Jan. 20, 1959 L. HORNBOSTEL ET AL 2,869,437

PAPER MACHINE PRESS SECTION

Filed Sept. 15, 1955 3 Sheets-Sheet 1

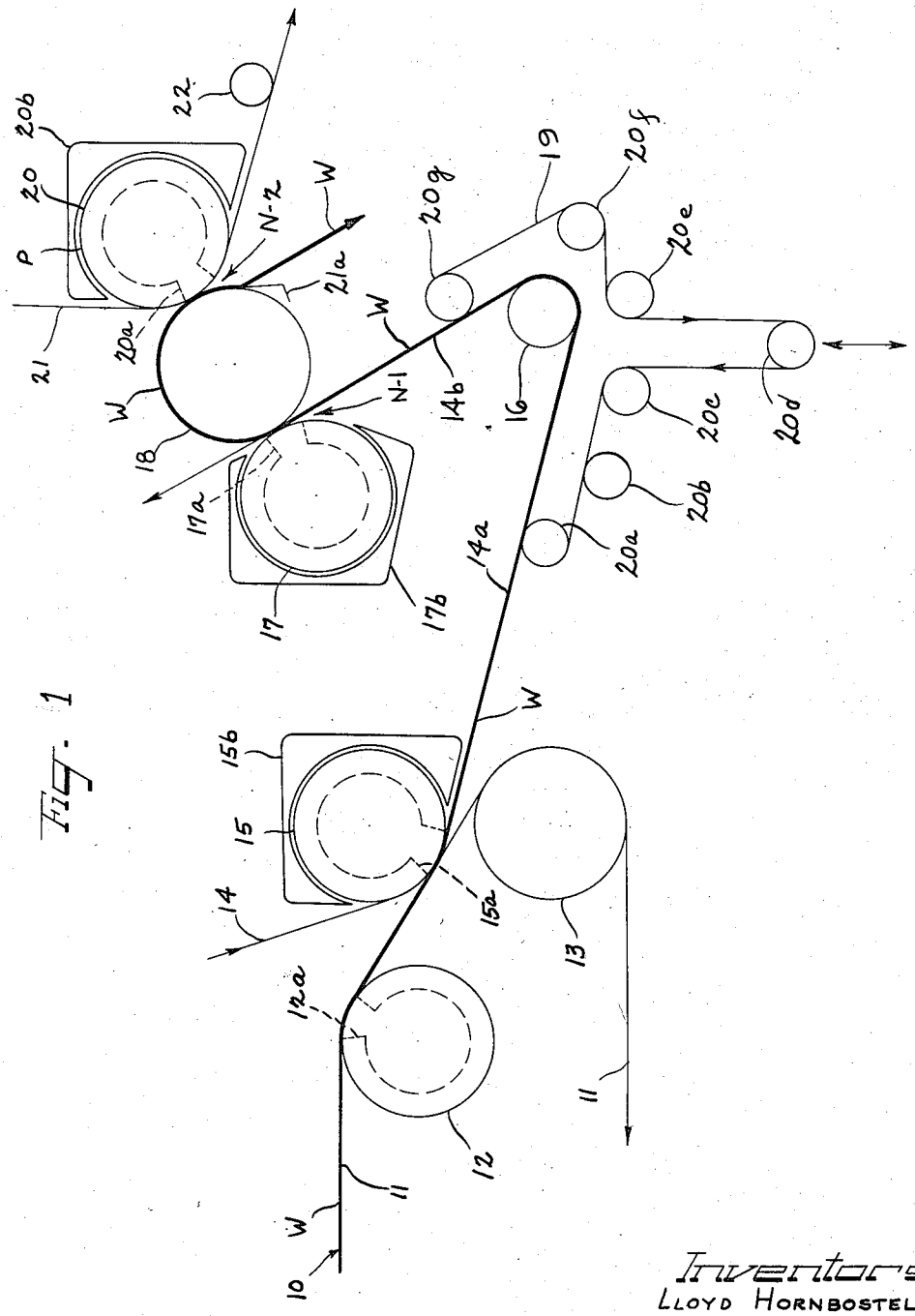


Fig. 1

Inventors
LLOYD HORNBOSTEL
EDWARD D. BEACHLER
DONALD A. ELY

By Lee, Sherman, Meroni, Gress & Kinyon Attys.

