communication with predetermined ones of the inner conduit apertures whereby the hot gaseous medium passes through the communicating apertures to dry the paper web or other material and whereby the passage of the hot gaseous medium is excluded by the sleeve members having apertures not in communication with respective apertures of the inner conduit.

In addition, the present invention provides means located adjacent to the paper web or other material for sensing the amount of moisture therein; means coupled to the outer sleeve members for rotating the sleeve members about the outer conduit; and control means coupled between the sensing means and the rotating means for enabling the rotating means to position the outer sleeves in accordance with the moisture sensed by the sensing means whereby more heated gaseous medium is directed against those portions of the web material containing more moisture and the material is uniformly dried.

In another preferred embodiment the present invention provides a baffle located within the conduit and dividing the conduit into separate axially extending supply and exhaust chambers. The conduit inlet com-

municates with the supply chamber and the conduit has an outlet at one end communicating with the exhaust chamber. The conduit further includes at least four rows of apertures with the apertures in the first pair of the rows communicating with the supply chamber for passing the heated gaseous medium outwardly from the supply chamber and the apertures in a second pair of the rows communicating with the exhaust chamber for passing moisture-laden gaseous medium into the exhaust chamber. Each of the outer sleeve members has at least a first pair of rows of apertures for selective movement into communication with the supply chamber through the apertures in the first pair of conduit aperture rows and has at least a second pair of rows of apertures for movement into communication with the exhaust chamber through the apertures in the second pair of conduit rows.

Thus, the invention provides a highly versatile drying device that is capable of producing the optimum drying of paper webs or other material and which continuously monitors the moisture content of the material to constantly provide an optimum drying profile across the width of the material.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the invention.

In the drawings:

FIG. 1 is a diagrammatic perspective view of one embodiment of the invention;

FIG. 2 is a diagrammatic view of an embodiment of the invention as used in the drying portion of a paper machine;

FIG. 3 is a diagrammatic perspective view of another embodiment of the invention;

FIG. 4 is a bottom view of the embodiments illustrated in FIGS. 1 and 3;

FIG. 5 is a section view of the embodiment shown in FIG. 3 taken on the line 5—5; and

FIG. 6 is a diagrammatic view of the moisture sensing feature of the invention.

With reference now to the drawings, wherein like reference characters designate like or corresponding parts throughout the several views, there is shown in FIG. 1 one embodiment of the drying apparatus of this invention which includes an inner fixed tubular conduit 10 having at least two rows of apertures 12 and 14 (see FIG. 5) extending in a substantially axial direction along the conduit. An inlet is provided, and as here embodied, inlet 16 is at one end of the conduit for passing a hot gaseous medium, such as air, into the conduit and through the rows of apertures 12 and 14.

A plurality of individually rotatable outer sleeve members 18 are axially disposed around and along inner conduit 10. Each of these sleeve members are separated by straps 20 that are located at spaced intervals along the inner conduit. The straps are fixedly positioned with respect to the inner conduit to maintain outer sleeve members 18 in spaced relationship with respect to each other and to permit rotation of the sleeve members in their respective positions about the inner conduit. Straps 20 can be affixed to the inner conduit in anyone of a number of conventional ways, such as by clamping, for example. Another mode is illustrated in FIG. 5 where screws 22 pass through the straps and the inner conduit to hold the straps in place.

Each of the outer sleeve members also includes at least two rows of apertures 24 and 26 located for selective movement into communication with aperture rows 12 and 14 of conduit 10. The apertures in sleeve members 18 are preferably of a circular configuration as are the apertures in inner conduit 10. In addition, the apertures in the sleeve members 18 are preferably of a larger size than those in inner conduit 10. Although this need not be, it is preferable in order to insure that the apertures in inner conduit 10 are fully exposed when desired even though the position of sleeve members 18 may not be precisely proper. Thus, if a sleeve member is slightly out of position in an axial direction, for example, the apertures in that sleeve member when moved into communication with the appropriate apertures in inner conduit 10 will fully expose those apertures in the inner conduit to permit maximum passage of the heated gaseous medium as desired.

