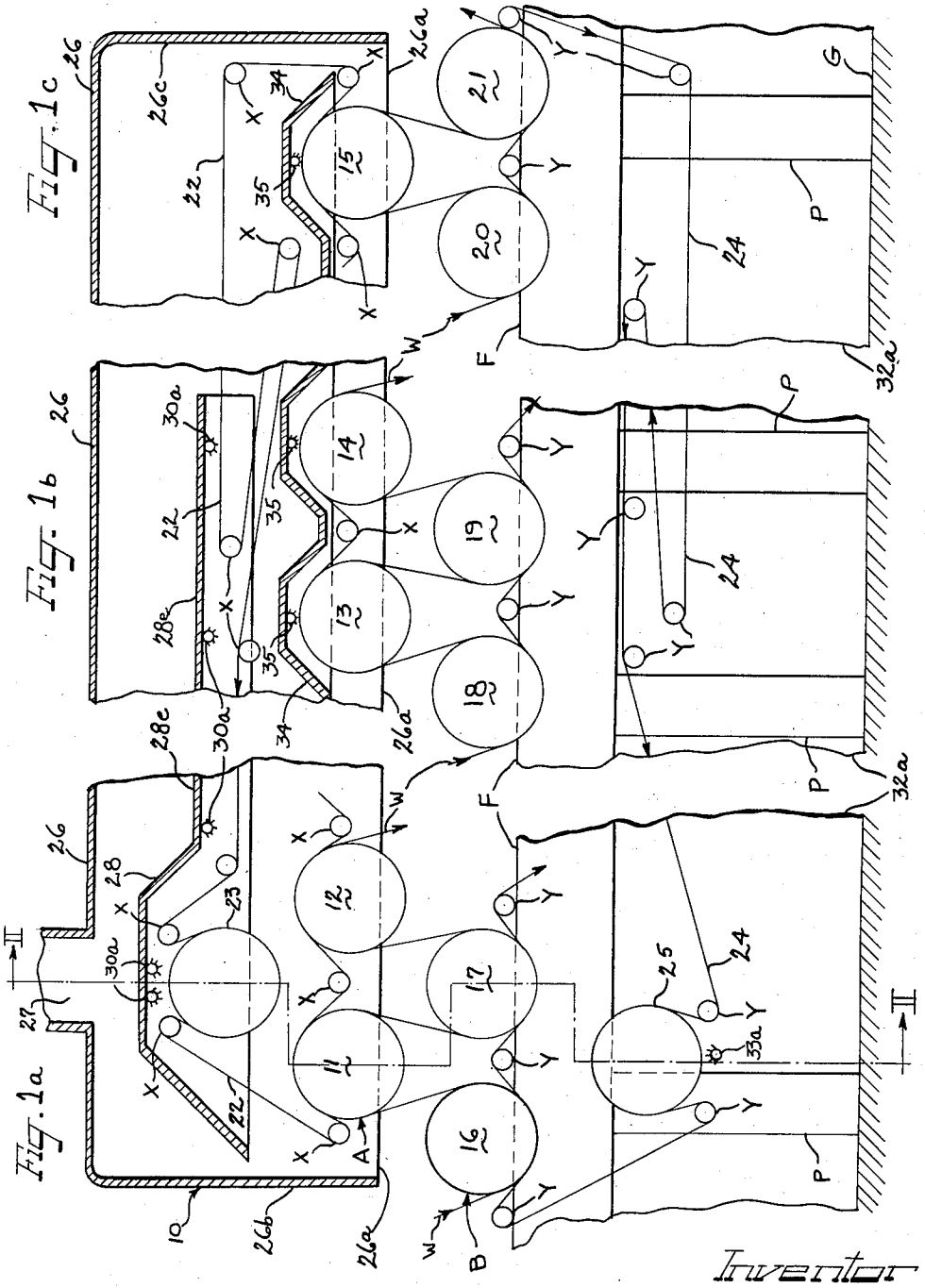
Oct. 27, 1959 L. HORNBOSTEL ET AL 2,909,847