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PAPER MACHINE PRESS SECTION

Filed Sept. 15, 1955 3 Sheets-Sheet 2

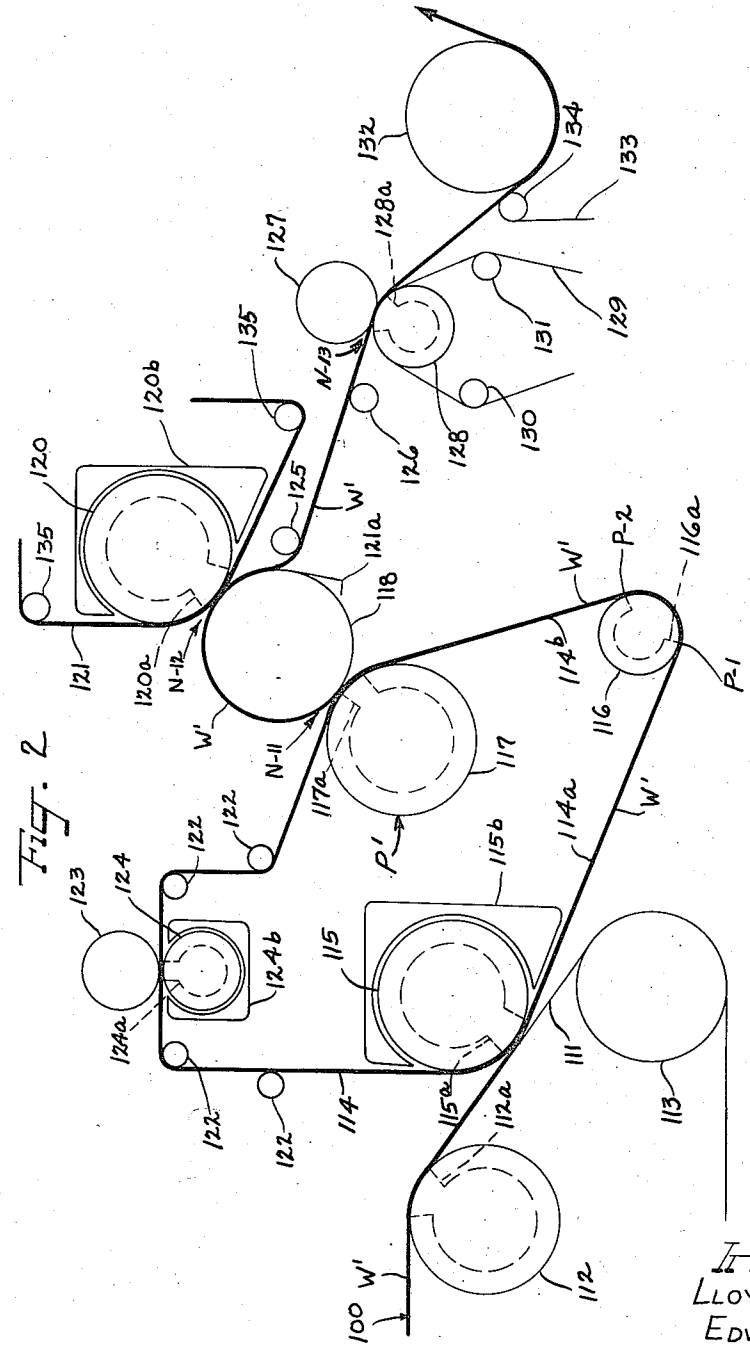


Fig. 2

Inventors
LLOYD HORNBOSTEL
EDWARD D. BEACHLER
DONALD A. ELY

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

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PAPER MACHINE PRESS SECTION

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Fig. 3

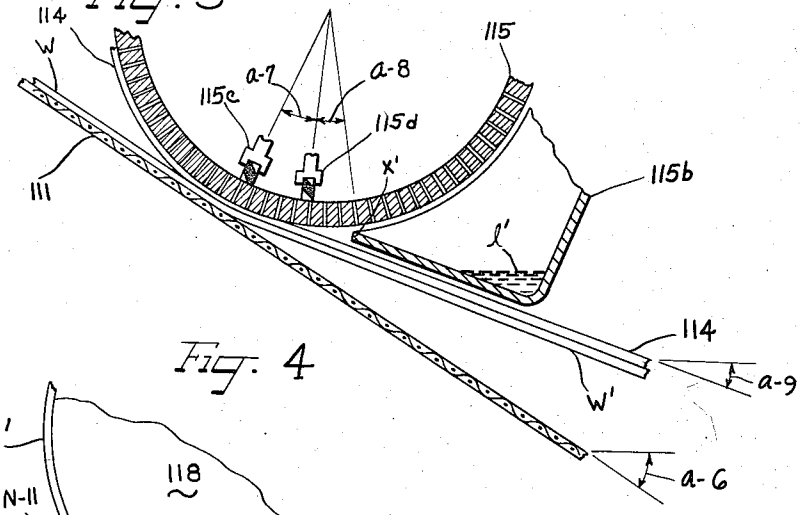


Fig. 4

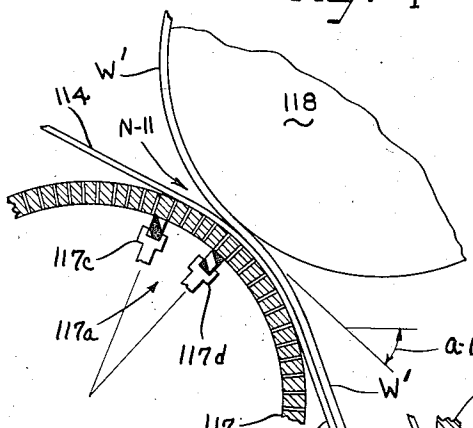
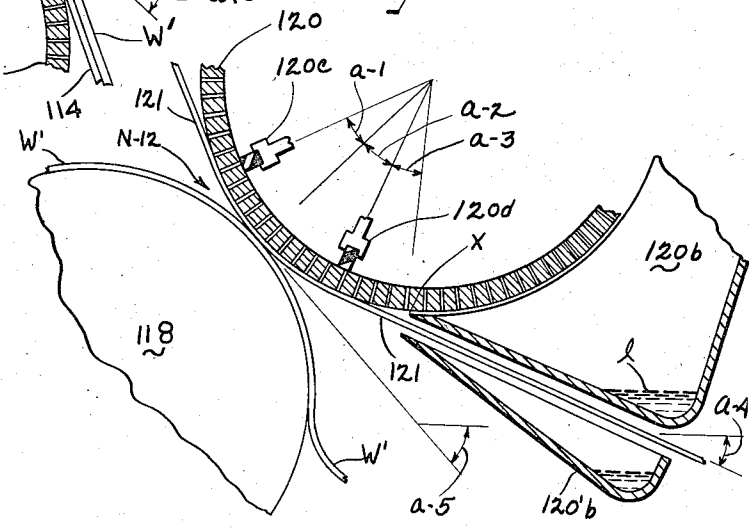


Fig. 5



Inventors
LLOYD HORNBOSTEL
EDWARD D. BEACHLER
DONALD A. ELY

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

United States Patent Office

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PAPER MACHINE PRESS SECTION

Lloyd Hornbostel, Edward D. Beachler, and Donald A. Ely, Beloit, Wis., assignors to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin

Application September 15, 1955, Serial No. 534,442

21 Claims. (Cl. 92—49)

This invention relates to a paper machine press section which conveys a freshly formed moist web of paper from its forming surface or forming wire to one or more presses, and more particularly, to a method and apparatus for conveying the web from the forming surface to a suction press without any open draws.

In the earlier paper machine arrangements, the web was ordinarily taken from the forming surface over an open draw (i. e. an unsupported reach of the web) and then placed on top of a felt which fed the web through a first press defined by an upper bare roll and a lower suction roll. More recently, the suction pickup arrangement has been developed and this involves a looped pickup felt with a suction pickup roll within the loop which urges the felt against the forming wire to pick up the web therefrom and guide the web along the underside of the felt to a first press. This first press involves an upper plain roll within the loop of the suction pickup felt and a lower suction roll within the loop of a second felt which ultimately receives the paper web to lead the same on through the machine. The suction pickup arrangement permits the use of much greater operating speeds in the machine with better efficiency, since the breaks in the web at open draws are minimized.

