

Nov. 16, 1954

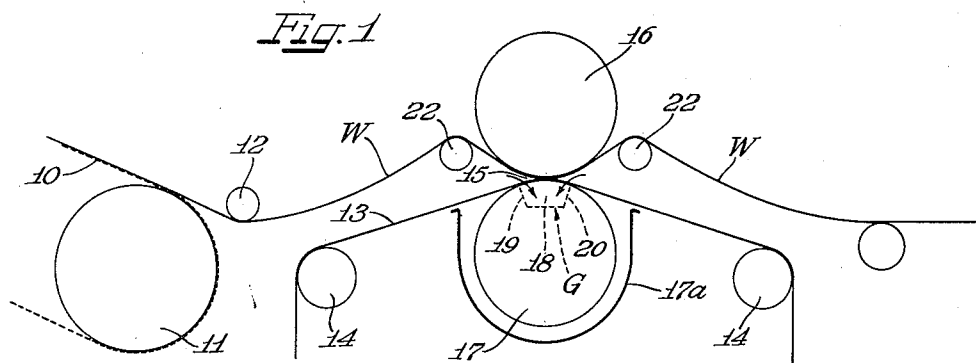
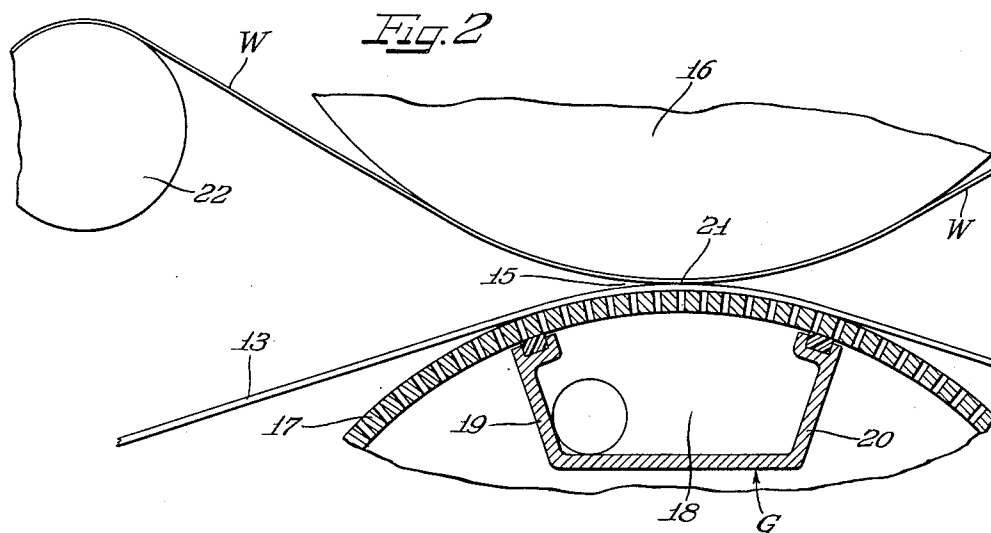
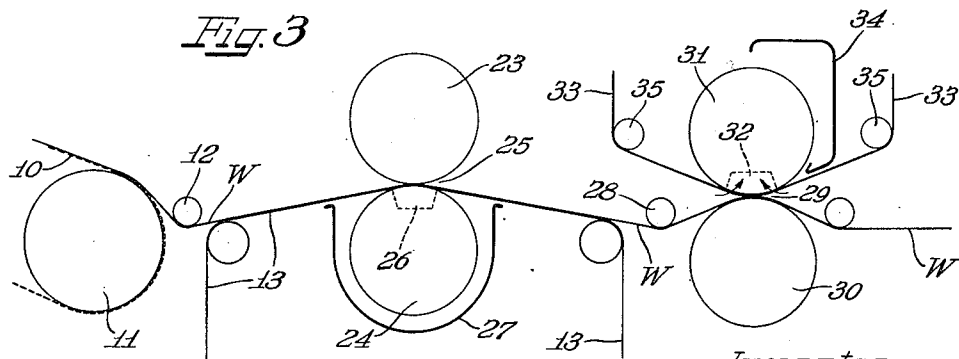
L. HORNBOSTEL