With reference now to FIG. 6, there is shown a conventional moisture sensor 28 located adjacent to the paper web or other material 30 for sensing the amount of moisture within the web. Rotating means 32, which may be conventional double-acting pistons or spring-biased bellows for example, are coupled to outer sleeve members 18 and to inner conduit 10 for rotating the sleeve members about the inner conduit. Conventional control means 34 are coupled between moisture sensor or sensing means 28 and rotating means 32 for enabling the rotating means to position outer sleeve members 18 in accordance with the moisture sensed by moisture sensor 28. As more moisture content is sensed in portions of web 30, more heated gaseous medium is directed against those portions of the web to provide uniform drying thereof. Because moisture sensor 28, control means 34 and rotating means 32, individually, are conventional in nature and do not form part of this invention except in the specific combination disclosed and claimed, the exact electrical circuits and the mechanisms of these elements are not discussed.

As here embodied, each outer sleeve member 18 has a lug 38 welded or otherwise conventionally fastened thereto, and each rotating means 32 is coupled between a lug 38 and an angle 40 integral with or fastened to strap 20.

Rotating means 32 may be conventional double-acting pistons or spring-biased bellows that return outer sleeve members 18 to a first predetermined position when de-activated. This position may be where the apertures in sleeve members 18 are aligned with the corresponding apertures in inner conduit 10 or may be the position where these apertures are not in alignment. Thus, if the apertures are normally aligned the application of air pressure to rotating means 32 will move the apertures out of alignment. In contrast, if the apertures of sleeve member 18 and of inner conduit 10 are normally out of alignment, the application of air pressure to rotating means 32 will move these apertures into alignment. Either mode of operation may be used in accordance with this invention.

As here embodied, rotating means 32 are located within protective housing 36 that is conventionally connected to inner conduit 10 by means of screws 22 (FIG. 5). These screws are inserted through holes 42 in housing 36 and pass through a flange portion 44 of the housing to fasten the housing to inner conduit 10. An end plate 45 closes one end of the housing, and another end

plate 46 closes the opposite end. However, end plate 46 includes a plurality of openings 48 therein, and a plurality of air tubes 50 pass through these openings and are in communication with respective ones of rotating means 32.

As here embodied, a flange 52 (FIG. 5) is conventionally coupled to angle 40 of strap 20, and flange 52 has an opening 54 therein. Rotating means 32 also include a flange portion 56 with an opening 58 therein so that a clevis pin 60, for example, is inserted through openings 54 and 58. Lug 38 also has an opening 62 therein, and rotating means 32 includes a shaft 64 with an aperture 66 at one end. A pin or hinge 68 passes through opening 62 and aperture 66 to enable rotational movement between lug 38 and shaft 64.

Although FIG. 5 illustrates the embodiment of the invention shown in FIG. 3, many of the elements of the embodiment shown in FIGS. 1 and 3 are the same, and FIG. 5 is used to assist in an understanding of the structure of FIG. 1 as well as to further illustrate the embodiment of FIG. 3. Those elements heretofore discussed with respect to FIG. 5 are present as described in the embodiments of both FIGS. 1 and 3.

In operation of the embodiment shown in FIG. 1, a single moisture sensor 28 is preferably located adjacent to paper web 30 to control a plurality of sleeve members 18 that are located in the same relative transverse position with respect to the web but at longitudinally spaced intervals along the web. For the purpose of explanation, therefore, assume that moisture sensor 28 controls the positioning of only a single one of outer sleeve members 18 as shown in FIG. 1. It should be understood, of course, that a single moisture sensor 28 could also be coupled to control more than a single outer sleeve member 18 in each individual drying device but that it is preferable in this embodiment to couple moisture sensor 28 to control a plurality of outer sleeve members 18, each located in a different drying device and located in the same relative transverse position with respect to web 30 but longitudinally displaced along the web.

As moisture sensor 28 determines the moisture content of web 30, control means 34 responds to provide the necessary air pressure through air tubes 50 to respective rotating means 32. The amount of air pressure is determined by moisture sensor 28, and control means 34 causes rotating means 32, which may be conventional double-acting pistons or bellows, to extend or retract shafts 64.

Because pin 60 (FIG. 5) maintains the righthand end of rotating means 32 in fixed position with respect to inner conduit 10, movement of shaft 64 causes movement of lug 38 and of the respective outer sleeve member 18 to which lug 38 is coupled. If, for example, the apertures within sleeve member 18 and within conduit 10 are normally out of communication with each other, moisture sensed by sensor 28 will cause sleeve member 18 to rotate about inner conduit 10 to position the apertures within sleeve member 18 and inner conduit 10 in communicating relationship.