DRYER SECTION ARRANGEMENT FOR PAPER MACHINES

Filed Oct. 17, 1955 3 Sheets-Sheet 1



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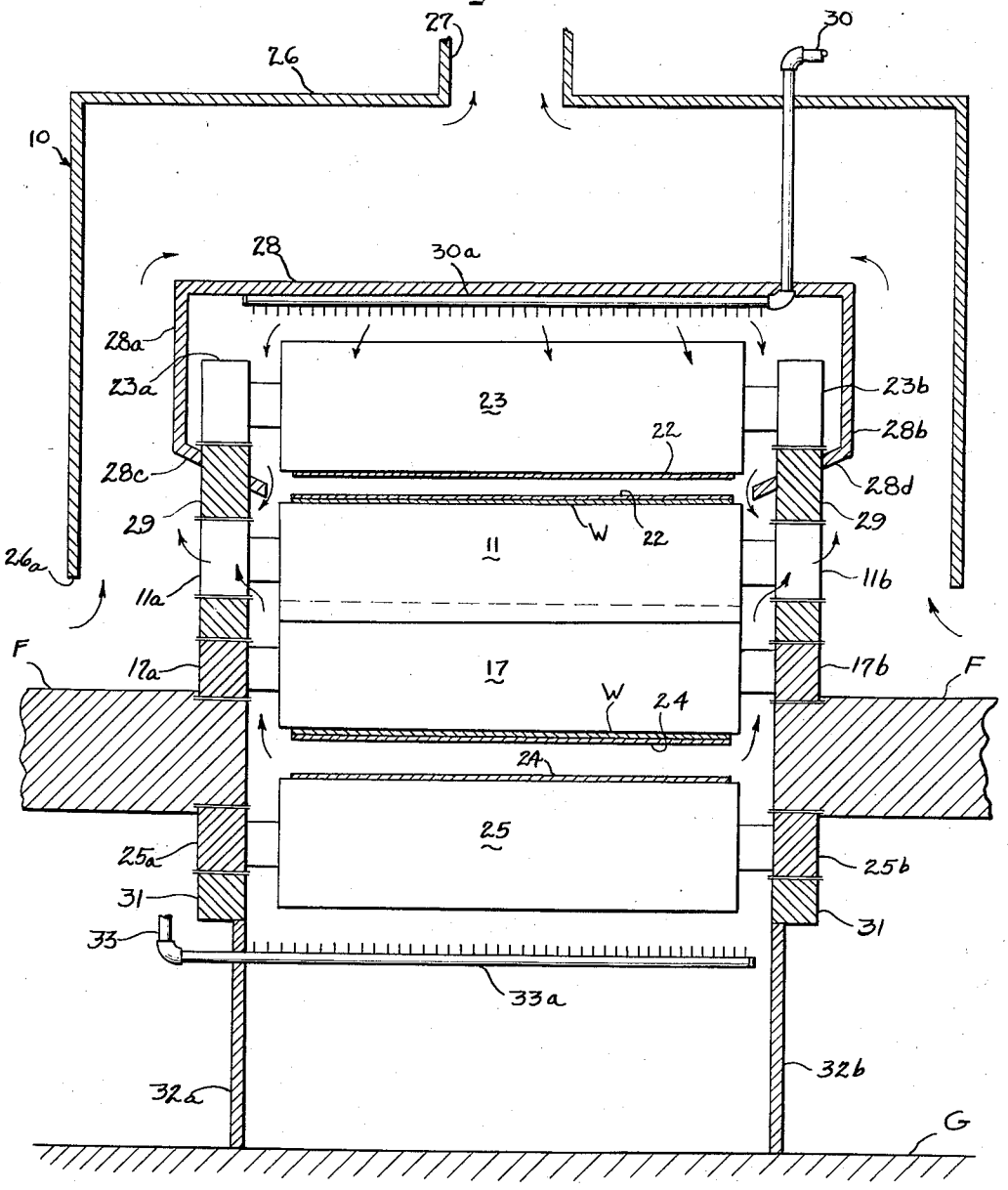
By Hill, Sherman, Meroni, Gross & Simpson Attys.

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DRYER SECTION ARRANGEMENT FOR PAPER MACHINES

Filed Oct. 17, 1955 3 Sheets-Sheet 2

Fig. 2



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Oct. 27, 1959 L. HORNBOSTEL ET AL 2,909,847