2,694,347

SUCTION PRESS ROLL ARRANGEMENT

Filed Aug. 31, 1950

3 Sheets-Sheet 1



Inventor
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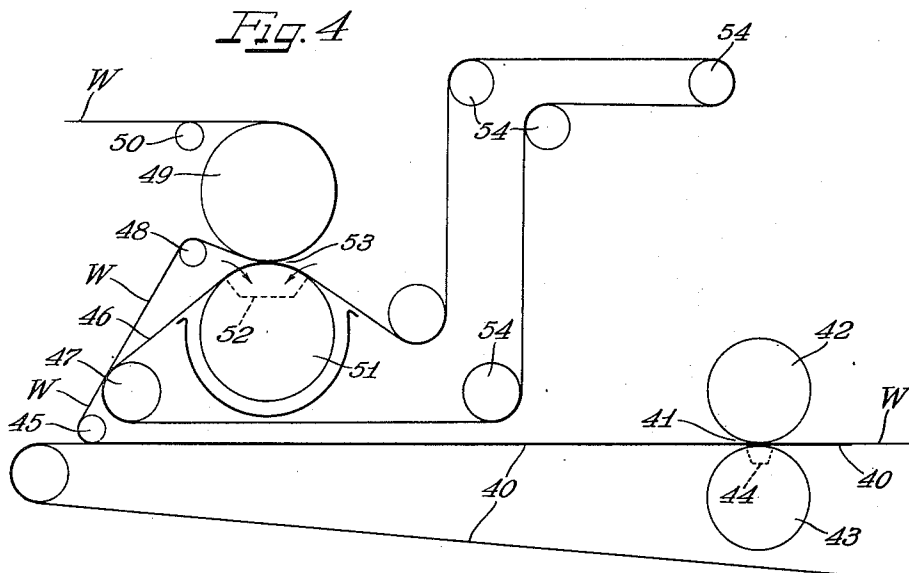
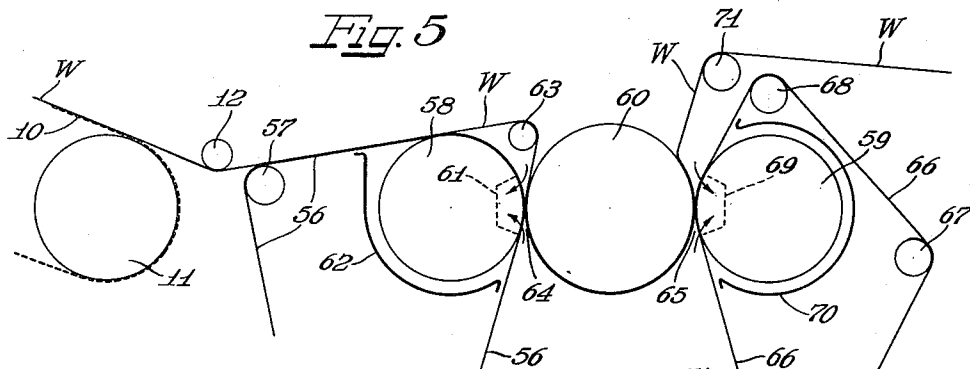
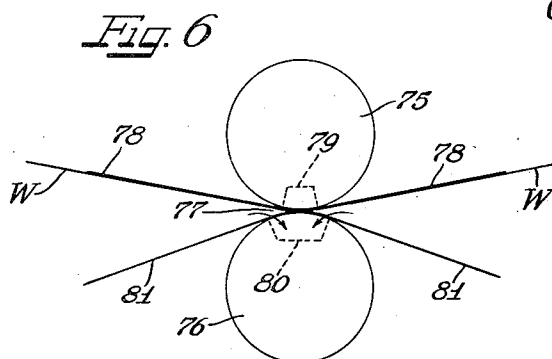
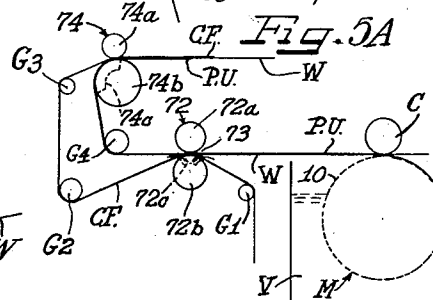
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2,694,347

SUCTION PRESS ROLL ARRANGEMENT

Filed Aug. 31, 1950

3 Sheets-Sheet 2



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2,694,347

SUCTION PRESS ROLL ARRANGEMENT

Filed Aug. 31, 1950

3 Sheets-Sheet 3

Fig. 7

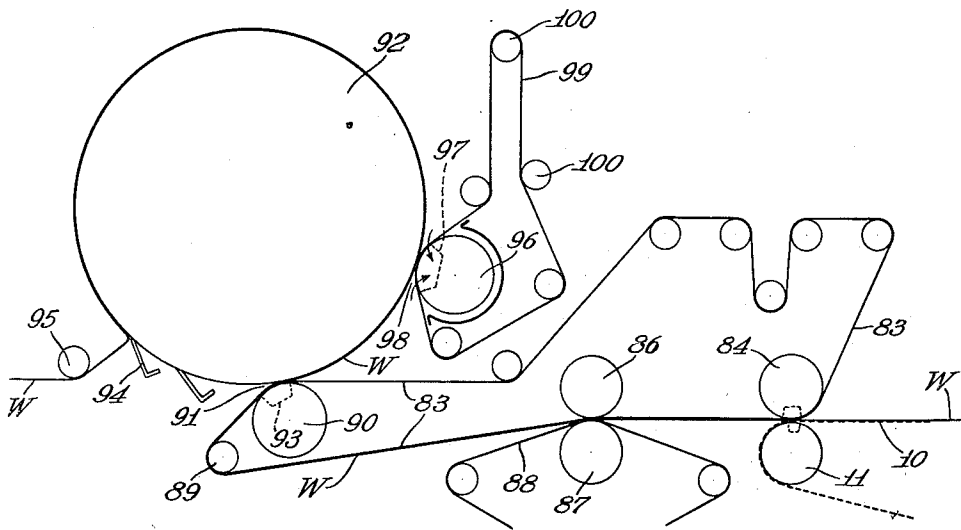
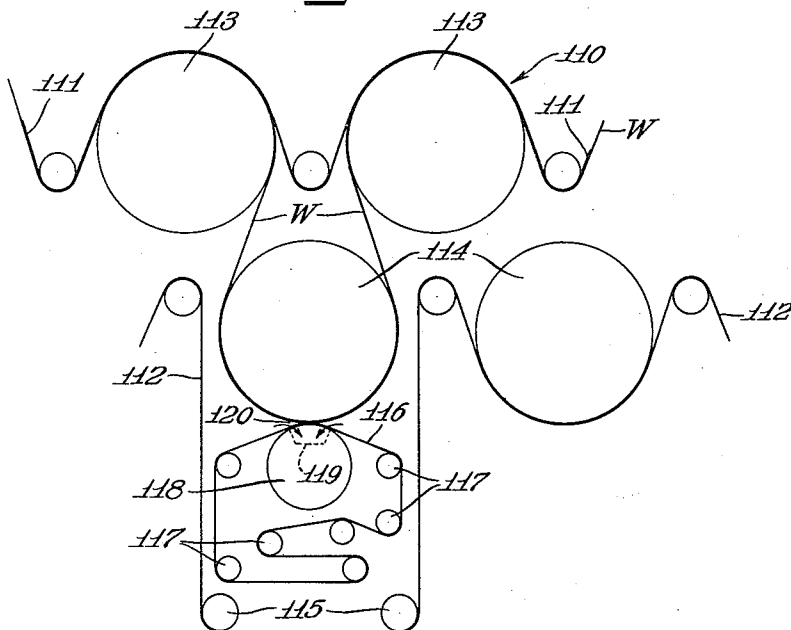