The instant invention is an improvement over the suction pickup arrangement hereinbefore described in that it permits still greater operating speeds and machine efficiency, plus the production of a uniquely uniform smooth web. For one thing, the instant arrangement involves the suction pickup roll and looped felt and it permits the use of the looped felt both as a pickup felt and a press felt by positioning a suction press roll within the loop of this felt. The suction press roll defines a first press nip with a bare or plain-surfaced roll which in turn defines a second press nip with another felt covered suction roll. In this way the wire side or bottom side of the web is subjected first to two successive presses against a plain-surfaced roll. Heretofore the wire side of the web was not subjected to a bare roll in a press at all, or not until later on in the press section when the web was substantially dryer and it could not be as effectively pressed to eliminate wire marks. In the instant arrangement, however, the wire side of the wet web is pressed by a bare roll at both the first and the second press nips through which the web passes and the wet web is guided from the forming wire to the first press without an open draw.

As an additional important feature of the instant invention it will be noted that the felt run from the suction pickup roll is downwardly inclined. This is an important feature affording a distinct advantage because the downwardly inclined felt traveling away from the suction area of the suction pickup roll (particularly if the save-all pan is positioned at the offrunning side) does not receive water thrown from the perforations of the suction pickup roll by centrifugal force. The suction pickup felt is thus not subjected to the addition of water and in the next treatment thereof a suction box on the felt side draws water from the web through the felt. The instant

arrangement avoids the necessity of drawing water from a felt and through the web at any point in the operation of the presses.