DRYER SECTION ARRANGEMENT FOR PAPER MACHINES

Filed Oct. 17, 1955 3 Sheets-Sheet 3

Fig. 3a

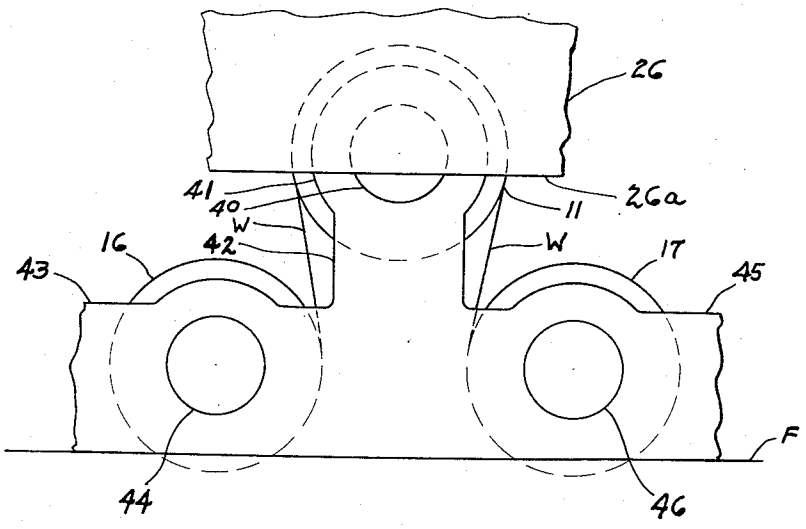
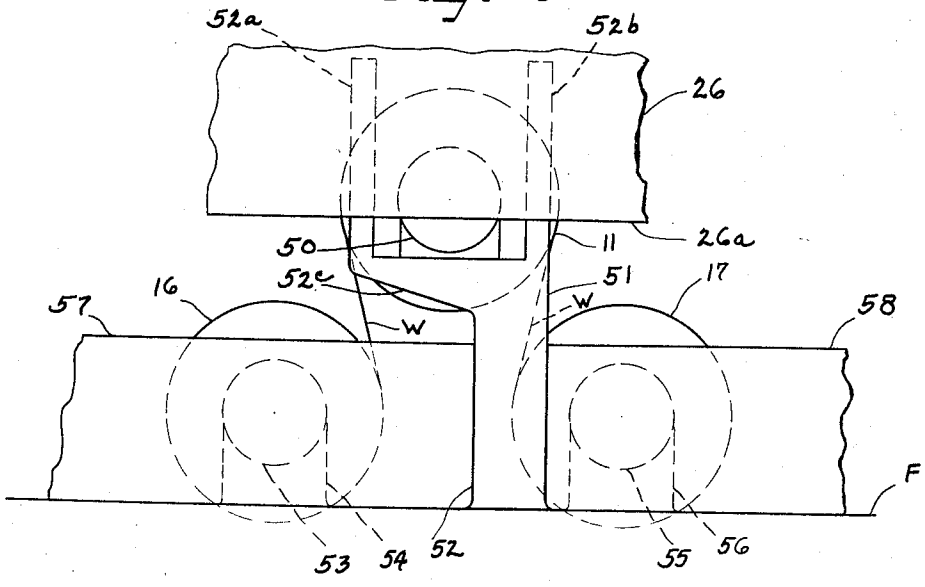


Fig. 3b



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DRYER SECTION ARRANGEMENT FOR PAPER MACHINES

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Application October 17, 1955, Serial No. 540,776

5 Claims. (Cl. 34—111)

This invention relates to a dryer section arrangement for paper machines, and more particularly, an improved air flow control arrangement for paper machine dryer sections.

In the usual paper machine dryer section, there are provided a plurality of tiers of paper dryer rolls. Ordinarily only an upper tier and a lower tier are provided with a plurality of parallelly aligned rolls in each tier. The rolls or drums provide a shell which is heated internally with steam and which is freely rotatable. The paper weaves a serpentine path through the dryer passing beneath a first roll in the lower tier and then over a first roll in the upper tier and then back down beneath the second roll in the lower tier, etc. Ordinarily an upper traveling looped felt passes over the top of each of the rolls in the upper tier so as to engage the paper web during most of its travel on such rolls and thus control and assist in the removal of moisture from the web, and the felt is trained over a separate dryer drum which is mounted just above the upper tier in order to assist in drying the felt when it is not in contact with the paper web on the dryer drums. There is usually also provided a traveling looped lower felt trained over the bottoms of the rolls in the lower tier so as to cover the paper web during most of its travel on the rolls of the lower tier, and the lower felt is also trained over or laps a lower felt dryer roll or drum mounted just below the lower tier. A large hood is mounted to extend over the tops of the superimposed rolls (and the upper felt and its dryer roll) and downwardly along the ends of the rolls although not quite reaching the floor level which is just beneath the axes of the drums in the lower tier. This way air may be drawn up from the atmosphere in the room upwardly along the ends of the rolls and out the top of the hood through suitable vent means. The lower felt and its dryer drum or roll are mounted generally just below the floor level in the basement of the plant and air may be drawn freely from the basement along both ends of the lower felt dryer drum and along the sides of the lower felt up into the hood. To assist in drying of the web and the felts, hot air has been forced beneath the hood through the space between the hood and the floor and this air, of course, is drawn upwardly through a top central vent in the hood.