Fig. 8



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2,694,347

SUCTION PRESS ROLL ARRANGEMENT

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Application August 31, 1950, Serial No. 182,579

9 Claims. (Cl. 92-49)

The present invention relates to a suction press for a paper making machine and more particularly to a paper machine suction press wherein the suction applied at the press nip is exerted against an uncovered press felt to facilitate drying of the felt by the passage of fluid there-through.

In the paper making art it is conventional practice to pass a moist paper web supported upon a press felt through one or more suction presses, whereby moisture is removed from the web by mechanical nip pressure of a pair of cooperating press rolls, together with suction exerted at the press nip. Generally, Fourdrinier-type paper making machines are designed to sufficiently dry the web by suction while still on the forming wire, so that suction alone in a later press section is not effective to further dewater the web. Accordingly, the use of mechanical pressure either alone or in conjunction with suction is necessary for further web dewatering. Press felts are generally utilized to convey the web from the forming wire to the paper machine drier part, the felt also serving to absorb moisture from the web in surface contact therewith. This water absorption by the felt is particularly effective when the felt and web are subjected simultaneously to mechanical pressure, such as a press nip.

The present invention now provides a novel form of suction press wherein one roll of a pair of pressure nip defining rolls has an interior suction gland defining an arcuate suction area extending to both the oncoming and off-running sides of the pressure nip. A press felt passes through the nip and is lapped about the one roll to cover the entire suction area thereof. The web to be dewatered, however, is guided through the nip to contact only a part of the suction area covering felt portion, preferably only at the nip proper. The felt is thereby uncovered for most of its run over the suction area both before and after the nip proper, and suction is effective to dewater the felt. Such dewatering is particularly effective on the uncovered felt, since it is open for the passage of atmospheric air therethrough into the suction area of the roll. This passage of atmospheric air into the suction area opens the pores of the felt to accommodate the drainage of moisture therethrough.

It also permits full air flow through the holes of the suction roll shell causing the water squeezed into these holes to be drawn into the suction gland. As a result, the water cannot be thrown back into the felt and web.

Further, as the web and the felt expand from their compressed state in the nip, air is freely available to fill the voids. Heretofore, the voids in the felt sealed by the web filled with water thrown from the suction roll holes.

In any press roll assembly, a high pressure area is created at the incoming side of the nip, due to convergence of the rotating rolls and a low pressure area is created at the outgoing side of the nip due to the divergence of the rotating rolls. The resulting pressure differential between the two sides of the nip tends to draw water through the nip. Since, in the present invention, the felt is open and uncovered by the web on the offgoing side of the nip, the reduced pressure area in the felt is relieved as soon as the nip load on the felt is relieved and the tendency to carry water through the nip will be nullified. Heretofore, any extension of the suction area beyond the nip had the disadvantage of further decreasing the reduced pressure on the off-going side of the nip created by the divergence of the rolls since the felt was covered by the web and could not quickly vent the reduced pressure area thereof

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to the atmosphere. As a result the extended suction area actually increased the amount of water carried through the nip.

On the oncoming side of the nip, the passage of air through the felt is effective to remove water squeezed from the web into the felt by mechanical nip pressure. On the off-going side of the nip, the passage of air through the felt removes residual moisture present in the felt after the subjection of the felt to mechanical nip pressure, and also the pores of the felt are opened and freed from web fibers, free lignins and other substances squeezed from the web at the nip. The opening of the felt pores after passage of the felt through the pressure nip also promotes freer air flow through the felt, together with consequent improved air drying characteristics of the felt as it is trained about its guide rolls prior to re-passage through the suction press nip.

Prior to this time, those skilled in the art, in analyzing the most effective utilization of suction in conjunction with mechanical nip pressure in a suction press assembly, have concluded that rapid drying of the web could best be promoted by extended web-felt contact in the suction area, thereby increasing the drainage of moisture through the web and the felt under differential air pressure conditions. Applicant has discovered the unobvious advantages hereinbefore recited residing in the contact of the felt with the web only at the point of mechanical nip pressure, with the felt alone being directed about the suction area both on the on-coming and off-running sides of the point of mechanical nip pressure. By promoting felt drying and by opening up the felt pores, applicant has greatly increased the possibility of water absorption by the felt without decreasing suction removal of water from the web at the press nip.

It is, therefore, an important object of the present invention to provide an improved suction press for a paper making machine including a press roll having an arcuate suction area and an uncovered porous press felt lapping said suction area for promoting drying of the felt and opening of the felt pores.

Another important object of the present invention is to provide an improved method of dewatering a moist paper web by the passage of the web and a press felt through the pressure nip of a suction press and subjecting the felt alone to suction both on the on-coming and off-running sides of the press nip to open the pores of the felt, thereby increasing the water absorption capacity of the felt.