Sensor 28 and control means 34 may be conventionally calibrated so that a particular moisture content, as sensed by the sensor, will result in a predetermined relative positioning of the apertures in sleeve member 18 and inner conduit 10. Thus, when a large moisture content is sensed these apertures are aligned to completely expose those apertures located in inner conduit 10. However, if the moisture content sensed by sensor 28 is low the outer sleeve member will be rotated so that only a portion of the apertures in inner conduit 10 are exposed, and the amount of hot gaseous medium that passes from inner conduit 10 onto the paper web is reduced as desired.

Thus, a plurality of moisture sensors can be located transversely of web 30 to control the positioning of respective outer sleeve members 18. In this way, a highly accurate drying profile is obtained so that more hot gaseous medium, such as hot air, is caused to impinge upon the web where it is most moist while a lesser amount of hot air is caused to impinge upon the web where it is least moist. By the use of this arrangement the amount of hot air that is caused to impinge upon any portion of the web is accurately and continuously controlled to provide the optimum drying profile for the web so the web is uniformly dried.

Another preferred embodiment of the invention is illustrated in FIGS. 2–5. This embodiment is particularly suited for location within pockets formed by the paper web 30 (FIG. 2) as the web follows a serpentine path around an upper tier 70 of drying cylinders and around a lower tier 72 of drying cylinders. In addition to selectively directing heated air against the web, this embodiment also selectively exhausts the moisture-laden air from within the pockets to further enhance uniform drying of the web.

As here embodied, the drying device includes the same features as previously described with respect to the embodiment of FIG. 1. However, this embodiment also includes a baffle 74 located within conduit 10 and dividing the conduit into an axially extending supply chamber 76 and a separate axially extending exhaust chamber 78.

In this embodiment, inner tubular conduit 10 preferably has at least two rows of apertures 12 and 14 extending in a substantially axial direction along the conduit and in communication with supply chamber 76. At least two additional substantially axially extending rows of apertures are provided in communication with exhaust chamber 78. One of these rows of apertures 80 is best seen in FIG. 3, and a second similar row of apertures 82 is located on the opposite side of inner conduit 10, as illustrated in FIGS. 2 and 5. These apertures are also in communication with exhaust chamber 78.

Each of the outer sleeve members 18 has two rows of apertures 24 and 26 for selective movement into communication with supply chamber 76 through apertures 12 and 14 of inner conduit 10. In addition, each of the outer sleeve members has a second pair of rows of apertures 84 and 86 for movement into communication with exhaust chamber 78 through apertures 80 and 82 located in inner conduit 10.

Apertures 24, 26, 84, and 86 in each sleeve member 18 are so positioned as to be simultaneously aligned with respective apertures 12, 14, 80, and 82 of inner conduit 10. Thus, when the maximum amount of heated air is passed through apertures 12, 14, 24, and 26 to dry a particular transverse section of the adjacent paper web 30, the maximum amount of moisture-laden air is simultaneously exhausted from the pocket formed

by the web between tiers of drying cylinders **70** and **72**. Similarly, if an adjacent transverse web section requires less drying air to reach the desired state of dryness, the greatest portion of each of the inner conduit apertures **12, 14, 24,** and **26** adjacent that section of the web will be closed by outer sleeve member **18**. Thus, only a small amount of heated air will pass through the apertures **12, 14, 24,** and **26** and only an equally small amount of moisture-laden air will be exhausted through apertures **80, 82, 84,** and **86** from the area adjacent that portion of the web. As a result, the hot air supplied to each transverse web portion withdrawn moisture from that transverse portion only and is then exhausted. Little or no movement of moisture-laden air occurs across the transverse dimension of the web so that drier transverse sections of the web are not moistened by movement of moist air thereacross from within transverse sections.

In operation of the embodiment of FIG. **3**, the drying apparatus is located within each of the pockets formed by the paper web and the drying cylinders (FIG. **2**). A moisture sensor **28** (FIG. **6**) is associated with a plurality of outer sleeve members **18** located in the same relative transverse position with respect to web **30** and which are located at different longitudinal positions with respect to the web.

If the sensor determines that a particular section of the web contains more moisture than should be present, control means **34** activates rotating means **32** associated with respective ones of outer sleeve members **18**. If the apertures in inner conduit **10** and in the outer sleeve member **18** are normally out of communication with respect to one another, activation of rotating means **32**, when a large moisture content is sensed by sensor **28**, will cause sleeve member **18** to rotate as shaft **64** is extended until apertures **24, 26, 84,** and **86** of sleeve member **18** are aligned with apertures **12, 14, 80,** and **82**, respectively, of inner conduit **10**.