The foregoing has been a more or less standard dryer arrangement for some time in paper machines, but this arrangement leaves something to be desired in certain respects. In particular, it is believed that recent efforts to speed up paper machines have brought out the general inflexibility of this arrangement, because of the tendency to cause defects in the web. One defect in particular in the web is manifested by imperfect edges in the web. In studying these defects, certain discoveries have been made, one of which is that the operation of paper machines at high production rates results in the driving off of such a substantial amount of moist air that this flow of moist air from the central portion of the dryer section

toward the roll ends, coupled with channeling of air upwardly along the roll ends has resulted in a slower drying of the web and felts in the middle or central portion. The edges of the felts and/or webs tend to dry more quickly because of this arrangement and the net result is defective edge portions on the finally dried web.

The instant invention not only is based on the discovery of defective air travel in the dryer but also on a discovery of a dryer arrangement for avoiding such defective air flow and obtaining paper webs of better quality. It is not desired to limit the invention to any particular theory concerning the air flow, but it should be pointed out that the instant dryer arrangement was based on the theory herein set forth and is used to obtain improved quality of dried paper web.

It is, therefore, an important object of the instant invention to provide an improved paper machine dryer section arrangement.

It is a further object of the instant invention to provide an improved paper machine arrangement for better controlling drying air drafts about the rolls and felts.

It is a further object of the instant invention to provide an improved arrangement whereby flow of drying air is reversed at certain portions of the dryer section in order to obtain more uniform drying of the web and felts across the width of the rolls.

Other and further objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed disclosure thereof and the drawings attached hereto and made a part hereof.

On the drawings:

Figures 1*a*, 1*b* and 1*c* show essentially diagrammatically successive portions of a dryer section with different hood arrangements embodying the invention shown in each of the views;

Figure 2 is an elevational view, with parts shown in section, taken substantially along the line II—II of Figure 1*a*; and

Figures 3*a* and 3*b* are elevational views of the rear and front sides, respectively, of a portion of the machine.

As shown on the drawings:

Referring to Figures 1*a*, 1*b* and 1*c* first as a unitary figure to show the conventional features of the dryer section, indicated generally by the reference numeral **10**, in a paper machine, it will be seen that the dryer section **10** comprises a plurality of tiers of paper dryer rolls, in this case an upper tier A containing rolls **11**, **12**, **13**, **14** and **15**, and a lower tier B containing rolls **16**, **17**, **18**, **19**, **20** and **21**. Each of the rolls or drums **11**, **12**, etc. has the typical dryer drum construction of a hollow shell rotatable about its axis with suitable means (not shown) for feeding steam into the hollow drum **11** and suitable means (not shown) for removing condensate therefrom. The rolls in the upper tier A and the lower tier B are generally parallelly aligned and in close running relation so that the paper web W may weave a generally serpentine path beneath the first roll **16** in the bottom tier B and then around and over the first roll **11** in the top tier A and then down and around the bottom of the second roll **17** of the bottom tier B, etc.

A traveling looped upper felt **22** is guided by a plurality of guide rolls *x*, *x*, etc. so as to be trained over the tops of each of the rolls **11**, **12**, etc. in the upper tier A and the felt **22** thus is urged against the web W during most of its travel over the top of the rolls **11**, **12**, etc. in the upper tier A so as to control the removal of moisture from the web W at these locations. An upper felt dryer roll **23** is lapped by the upper felt **22** and mounted above the upper tier A just between the rolls **11** and **12**. The felt dryer roll **23** has substantially the same construction as the paper dryer rolls **11**, **12**,

etc. and this roll serves to remove moisture which the felt 22 has picked up during its engagement with the web W traveling over the rolls in the top tier A.

A traveling looped lower felt 24 is mounted on a plurality of guide rolls *y*, *y*, etc. and trained over the bottoms of the rolls 16, 17, etc. in the lower tier B so as to function in a manner substantially similar to the function of the upper felt 22 in controlling the drying out of the web W during most of the time that the web W is engaging the bottom of each of the lower rolls 16, 17, etc. A lower felt dryer roll 25 is lapped by the lower felt 24 and mounted below the lower tier B of dryer rolls for the purpose of drying out the felt 24 when it is not engaged with the web W.

As will be noted the floor level F passes just beneath the axes of the rolls in the lower tier B and posts P, P mounted at ground level G support the floor F. The lower felt 24 and its dryer roll 25 are thus mounted essentially below the floor level F in the basement of the plant in the usual arrangement. This permits an updraft of drying air from the basement up past the sides of the felt 24 and past the ends of the lower felt dryer drum 25 and the rolls in the tiers A and B.