Still it is a further important object of the present invention to provide an improved suction press including a suction press roll cooperating with an additional roll to define a pressure nip therebetween, means lapping a press felt about the entire suction area of the press roll both on the on-coming and off-running sides of the press nip and means directing a moistened paper web to contact with the press felt only at the press nip, the press felt pores being opened by flow of air therethrough as the same passes about the suction area to increase the water absorption efficiency of the felt at the pressure nip.

Still another important object of the present invention is to provide a method of increasing the water removal efficiency of a suction press by providing a suction press having a mechanical pressure nip, subjecting a press felt to vacuum on both the on-coming and off-running sides of the pressure nip, and guiding a paper web in contact with the felt only at the press nip, whereby the water absorption efficiency of the felt is increased by the opening of the pores of the felt and the drying of the same under vacuum with the web out of contact.

Yet another important object of the present invention is to provide a paper machine press in which suction is applied to a press felt both in advance of and immediately after passage of the felt through a mechanical pressure nip and in which a moist paper web is guided into contact with the press felt only at the pressure nip, whereby the water absorption efficiency of the felt is increased without interfering with the efficiency of water removal from the web by the concurrent application of mechanical pressure and vacuum at the pressure nip.

Other and further important objects of this invention will be apparent from the disclosures in the specification and the accompanying drawings.

On the drawings:

Figure 1 is a diagrammatic representation of the present invention as embodied in a straight through suction press;

Figure 2 is an enlarged vertical cross-sectional view, with parts shown in elevation, illustrating in detail the operation of the suction press of Figure 1;

Figure 3 is a diagrammatic representation of the present invention as utilized in a straight through reverse press;

Figure 4 is a diagrammatic representation of the present invention as applied to a reverse suction press;

Figure 5 is a diagrammatic representation of the present invention as applied to a horizontal dual suction press;

Figure 5A is a diagrammatic representation of the present invention as applied to a suction press and drum combination for a cylinder type paper machine.

Figure 6 is a diagrammatic representation of the present invention as applied to a double suction press;

Figure 7 is a diagrammatic representation of the present invention as used in conjunction with a Yankee dryer; and

Figure 8 is a diagrammatic representation of the present invention as utilized within a conventional paper machine drier section.

As shown on the drawings:

In Figure 1, reference numeral 10 refers generally to a foraminous Fourdrinier-type forming wire wrapped about a suction couch roll 11. The web W, initially formed on the wire and substantially freed of surface water while thereon, is removed from the wire and trained beneath a guide roll 12 in spaced relation to a press felt 13 trained about a guide roll 14. The felt is passed through a suction press nip 15 defined by a plain upper press roll 16 and a lower suction roll 17 partially surrounded by a conventional arcuate save-all pan 17a. The suction roll 17 is provided with an arcuate suction area 18 defined by a suction gland G disposed within the interior of a perforated rotating shell and defined by a front gland wall 19 and a rear gland wall 20. The suction area 18 and walls 19 and 20 are displaced peripherally of the roll 17 on the on-coming and off-running sides, respectively, of the nip 15 so that suction is applied at the roll periphery both immediately in advance of and immediately in the rear of the area 21 at which the mechanical nip pressure is applied.

The web W contacts the felt 13 only at the nip pressure area 21, and the web W is partially lapped about the upper press roll 16 by means of a guide roll 22 positioned above the felt and adjacent the upper plain roll 16 of the felt in advance of the nip 15. A second guide roll 22 is positioned adjacent the upper roll 16 immediately after the nip 15 to aid in stripping the web W from the upper roll 16. As is apparent the nip 15 lies in a plane generally tangential to both the rolls 16 and 17, and the guide rolls 22, 22 are positioned above said plane or on the (top) side thereof opposite the suction roll 17.

On the other hand, the felt 13 is lapped about the lower suction roll 17 to contact that portion of the roll periphery overlying the interior suction area 18. In this manner, the sole suction effect of the roll gland G is applied to the felt. The moist paper web W contacts the felt 13 only at the nip pressure area 21 so that the web is subjected to the suction effect of the roll 17 only at the exact point of mechanical pressure.

It will be appreciated that water will be forced from the moist felt W by the nip pressure at the point 21 and that the water thus removed from the web will be drawn through the felt 13 into the suction area 18 of the roll 17, as is well known in the art. However, the suction effect of the roll 17 at the remainder of the suction area 18 will be exerted solely upon the press felt and the suction thus exerted will serve to draw atmospheric air through the felt to open the felt pores and to remove residual moisture therefrom. Further on the on-coming side of the immediate nip area 21, the suction area 18 will serve to remove moisture squeezed from the web and the felt. Such moisture generally collects upon the surface of the web and the felt immediately in advance of the nip, and the suction area will be effective to remove this surface moisture.

On the off-going side of the felt, namely, between the area 21 and the rear suction gland wall 20, the suction

will effectively remove the residual moisture from the felt and open the pores of the felt to increase circumambient atmospheric drying of the felt as it is guided upon its return path to the nip 15 about the guide rolls 14. After passage through the mechanical pressure nip, the felt is squeezed and compacted so that its density is materially increased and the flow of air and moisture through the felt is hindered. The drawing of atmospheric air through the felt will serve to open the felt pores, thereby materially increasing the drying of the felt.

In the embodiment shown in Figure 3, the reference numeral 10 again refers to a Fourdrinier-type forming wire with the web W being removed therefrom and lapped again about roll 12 into contact with a press felt 13. Felt 13 is passed through a conventional first suction press including a plain upper press roll 23 and a lower press roll 24 defining a press nip 25 therebetween. The suction press roll 24 is provided with an interior suction area 26 which is lapped by the press felt 13 and the web W. A conventional arcuate save-all pan 27 is provided to receive water centrifugally thrown from the surface perforations of the press roll 24.