Thus, the heated gaseous medium or hot air provided to supply chamber **76** passes through apertures **12, 14, 24,** and **26** to directly impinge upon paper web **30** as the web contacts drying cylinders **70** and **72**. The moisture given off by drying of the web collects within the pocket formed by the web and the drying cylinders, and this moisture-laden air is then directly exhausted through apertures **80, 82, 84,** and **86**. The moisture-laden air is directed through exhaust chamber **78**, and by means of a closed exhaust arrangement, not illustrated, the moisture-laden air is removed from the area without the need for an enclosed hood over the machinery. Although an open hood (not shown) is preferably used, the absence of an enclosed hood makes access to the machinery much easier, and repairs are made much more quickly. Of course, the absence of a closed hood over the machinery also permits better observation thereof during operation so that frequently failure can be more quickly detected than if a hood enclosed the machinery.

While one transverse section of paper web **30** may be excessively moist so that a large volume of drying air is required, an adjacent transverse section of the web may be sufficiently dry so that little or no drying air need be supplied to the already dried portion. Variation in the amount of air supplied and exhausted across the web is readily accomplished by means of this invention since at least one separate moisture sensor **28** is provided for each transverse section of the paper web. As a result, a maximum amount of drying air may be directed against one portion of the web and exhausted therefrom while little or no air may be directed against and exhausted from an adjacent transverse portion of the web.

As may be appreciated, it is desirable in this situation that little transverse movement of the air occur with respect to the web. Thus, it is desired that the air directed against a transverse portion of the web be exhausted within that same transverse area so that moisture-laden air from a moist transverse section of the web does not travel transversely of the web to further moisten an already dried area.

This is uniquely and efficiently accomplished by this invention because when the supply apertures of inner conduit **10** and sleeve member **18** are in communication with supply chamber **76**, the exhaust apertures in inner conduit **10** and outer sleeve member **18** are in communication with exhaust chamber **78**. As a result, the air directed from the supply chamber into the pocket area formed by the web and drying cylinders **70** and **72** is directly exhausted by those apertures that are in communication with exhaust chamber **78** after the air takes up moisture from the web. Thus, there is very little or no transverse movement of moisture-laden air from one transverse portion of the web to another.

Furthermore, the axial positions of sleeve members **18** are adjusted in accordance with the amount of moisture sensed by respective sensors **28**. If web **30** is only slightly wetter than desired, only a portion of apertures **12, 14, 80,** and **82** are exposed by respective apertures **24, 26, 84,** and **86** of outer sleeve member **18**. As a result, a lesser volume of heated air is directed against the dryer portion of the paper web and a lesser amount of moisture-laden air is exhausted from the pocket. Conversely, a greater amount of heated air is directed against wetter portions of the web and a greater amount of moisture-laden air is exhausted from the pocket. The amount of heated air directed against the paper web and the amount of moisture-laden air exhausted for any particular transverse section of the web are, thus, always proportional, and little or no transverse movement of the moisture-laden air across the paper web occurs. This results in efficient and uniform drying of the web.

Thus, the present invention provides drying apparatus for uniformly drying paper webs or other material, and also provides apparatus which continuously monitors the moisture content of the paper web or other material to continuously maintain the desired drying profile across the transverse dimension of the web.

The invention in its broader aspects is not limited to the specific details shown and described and departures may be made from such details without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. Apparatus for uniformly drying moist, moving material, comprising:

an inner fixed tubular conduit having at least one row of apertures extending in a substantially axial direction along the conduit and having an inlet at least at one end for passing a hot gaseous medium into the conduit;

a plurality of separate and individually rotatable outer sleeve members disposed around and spaced axially along the inner conduit, each of said outer sleeve members having at least one row of apertures for communication with respective inner conduit apertures upon selective rotation of the sleeve members; and

means for rotating said outer sleeve members with respect to the tubular conduit and independently of one another, whereby hot gaseous medium passes out through sleeve members rotated into communication with the apertures in the inner conduit to dry the material in selected areas adjacent the sleeve members and to be excluded by sleeve members rotated out of communication with the apertures in the inner conduit.