Also, it is conventional to provide the dryer section 10 with a main hood 26 to control generally the drawoff of hot moist air from the dryer section 10. The hood 26 is provided with vent means or a vent duct 27 at the top thereof for drawing air upwardly and out of the room wherein the dryer section 10 is located. The hood 26 may be formed of suitable metal sheeting for air ducts and the like and the hood 26 extends over the top of the upper dryer roll 23, the upper felt 22 and each of the rolls 11, 12, 13, etc. of the upper tier A; and the hood 26 extends down along the ends of the upper felt dryer roll and the paper dryer rolls in the tiers A and B. Actually, the hood preferably extends down approximately to the region between the axes of the rolls in the upper tier A and the axes of the rolls in the lower tier B (nearer to the axes of the upper tier A) so as to leave an appreciable amount of space between the bottom 26*a* of the hood and the floor level F to permit air to be drawn therebetween up into the hood 26. The hood 26 also extends downwardly at the front end of the dryer section at 26*b* and at the back end of the dryer section 26*c* to the bottom level 26*a*.

The foregoing describes generally the conventional arrangement for a paper machine dryer section 10. In such arrangement hot air would often be fed in beneath the bottom level 26*a* of the hood 26 and above the floor F to assist in removing the moist air beneath the hood 26. As previously mentioned, however, at higher paper machine operating speeds the conventional arrangement often resulted in defects in the paper, particularly defects along the edges of the paper; and it is believed that such defects were caused by premature drying of the edges of the paper and/or felts because of a tendency for the drying air to channel along the ends of the dryer drums. In the instant invention, however, a secondary hood 28 may be provided as shown in Figure 1*a* and in Figure 2 positioned within the main hood 26 and extending in close relationship over the top of the top roll, or the upper felt dryer roll 23 and down along the end of the upper felt dryer roll 23. As indicated in Figure 2, the bearing mounted ends of the upper felt dryer rolls 23 at 23*a* and 23*b* are suitably mounted on supporting frame work 29 which in turn is mounted on the floor F. The secondary hood 28 extends across the top of the roll 23 and down at 28*a* and 28*b* along the ends 23*a* and 23*b* respectively of the roll 23. Preferably, the lowermost portions 28*c* and 28*d* of the secondary hood 28 are turned inwardly so as to function directly as baffles interfering with flow of air in a directly vertical manner past the bearing mounted ends 23*a*, 23*b* of the roll 23 as well as the bearing mounted ends 11*a*, 11*b* of the roll 11 and 17*a*, 17*b* of the roll 17. The individual baffle members 28*c* and 28*d* are thus positioned at an angle to the vertical planes containing the roll ends or bearings 11*a*, 17*a*, 23*a* and the roll ends or bearings 11*b*, 17*b* and 23*b* to divert flow of air away from such planes, or actually to divert flow of air outwardly and upwardly away from such planes. (In Figure 1, the bearings are not shown and the tiers A and B are spaced apart to simplify the drawings; whereas Figure 2 more accurately shows the usual spacing of the rolls). The secondary hood 28 extends downwardly at least about to the axle of the top roll 23, and preferably to at least the bottom of the roll 23. The baffles 28*c* and 28*d*, which need not be a part of the hood 28 and can be used separately are preferably positioned intermediate the axes of the top two rolls, in this case the rolls 23 and 11.

Preferably, a conduit 30 connected to a suitable source of hot air (not shown) is connected to the second hood 28 for introducing hot air under the second hood 28. The conduit 30 may have a sparger arrangement 30*a* whereby the hot air is fed beneath the hood 28 through a plurality of fine holes in a header extending across the top of the roll 23 and affixed to the roof of the hood 28 as here shown. Other air distributing devices may, of course, be used in place of the sparger 30*a*. The effect of the sparger 30*a* is to force air downwardly over the roll 23 covered by the felt 22 and then outwardly beneath the side walls 28*a* and 28*b* of the hood, or beneath the baffles 28*c* and 28*d*, if such are mounted as here shown as a part of the hood. This results actually in a flow opposite to that heretofore employed with respect to the top roll 23, but it also results in interference with the previously employed channeling of air up past the roll ends and it results in flow of the air generally away from the roll ends and up between the main hood 26 and the secondary 28, as indicated by the arrows shown in Figure 2.