Following the passage of the web W through the press nip 25, the web is stripped from the felt 13 and is passed about a web guide roll 28 through the nip 29 of a reverse press assembly defined by a lower plain press roll 30 and an upper suction press roll 31. The end of the press roll 31 is provided with an arcuate suction area 32 lapped by a press felt 33 trained about the roll 31 and through the press nip 29. The save-all pan 34 is provided adjacent the suction roll 31 within the loop of the press felt 33 to receive water thrown down the apertured periphery of the roll 31.

Here, again, it will be noted that the felt 33 is guided by a pair of guide rolls 35 into contact with the entire arcuate suction area 32, while the web W overlies the suction area 32 only at the exact point of nip pressure, that is, at the point where the rolls 30 and 31 define the nip 29. Thus, the suction effect of the arcuate area 32 is exerted mainly upon the felt to dry the felt on both the on-coming and out-going sides of the nip.

In Figure 3, the felt W is retained upon a felt 40 trained through the nip 41 of a conventional suction press including an upper plain press roll 42 and a lower suction press roll 43 having a suction area 44 at the nip 41.

Following passage of the web W on the felt 40 through the nip 41, the web is removed from the felt 40 by means of a web guide roll 45 and the web W is trained into contact with a press felt 46 lapped about a press guide roll 47. The web W is subsequently removed from the felt 46 by means of a web guide roll 48 positioned adjacent an upper plain press roll 49 of a reverse press assembly. The roll 48 is effective to guide the web W into surface contact with the roll 49 for passage thereabout and subsequent stripping therefrom by means of a web guide roll 50. The lower roll of the reverse suction press assembly takes the form of a suction press roll 51 having an arcuate interior suction area extending toward the on-coming and off-running sides of a reverse suction press nip 53 defined by the rolls 49 and 51. The felt 46 is lapped about the entire arcuate suction area 52, while the web W, having been stripped from the felt 46, overlies the suction area 52 only at the pressure nip of the rolls 49 and 51.

In this manner, as hereinbefore explained, the suction area effectively operates upon the felt 46 to remove moisture therefrom on both the on-coming and the off-going sides of the nip, so that the felt is dried and a drier felt surface is presented to the web at the nip 53. Also, the opening of the felt pores by the passage of air into the suction area 52 on the out-going side of the nip promotes the air drying of the felt as it is passed about the guide rolls 54 in its return path to the guide roll 47.

As illustrated in Figure 5 of the drawings, the invention may also be applied to a horizontal dual suction press. In this figure of the drawings, the forming wire 10 is again lapped about a suction couch roll 11, and the web W is removed by means of a guide roll 12 for conveying the web into contact with a first press felt 56. The press felt 56 is guided by a felt guide roll 57 to a first suction press roll 58. A plain press roll 60 is aligned with the first suction roll 58 and a second suction press roll 59 positioned in a diametrically opposed re-

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lation to the roll 60 and in horizontal axial alignment with the press rolls 58 and 60.

The suction roll 58 is provided with an arcuate suction area 61 about which the felt 56 is lapped and with an arcuate save-all pan 62 positioned within the loop of the felt 56. The felt 56 passes about the periphery of the roll 58, while the web W is removed from the felt 56 for passage about a web guide roll 63 positioned above the suction roll 58. The web W passes about the guide roll 63 and is in contact with the central plain press roll 60 for conveyance by the roll to a first suction nip 64 defined by the rolls 58 and 60. Because of the tendency for the web W to adhere to the surface of the plain roll 60, particularly after going through the first nip 64, only the guide roll 63 (positioned on the plain roll side of the plane of the first nip 64) is required to obtain the desired web travel; and felt guide rolls such as the roll 57 within the loop of the felt 56 provide guide means for separating the web W and the felt 56 at the outgoing side of the nip 64. This latter feature of separating the web W from the felt at the outgoing side of the nip when the web is permitted to adhere to the plain roll surface is shown more clearly in Fig. 4 through the use of the guide rolls 54 for the web 46 (whereby guide means 54 positioned on the suction roll side of the plane of the nip 53 accomplish this purpose). The roll 59 is lapped by a second press felt 66 which is lapped about felt guide rolls 67 and 68 in contact with the entire suction area 69 of the roll 59. Roll 59 is also provided with an arcuate save-all pan 70. Following the passage of the web W through nips 64 and 65, the web is removed from the central roll 60 and is trained about a web guide roll 71.

It will be seen that the web is subjected to suction areas 61 and 69 only at the point of pressure nip contact of the rolls 58, 59 and 60, while the press felts 56-66 are each subjected to the entire suction areas of the rolls, respectively. In this manner, the pores of the felts are opened for drying at the suction areas and for subsequent air drying of the felts on the return passage of the felts about their respective guide rolls to the suction nips.

In the embodiment shown in Figure 5A, the forming wire 10 is on a cylinder mold M rotatably mounted in a vat V of a cylinder type paper making machine and the web W is couched off of the mold wire 10 onto the bottom face of a conventional pick-up felt P. U. by the couch roll C of the machine. The pick-up felt carries the web straight through a suction press 72 having a plain top roll 72a and a bottom suction roll 72b defining a horizontal suction nip 73. A suction area 72c defined by a gland in the suction roll 72b extends through and beyond both sides of the nip 73. A cover felt C. F. is lapped around the suction area 72c of the roll 72b but contacts the web W only in the nip 73 so that the suction area portions extending beyond both sides of the nip area are covered by the cover felt C. F. only. A guide roll G₁ receiving the felt C. F. thereover at a level below the suction roll 72b directs the felt into lapping relation with the top portion of the suction roll 72b ahead of the nip 73 while a guide roll G₂ on the other side of the nip receives the felt C. F. thereunder to lap the felt around the off-going side of the suction area of roll 72b. The felt C. F. extends upwardly from the roll G₂ to a roll G₃ spaced in front of a suction drum press 74 consisting of a plain top roll 74a and a suction drum roll 74b with a wide-mounted suction gland defining an extended suction area 74c around the ascending side and top of the drum roll.