2. The apparatus of claim 1, including at least two rows of apertures in the inner conduit and outer sleeve.

3. Drying apparatus as in claim 2 further including:

means located adjacent said material for sensing the amount of moisture therein;

said rotating means being coupled to said outer sleeve members and to said inner conduit for rotating said sleeve members about said inner conduit; and

control means coupled between said sensing means and said rotating means for enabling said rotating means to position said outer sleeves in accordance with the moisture sensed by said sensing means whereby more heated gaseous medium is directed against those portions of the material containing more moisture and the material is dried uniformly.

4. Drying apparatus as in claim 3 wherein said inner conduit apertures and said outer sleeve apertures are circular and wherein said outer sleeve apertures are larger than said inner conduit apertures.

5. Drying apparatus as in claim 4 further including a housing located in fixed position around a portion of said inner conduit and enclosing said rotating means.

6. Drying apparatus as in claim 2 further including:

a baffle located within the conduit and dividing the conduit into separate axially extending supply and exhaust chambers;

said conduit inlet communicating with said supply chamber and said conduit having an outlet at one end communicating with said exhaust chamber;

said conduit further having at least two additional rows of apertures with the apertures in a first pair of said rows communicating with said supply chamber for passing the heated gaseous medium outwardly from the supply chamber and with the apertures in a second pair of said rows communicating with said exhaust chamber for passing moisture-laden gaseous medium into said exhaust chamber; and

each of said outer sleeve members having at least two additional rows of apertures with a first pair of said sleeve member rows of apertures located for selective movement into communication with said supply chamber through said apertures in said first pair of inner conduit aperture rows and a second pair of said sleeve member rows of apertures located for simultaneous movement into communication with said exhaust chamber through said apertures in said second pair of inner conduit rows.

7. Drying apparatus as in claim 6 further including:

means located adjacent said material for sensing the amount of moisture therein;

said rotating means being coupled to said outer sleeve members and to said inner conduit for rotating said sleeve members about said inner conduit; and

control means coupled between said sensing means and said rotating means for enabling said rotating means to position said outer sleeves in accordance with the moisture sensed by said sensing means whereby more heated gaseous medium is directed against those portions of the material containing more moisture and the material is dried uniformly.

8. In a drying mechanism for a paper machine having at least upper and lower tiers of drying cylinders for feeding a paper web therethrough wherein the paper web forms pockets between the drying cylinders containing moisture evaporated from the paper web, the improvement comprising: apparatus located within each of said pockets for uniformly drying the paper web wherein each apparatus includes;

an inner fixed tubular conduit,

a baffle located within the conduit and dividing the conduit into separate axially extending supply and exhaust chambers,

the conduit having an inlet at an end communicating with said supply chamber and an outlet at one end communicating with said exhaust chamber, and having at least two linear rows of apertures communicating with said supply chamber for passing a heated gaseous medium directly from the supply chamber onto said paper web and at least two linear rows of apertures communicating with said exhaust chamber for passing moisture-laden gaseous medium directly from said pocket into said exhaust chamber, and

a plurality of separate and individually rotatable outer sleeve members disposed around and spaced axially along the inner conduit,

each of said outer sleeve members having at least two linear rows of apertures for movement into communication with said supply chamber or through first predetermined ones of said inner conduit apertures and having at least two additional linear rows of apertures for simultaneous movement into communication with said exhaust chamber through second predetermined ones of said inner conduit apertures.

9. The drying mechanism of claim 8 further including:

means located adjacent said paper web for sensing the amount of moisture therein;

means coupled to said outer sleeve members for rotating said sleeve members about said inner conduit; and

control means coupled between said sensing means and said rotating means for enabling said rotating means to position said outer sleeves in accordance with the moisture sensed by said sensing means whereby more heated gaseous medium is directed against those portions of the paper web containing more moisture and the paper web is dried uniformly.

10. The drying mechanism of claim 9 wherein a single one of said sensing means is located immediately ahead of a predetermined number of said sleeve mem-

bers and is coupled through said control means to said predetermined number of said sleeve members for adjusting the amount of heated gaseous medium that is directed against a predetermined transverse and longitudinal portion of said paper web.

11. The drying mechanism of claim **10** wherein said inner conduit is positioned across the paper web and substantially equidistant therefrom.

12. The drying mechanism of claim **11** further including:

means communicating with said supply chamber for introducing into said supply chamber said heated gaseous medium; and

means communicating with said exhaust chamber for removing from said exhaust chamber moisture-laden gaseous medium.

13. The drying mechanism of claim **11** further including a housing located in fixed position around a portion of said inner conduit and enclosing said rotating means.

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