Referring now to the lower felt dryer roll 25 with the felt 24 trained thereover, as shown in Figure 2, it will be seen that the bearing mounted ends 25*a* and 25*b* of the roll 25 are supported by the floor F on a downwardly projecting portion 31 thereof. The portion 31 does not extend downwardly to the ground level G and heretofore the space between the depending portion 31 on the ground level G was substantial in the basement of the paper machine plant so that a very substantial amount of air from the basement could pass therebetween and upwardly past the ends 25*a* and 25*b* of the roll 25. In the instant invention partitions 32*a* and 32*b* are provided to close this space off between the depending portions 31 and the ground level G so as to preclude the free flow of air from the basement up beneath the dryer section 10. It is now believed that this free flow of air has been a major cause of channeling of the air flow directly past the roll ends and premature drying of the web and/or felt at these locations. By closing the partition walls 32*a* and 32*b* it is possible to provide what amounts to an open topped chamber in close relationship with the bottom and up along the ends 25*a* and 25*b* of the bottom roll 25. This chamber is defined by the ground G and the floor F plus the depending floor portions 31 and the partition walls 32*a* and 32*b* so as to substantially preclude upward flow of air from the general atmosphere in the basement through the opening in the floor F provided for the dryer section 10. This chamber will, of course, extend the full length of travel for the bottom felt 24 as indicated at 32*a* in Figures 1*a*, 1*b* and 1*c* and end walls can be provided (not shown) to close in and completely control the air supplied to this "chamber."

In the absence of the partition walls 32*a* and 32*b* and associated elements forming a chamber closed except for its top in the manner here described, the air from the basement created a relative humidity of perhaps as low as 30 or 40% in the area around the bottom roll 25 and with the resultant channeling of this air along opposite

edges of the felt **24**, the drying difficulties hereinbefore described were encountered. In contrast now it has been found that the closed chamber should be operated so as to maintain just enough air therein to keep a very high relative humidity of from at least about 70% to just less than 100% (to prevent condensation). This is accomplished, preferably, by the use of a second conduit **33** connected to a source of air or hot air under slight pressure (not shown) which is connected to and feeds into the chamber to introduce hot air therein at a controlled rate beneath the bottom roll **25** (or in the atmosphere surrounding the bottom roll **25**). As here shown the conduit **33** is mounted on the partition wall **32***a* passing therethrough and presenting a sparger portion **33***a* extending the length of the roll **25** with suitable apertures therein to flow air underneath the roll **25**. The hot air thus flowed into the chamber beneath the roll **25** serves to maintain the desired relative humidity of 70–100% in this chamber and permit the constant flow of moist air outwardly past the floor level F as indicated by the arrows and upwardly between the hoods **26** and **28**. As will be appreciated, the instant invention contemplates maintaining a space between the bottoms of the hoods **26** and **28** and the floor level F (or as shown in Figures 3*a* and 3*b*) so that a certain amount of fresh air may enter from the operating room. The amount of fresh air that does enter is controlled to some extent by the rate at which air is passed through the system through the conduits **30** and **33** and drawn off through the vent **27** and, the hood **26** could be lengthened to extend to the floor F so that additional air conduit means could be provided to control precisely the amount of air entering in this region. It has been found, however, that satisfactory results can be obtained without making this change so that an additional control feature is not necessary, merely by adequately controlling the air entering the conduits **30** and **33**.

Referring again to Figure 1*a*, it will be noted that the hood **28** passes over the top of the top roll **23** and then slopes downwardly slightly at **28***e* to follow generally the top portion of the felt **22** in relatively close relationship. Another sparger **30***a* may be mounted on the roof of the downwardly positioned portion **28***e* of the hood **28** in order to supply additional hot air beneath the hood **28** close to the felt **22**. In this arrangement the secondary hood **28** is mounted primarily to protect the top felt **22** and to drive hot air back over the top felt **22** and downwardly against the air tending to flow upwardly over the ends of the roll **12**, for example.

In Figure 1*b* it will be noted that a third hood member **34** is mounted in close relationship over the tops and down along the ends of the uppermost rolls **13** and **14** of the superimposed rolls provided by the tiers A and B. Suitable spargers **35** are provided in the roof portions of the third hood **34** to introduce hot air therebeneath in the manner hereinbefore described. The hood **34** functions in substantially the same manner that the hood **28** functions, only the hood **34** operates in connection with the rolls **13** and **14**, whereas the hood **28** operates in connection with the roll **23**. In other respects, the functions of the hoods **28** and **34** are substantially identical; but the cooperation between the hood **34** and the secondary hood portion **28***e* shown in Figure 1*b* results in a still greater improvement in the drying operation. In other words, the instant invention permits the use of a plurality of secondary hoods nested within each other which successively prevent the tendency for air to channel up past the side edges of the felt **22** and/or the ends of the rolls. Each of such hoods **28***e* and **34** also is preferably provided with hot air inlet means so that hot air will be introduced beneath the hoods and will be forced outwardly and downwardly therefrom to further prevent any tendency toward the undesirable air channeling along the roll ends.