The pick-up felt P. U. with the web W on the underface thereof, after passing through nip 73, is lapped around the underside of a guide roll G₄ to be directed onto the ascending side of the drum roll 74b for covering the suction area 74c. The cover felt C. F. then contacts the web W as the web enters into the suction nip of the drum press 74 on the pick-up felt after both the web and pick-up felt have been treated by suction from the portion of the suction area 74c in advance of the suction nip. After passage through the nip of the drum press, the cover felt is trained back to the guide roll G₁ while the pick-up felt is trained back to the couch roll C. The cover felt has runs of appreciable length between contacts with the web.

In the embodiment of Figure 5A, the freshly formed wet web from the cylinder machine is conveyed hori-

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zontally on the underside of a pick-up felt straight through the horizontal nip of a suction press and is covered by a cover felt in the nip. The cover felt is guided around the suction roll of the press to be treated by suction both before and after contact with the web in the nip so that air will be pulled through the felt as shown by the arrows. The felt will be opened up and dewatered for better absorption of water from the web. The web and pick-up felt, after treatment in the horizontal nip of the suction press, are then lapped around the suction area of the drum press. The cover felt, after suction treatment on the off-going side of the horizontal nip of the suction press, then recontacts the web at the suction nip of the drum press to again cover the web as it passes through a suction nip. A single cover felt therefore contacts the web at several nips, but only after being treated alone by suction adjacent one of the nips. This arrangement greatly increases the drying capacity of the drum press and suction press combination.

In that form of the invention shown in Figure 6 there is illustrated a double suction press assembly including an upper suction roll 75 and a lower suction roll 76 defining a double suction press nip 77. The upper press roll 75 is positioned within the loop of a pick-up felt 78 carrying on its undersurface a moist paper web W, the felt and the web lapping a suction area 79 of the roll 75. The lower suction press roll 76 is provided with an arcuate suction area 80 which is completely lapped by the bottom press felt 81.

The bottom press felt 81 contacts the web W only at the point of mechanical nip pressure, that is, at the nip proper of the press assembly defined by the rolls 75 and 76. The felt 81, however, laps the entire arcuate area 80 of the roll 76, the felt being subjected to suction on both the on-coming and off-going sides of the nip 77. The suction exerted on the felt in advance of the nip 77 draws air into the suction area 80 through the felt 81, thereby removing moisture squeezed from the web and the upper felt 78 at the nip and any residual surface moisture from the web W. That portion of the suction area 80 effective on the off-going side of the nip 77 opens the pores of the bottom felt 81 to effectuate the removal of residual moisture from the felt and to promote later air drying of the felt as it is trained about its guide rolls for subsequent re-passage through the nip 77. Thus, the present invention is effective to dry the lower press felt, even though the web W is confined between a pair of felts 78 and 81 as it passes through the nip 77.

In another form of the invention shown in Figure 7, reference numeral 10 again refers to a foraminous Fourdrinier type of web forming surface wrapped about a suction couch roll 11. The web W is removed from the wire 10 by means of a pick-up felt 83 lapped about a suction pick-up roll 84 to contact the web W to remove the same from the wire 10. Felt 83 then passes through a nip 85 of a conventional plain press assembly defined by an upper press roll 86 and a lower press roll 87, the latter roll being lapped by a press felt 88.

After passing through the press nip 85, the web W, still carried by the felt 83, is trained about a guide roll 89 to a suction press roll 90 defining a press nip 91 with a heated "Yankee" drier drum 92. The press roll 90 is provided with a suction area 93 cooperating with the drier drum 92 to provide a suction press at the nip 91 of which the web W is transferred to the surface of the drum 92. The web W is carried by the drum 92 for removal therefrom by means of a doctor blade 94, after which the web is passed about a web guide roll 95 for further processing.

A second suction press roll 96 is positioned adjacent the drive drum 92 beyond the press roll 90. The roll 96 is provided with an arcuate suction area 97 positioned at the nip 98 defined by the roll 96 and the drier drum 92. A felt 99 is guided by a plurality of guide rolls 100 about the roll 96 to lap the entire arcuate suction area 97 thereof. It will be seen that the felt 99 contacts the web W only as it is supported by the surface of the drier drum 92 and that the only actual contact between the web and the felt 99 occurs at the pressure nip defined by the rolls 96 and 92.

It will also be appreciated that the felt 99, being lapped about the entire suction area 97 of the roll 96, is dried by the passage of air into the suction area 97. The further drying of the web W, in addition to that drying

effect exerted by the relatively dry felt 99 and the suction area 97, is accomplished by the pre-heating of the web at the surface of the drum 92. At the time the felt 99 contacts the web W, the web W has been pre-heated on the drum 92, so that a freer web W is presented to the drum, thereby causing improved water removal.

The application of the concept of the present invention to the drying of a web passing through a paper machine drying section is shown in Figure 8 in which the web W is conveyed through a conventional drier section 110 by upper and lower felts 111 and 112, respectively, partially lapped about upper and lower rows of drier drums 113—114, respectively. In this form of the invention, the lower felt 112 is lapped about a pair of guide rolls 115 to remove the felt 112 from contact with one of the lower drier drums 114. The one lower drier drum 114 conveying the web thereabout cooperates with a suction press roll 118 having a press felt 116 trained thereabout by a plurality of felt guide rolls 117. The superimposed rolls 114 and 118 thus define a suction press nip 120.