It will thus be seen that the secondary hood **28** may be used alone, as shown in Figure 1*a*, or it may be used in conjunction with a third hood **34**, as shown in Figure 1*b*; or the third hood **34** may be used alone, as shown in Figure 1*c*. It will be appreciated that the showing of the hood **34** and air sparger **35** in Figure 1*c* shows still another embodiment of the instant invention wherein the hood **34** is mounted over the top roll **15**, but not over the top felt **22**. Here again the function is similar in that channeling along the edges of the web and the ends of the rolls **15**, **20** and **21** is prevented. It will further be appreciated that the hood **28** may be used only in connection with the upper roll **23** or it may be used with the lowered portion **28***e* for the entire paper machine section **10**, or the remainder of the paper machine section **10**, such as the rolls **13**, **14** and **15** may be covered by a third hood **34** as shown.

Referring now to Figures 3*a* and 3*b*, which show essentially diagrammatically the rear and front sides of a portion of the dryer section, as here indicated including dryer rolls **11**, **16** and **17**, with felts, felt guide rolls, etc. omitted for the purpose of simplifying these views. As shown in Figure 3*a*, the rear main hood portion **26***c* extends downwardly below the axis of the roll **11** (to a bottom edge **26***a*). In Figure 2, the difference between the front and rear sides of the paper machine with respect to mounting of the rolls is not brought out for the purpose of simplifying the showing in Figure 2; but from Figure 3*a* it will be seen that the rear bearing **40** for the roll **11** is carried in a generally cylindrical housing **41** supported on a heavy upright pedestal **42**. The housing **41** and pedestal **42** cooperate to support steam inlet and condensate exit lines (not shown) and are thus built of substantial size so as to cover an appreciable portion of the end of the roll **11**. A comparable relatively heavy supporting housing **43** mounts the bearing **44** for the rear end of the roll **16**, and a similar heavy housing **45** mounts the bearing **46** carrying the rear end of the roll **17** just above the level of the floor F. The heavy housing members **43** and **45** extend upwardly from the floor to above the axes of the rolls **16** and **17** but below the tops thereof. The heavy housings **43** and **45** are substantial in size and sturdy in structure so as to support the various steam inlet and condensate exit lines (not shown) for the rolls **16** and **17**; and these housing elements **43** and **45** merge with the base of the pedestal **42** extending therebetween so as to close off the rear side of the paper machine from the floor level F to approximately ¾ of the height of the lower tier of rolls (i.e. rolls **16** and **17**).

The foregoing describes the prior art arrangement for mounting dryer rolls. In this arrangement air cannot pass direrctly from the floor level beneath the hood **26**, but must pass over the tops of the housing portions **43** and **45** (and around the pedestal **42**) in order to flow beneath the hood **26**.

In contrast, as shown in Figure 3*b*, in the front side of the paper machine the front end of the roll **11** is supported on a bearing **50** carried in a framework **51** defined by a pedestal **52** mounted on the floor having spaced upright arms **52***a* and **52***b* with a cross arm **52***c* mounted therebetween and supporting from beneath the bearing **50**. This lighter type of framework **51** is all that is required for the front end of the roll **11***a*, because the various auxiliary pieces of equipment such as the steam inlet lines, etc. are not mounted at the front end. As indicated, the hood **26** extends downwardly to beneath the axis of the roll **11** so that air, in passing through the framework **51**, must pass beneath the bottom edge **26***a* of the hood **26**.

In the prior art arrangements, the front bearing **53** for the roll **16** is mounted on a relatively small pedestal extending upwardly from the floor and the bearing **55** for the front end of the roll **17** is similarly mounted on a small pedestal **56** extending upwardly from the floor. Again, only light supports such as the pedestals **54** and **56** are

required for the bearings 53 and 55 at the front end of the rolls 16 and 17. It has now been found, however, that the prior art mountings for the front and rear ends of dryer rolls have resulted in an irregularity in air flow in the dryers which was not heretofore appreciated. Apparently substantially more air is permitted to flow beneath the hood 26 on the front side of the machine. This produces an additional undesired drying effect along the edges of the front side and the instant invention affords a method of curing this deficiency.