Here, again, the press felt 116 laps the entire arcuate suction area 119 of the roll 118, while the web W contacts the felt 116 only at the point of pressure contact between the roll 118 and the associated drum 114. Thus, the felt is dried by the passage of air therethrough into the suction gland at both the on-coming and off-going sides of the nip 120, so that the felt is again dried to improve the water removal characteristics thereof.

It will thus be seen that the present invention provides means for improving the desired drying characteristics of the paper machine press felt. This improvement in the drying characteristics is accomplished by increasing the moisture absorption potential of the felt, rather than as previously attempted by increasing either the suction exerted upon the sheet or the mechanical pressure exerted thereon.

In accordance with the principles of the present invention, a press felt and a paper web are each guided through a suction press nip. However, the felt and the web are separately guided through the nip so that contact of the web with the felt occurs only at the actual pressure nip of the press. The press felt is lapped about the entire suction area which extends on both the on-coming and off-running sides of the press nip. On the on-coming and off-running sides of the nip, the felt is not covered with the web, so that the suction area is effective to draw air through the felt into the suction area.

This passage of air through the felt into the suction area accomplishes several immediate results which increase the drying efficiency of the felt. First, on the on-coming side of the nip, water squeezed from the web and the felt of the pressure nip accumulates ahead of the nip, and suction through the felt removes this water by passage under differential air pressure into the interior of the suction area. Also, the felt itself is subjected to a final drying action so that it is substantially free of water prior to its contacting the web at the pressure nip. Further, the felt pores are open immediately prior to the contacting of the felt with the web at the nip so that a freer felt is presented to the web at the pressure nip.

On the off-going side of the pressure nip, the felt is again subjected to suction drawing atmospheric air through the felt into the suction area of the suction press roll. This suction effect again serves to remove residual moisture from the felt and to remove free lignin and pulp particles from the felt pores. In addition, the felt pores are again opened which serves an important purpose inasmuch as the felt is normally compacted and the pores clogged by passage of the felt through the pressure nip. This opening of the felt pores increases surface drying of the felt upon exposure to the circumambient atmosphere during its passage about the associated felt guide rolls to its next pass through the pressure nip.

The effect of the subsection of the felt alone to suction both in advance of and immediately in rear of the pressure nip results in an increase in the moisture absorption efficiency of the felt. This increase in absorption efficiency facilitates the more ready removal of moisture from the felt, the presentation of a dryer felt to the web, and the more efficient air drying of the felt after its passage through the pressure nip.

It will be understood that modifications and variations

may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A paper machine suction press comprising a pair of cooperating press rolls defining a pressure nip therebetween lying in a plane generally tangential to both said rolls, at least one of said rolls being a suction roll having a suction area straddling said nip, an endless felt trained through the nip of said press and completely lapping the suction area of said suction roll, and guide rolls positioned on the side of said plane opposite said suction roll and adjacent the other of said press rolls for guiding a moist paper web through said nip and said guide rolls being positioned sufficiently far on the side of said plane opposite said suction roll to maintain the felt uncovered by the web for most of its run over the suction area on both the on-coming and off-going sides of said nip, said web contacting said felt only at said nip intermediate that portion of said felt lapping the suction area of said one roll, whereby said felt is dried by said suction area both immediately before and immediately after contacting said felt with said web.

2. A paper machine suction press assembly comprising a central plain press roll, a pair of suction press rolls on diametrically opposed sides of said plain central press roll cooperatively defining successive pressure nips therewith each lying in a plane generally tangential to the two rolls defining such nip, each of said suction press rolls having a suction area straddling its respective pressure nip, a press felt trained about each of said suction press rolls for completely lapping the suction area thereof, and guide means positioned on the plain roll side of both said planes for guiding a moist paper web into contact with said plain central roll for conveyance thereby through said successive pressure nips, said guide means being positioned sufficiently far on the plain roll side of both said planes to maintain the felt uncovered by the web for most of its run over each suction area on both the on-coming and off-going sides of each nip, said web contacting said press felt only at said nips and said press felt being dried by said suction areas both before and after contact with said web at the nips.

3. A paper machine suction press assembly comprising a pair of suction press rolls cooperatively defining a press nip therebetween lying in a plane generally tangential to both of said rolls, a suction area in each of said rolls, each straddling the press nip, press felts lapping each of said suction areas, a moist paper web carried by one of said felts for passage through said nip, guide means positioned on one side of said plane associated with the felt carrying the paper web for effecting separation of the felt carrying the web from the other felt before and after passage of said felts through said nip, the other of said felts contacting said web only at said nip and being dried by the associated suction area before and after contact with said web, said guide means being positioned sufficiently far on said one side of said plane to maintain said other of said felts uncovered by the web for most of its run over the suction area on both the on-coming and off-going sides of said nip.

4. In a paper machine drier section, a heated drier drum having a paper web lapped thereabout, a suction press roll cooperating with said heated drier drum to define a press nip therebetween lying in a plane generally tangential to said drum and said roll and having a suction area extending on both the on-coming and off-going sides of said press nip, guide means on the drier drum side of said plane guiding the paper web travel to effect the lapping thereof about said drier drum and a press felt trained about said press roll and completely lapping the suction area thereof for passage through said nip, said press felt contacting said web at said nip only and the felt alone being subjected to suction by said suction area on both the on-coming and the off-going sides of said nip for drying said felt, said guide means being positioned sufficiently far on the drier drum side of said plane to maintain said press felt uncovered by the web for most of its run over the suction area on both the on-coming and off-going sides of said nip.