In the instant invention baffle members or walls 57 and 58 are provided for the ends of the rolls 16 and 17, respectively. The baffles 57 and 58 extend upwardly from the floor F to approximately the same height as the heavy housings 43 and 45 extend at the rear of the machine. The baffles or walls 57 and 58 are suitably secured to the sides of the pedestal 52 so as to close off flow of air toward the dryer drums beneath the top levels of the walls 57 and 58. In this way the air flowing into the hood 26 must flow between the space defined from the top edges of the walls 57 and 58 and the bottom edge 26a of the hood 26. This space is, in accordance with the teachings of the instant invention, substantially the same as the space between the bottom edge of the baffle 26a and the top edges of the heavy housing members 43 and 45 at the rear of the machine. It has been found that this uniformity of spacing is of particular importance in removing certain defects in the drying procedure. In this way, the closed chamber (with an open top) which receives the lower roll members in the instant dryer now preferably extends not merely from the basement to the floor level but to approximately ¾ of the height of a dryer roll above the floor level (or to above the axes of the tier of rolls mounted at the floor level).

It will be understood that modifications and variations may be effected without departing from the spirit and scope of the novel concepts of the present invention.

We claim as our invention:

1. In a paper machine dryer section, a plurality of tiers of paper dryer rolls including an upper tier and a lower tier having a traveling paper web trained therethrough, a traveling looped upper felt trained over the tops of the rolls in the upper tier, an upper felt dryer roll lapped by the upper felt above said upper tier, a first hood extending over the top of the upper felt dryer roll and down along the ends of said upper felt dryer roll and said paper dryer rolls, a second hood positioned within said first hood and extending in close relationship over the top and down along each of the ends of said upper felt dryer roll, a conduit connected to said second hood introducing hot air under the second hood, and vent means at the top of said first hood drawing air upwardly along the roll ends and then between said hoods.

2. In a paper machine dryer section, a plurality of superimposed dryer rolls arranged in upper and lower tiers, a first hood extending over the tops and down along the ends of the upper tier of the superimposed rolls, a second hood positioned within the first hood and closely spaced therefrom and extending in close relationship over the top and down along each of the ends of the top of said upper tier of superimposed rolls, vent means at the top of the first hood drawing substantially equal quantities of gases upwardly along opposite roll ends and between the hoods, and baffle means closely spaced from the roll ends and spaced from the hoods to provide openings allowing substantially equal access to ambient atmosphere at opposite ends of the rolls.

3. In a paper machine dryer section, a plurality of superimposed dryer rolls arranged in upper and lower tiers, a first hood extending over the tops and down along the ends of the upper tier of the superimposed rolls, a second hood positioned within the first hood and closely spaced therefrom and extending in close relationship over the top and down along each of the ends of the top of said upper tier of superimposed rolls, a conduit connected to said second hood introducing hot air under the second hood, vent means at the top of the first hood drawing substantially equal quantities of gases upwardly along opposite roll ends and between the hoods, and baffle means closely spaced from the roll ends and spaced from the hoods to provide openings allowing substantially equal access to ambient atmosphere at opposite ends of the rolls.

4. In a paper machine dryer section, a plurality of superimposed dryer rolls arranged in upper and lower tiers, a first hood extending over the tops and down along the ends of the upper tier of the superimposed rolls, a second hood positioned within the first hood and closely spaced therefrom and extending in close relationship over the top and down along each of the ends of the top of said upper tier of superimposed rolls, vent means at the top of the first hood drawing substantially equal quantities of gases upwardly along opposite roll ends and between the hoods, baffle means closely spaced from the roll ends and spaced from the hoods to provide openings allowing substantially equal access to ambient atmosphere at opposite ends of the rolls, a traveling looped lower felt trained over the bottoms of the rolls in the lower tier, a lower felt dryer roll lapped by the lower felt below said lower tier, walls defining an open topped chamber in close relationship under the bottom and up along the ends of the bottom of said lower felt dryer roll but spaced from said first and second hoods, and a conduit connected to said chamber introducing hot air under said lower felt dryer roll.

5. In a paper machine dryer section, a plurality of superimposed dryer rolls arranged in upper and lower tiers, a first hood extending over the tops and down along the ends of the upper tier of the superimposed rolls, a second hood positioned within the first hood and closely spaced therefrom and extending in close relationship over the top and down along each of the ends of the top of said upper tier of superimposed rolls, vent means at the top of the first hood drawing substantially equal quantities of gases upwardly along opposite roll ends and between the hoods, baffle means closely spaced from the roll ends and spaced from the hoods to provide openings allowing substantially equal access to ambient atmosphere at opposite ends of the rolls, a traveling looped lower felt trained over the bottoms of the rolls in the lower tier, a lower felt dryer roll lapped by the lower felt below said lower tier, and walls defining an open topped chamber in close relationship under the bottom and up along the ends of the bottom of said lower felt dryer roll but spaced from said first and second hoods.

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