5. A straight through reverse suction press assembly for a paper making machine which comprises a first press including a plain top roll and a bottom suction roll together defining a substantially horizontal nip, a first press felt having a substantially horizontal top run trained through said substantially horizontal nip of the first press for conveying a wet web of paper through the press in

contact with the plain press roll thereof, means for stripping said wet web from said first press felt beyond said first press, a second suction press including a plain bottom roll and a suction top roll together defining a substantially horizontal nip therebetween, said suction roll of said second press having a suction gland defining a suction area extending continuously from a point in advance of the oncoming side of the nip to a point beyond the offgoing side of the nip for providing a continuous suction nip with suction zones both in advance of and beyond the nip, a second press felt on said top suction roll of the second press lapping the entire suction area of said second suction press and compressively loaded in said nip by said bottom plain roll of said second suction press, means for lapping the paper web stripped from said first press felt on the plain roll to pass through the nip of the second press on the plain roll of the second press from a point in advance of the nip to a point beyond the nip thereof, said means holding the web in spaced relation from said suction zones to contact the second felt only in said nip of the second press and to leave the felt uncovered along said suction zones, said means being positioned sufficiently far beneath a horizontal plane through the nip of said second suction press to maintain the felt uncovered by the web for most of its run over the suction area of the top suction roll of said second suction press on both the on-coming and off-going sides of the nip, and an exhaust outlet for evacuating the suction area of the top suction roll of said second press to evacuate the nip and pull air from the atmosphere through the uncovered second felt along said suction zones.

6. An upside down suction press which comprises a lower plain roll, an upper suction roll, said upper suction roll having a perforated cylindrical shell in pressure nip defining relation with the periphery of the plain roll, a suction gland in said shell defining a suction area opening downwardly and extending along the lower portion of the shell from a point in advance of the oncoming side of the nip through the nip to a point beyond the offgoing side of the nip for providing a continuous suction nip with suction zones on the shell both in advance of and beyond the nip, a press felt on the shell lapping the entire suction area and compressively loaded in said nip by said plain roll, means for lapping a paper web on the plain roll to pass through the nip on the plain roll from a point in advance of the nip to a point beyond the nip, said means holding the web in spaced relation from said suction zones to contact the felt only in said nip and leave the felt uncovered along said suction zones, said means being positioned sufficiently far beneath a plane through said nip and generally tangential to both said rolls to maintain the felt uncovered by the web for most of its run over the suction zones on both the on-coming and off-going sides of said nip, and an exhaust outlet for evacuating said suction gland to evacuate the nip and pull air from the atmosphere upwardly through the uncovered felt along said suction zones for creating an air lift for water squeezed from the web.

7. A paper machine suction press assembly comprising a pair of adjacent press rolls cooperatively defining a pressure nip therebetween lying in a plane generally tangential to both said rolls, one of said rolls being a plain roll and the other of said rolls being a perforated suction roll having a suction area straddling and extending beyond both sides of the nip and extending through said nip, a press felt lapping the entire suction area of said suction roll and compressively loaded in said pressure nip, guide means positioned on the side of said plane opposite said area straddling both sides of the press nip guiding a moist paper web into contact with said plain roll in advance of the nip for conveyance thereon through said nip and beyond the nip for contact with said felt in the nip only at the point of pressure

loading exerted by said rolls, said guide means being positioned sufficiently far on the side of said plane opposite said area to maintain the felt uncovered by web for most of its run over the suction area on both the on-coming and off-going sides of said nip, and means for pulling air from the atmosphere directly through the felt immediately adjacent both sides of the loaded portion of the nip to minimize the pressure differential between the oncoming and offgoing sides of the nip and thereby reduce the flow of water through the nip while simultaneously drying the felt and draining the perforated suction roll.

8. A paper machine suction press comprising a pair of adjacent press rolls cooperatively defining therebetween a pressure nip lying in a plane generally tangential to both said rolls, one of said rolls being a suction roll with a suction gland disposed therein and defining a suction area extending through and beyond the pressure nip on both the on-coming and off-going sides of said nip, a porous press felt lapping said suction roll and overlying the entire suction area thereof, and means positioned on the side of the plane opposite said suction roll holding a moist paper web against the other of said rolls both before and after the nip for passage through said nip on said other roll and for contact with said felt only at said nip, said means being positioned sufficiently far on the side of the plane opposite said suction roll to maintain the felt uncovered by the web for most of its run over the suction area on both the on-coming and off-going sides of said nip, whereby the suction effect of said suction area is exerted solely on said felt on both the on-coming and off-going sides of said nip to pull the air directly from the atmosphere through the felt into the suction gland of said suction roll.

9. In a paper machine suction press, including an upper plain press roll and a lower suction press roll cooperatively defining therebetween a pressure nip lying in a generally horizontal plane, a suction area in said suction roll extending on both the oncoming and off-going sides of said pressure nip, a press felt lapped about the suction area of said suction roll, first guide means positioned below said plane at the offgoing side of said pressure nip for directing said press felt away from a moist paper web at the offgoing side of said pressure nip, and second guide means positioned sufficiently far above said horizontal plane to maintain the felt uncovered by the web for most of its run over the suction area on both the oncoming and offgoing sides of said nip, said second guide means being positioned above said horizontal plane for directing the moist paper web into contact with said plane press roll for conveyance thereby through said nip, said web contacting said felt only at said nip, and said suction area subjecting said felt alone to suction on both the oncoming and offgoing sides of said nip to dry the felt before and after its contact with the web.

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