Another feature of the instant invention involves the positioning of a guide roll between the suction pickup roll and the first suction press roll about which the guiding suction pickup felt is lapped. As will be appreciated, the on-coming and off-running reaches of a felt lapped over a guide roll cannot define an angle greater than 180°, or the felt will not be lapped over or supported by the guide roll. The web is, of course, carried on the side of the felt opposite that engaging the guide roll so that the web is actually urged away from the felt at the guide roll by centrifugal forces if a change in direction of the web around the guide roll is desired. For this reason earlier paper machine structures have been laid out so as to avoid abrupt changes in direction; but the instant arrangement takes advantage of an abrupt change in direction and overcomes any difficulties which might otherwise be involved by providing means for preventing the web from being separated from the felt when passing over the guide roll.

It is, therefore, an important object of the instant invention to provide an improved method and apparatus for de-watering a paper web in the press section of a paper machine.

It is a further object of the instant invention to provide an improved method and apparatus for conducting a wet web through a portion of a paper machine press section without an open draw, and pressing the wire side of the web against a bare roll at successive press nips in order to substantially eliminate wire marks. It is also an object of the instant invention to provide an improved method of guiding a paper web carried on a felt lapped-over guide roll.

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:

Figure 1 is a diagrammatical view of a paper machine press section embodying the instant invention;

Figure 2 is a diagrammatical view of another paper machine press section embodying the instant invention;

Figure 3 is a fragmentary detail view of the suction pickup assembly of Figure 2;

Figure 4 is a similar view of the first suction press roll in Figure 2; and

Figure 5 is a fragmentary detail view of the uppermost press roll shown in Figure 1.

As shown on the drawings:

The paper machine, indicated generally by the reference numeral **10**, shown in Figure 1, comprises a looped forming wire **11** whereon the web W is formed and the forming wire **11** travels over a suction couch roll **12** with suction area **12***a* for de-watering the web W then around a turning roll **13** to reverse the direction of the forming wire **11**.

In the instant paper machine **10** there is provided a looped pickup and press felt **14**, a suction pickup roll **15** (with suction area **15***a* and an appropriate save-all **15***b*) within the loop of the pickup felt **14** urging the pickup felt **14** against the web W on the forming wire **11** (between the couch roll **12** and the turning roll **13**, where it is inclined downwardly about 35° from horizontal) to pick up the web and transfer the web W to the underside of the pickup felt **14**. A guide roll **16** is mounted (beneath and ahead of the suction roll **15** in the direction of web travel) within the loop of the pickup felt **14** and cooperates with the suction pickup roll **15** to define a first generally horizontal or forwardly extending reach **14***a* of the pickup felt **14** therebetween. The

first reach **14***a* is sloped downwardly slightly (i. e. about 15° from horizontal) in the direction of felt travel and this reach **14***a* engages the top side of the web W and supports the web from above down as far as the guide roll **16**.

Above the guide roll **16** a press, indicated generally by P, is suitably mounted. The press P comprises a pair of press rolls **17** and **18** defining a press nip **N–1** therebetween. Suction press roll **17** is above and behind the guide roll **16**; and bare press roll **18** is above and ahead of suction press roll **17** (in the direction of web travel). The press nip **N–1** is generally vertically aligned (actually upwardly inclined about 60° from horizontal) and it is aligned angularly with respect to the first reach **14***a* of the felt **14**. A second reach **14***b* of the felt **14** is aligned generally with the press nip **N–1** and extends therefrom to the guide roll **16**. Actually, the first reach **14***a* and the second reach **14***b* define an angle of approximately 45°, although an advantageous feature of the instant invention permits the reaches **14***a* and **14***b* to define an angle of approximately 30 to 80°, whereby the felt **14** is autually reversed in direction as it guides the web W from the forming wire **11** to the first press nip **N–1**.

As will be noted, the first press nip **N–1** is defined by a suction roll **17** having a suction area **17***a* at the oncoming side of the nip **N–1** and a plain roll **18** outside of the felt loop. The suction roll **17** is within the felt loop and is generally below the nip **N–1**, so as to permit free flow of water from the press nip **N–1** downwardly and generally in the direction of the suction area **17***a*. As will be appreciated, the suction area **17***a* cannot be operated easily if the suction roll is above the press nip rather than below the press nip, or in other words, if the suction roll **17** is above the press nip and the plain roll **18** is below the press nip, because pickup of water through the suction area **17***a* is additionally complicated by the tendency of the water to flow downwardly away from the suction area in such an arrangement. The instant invention affords a particular advantage in this respect, in that the invention permits the complete reversal of the travel of the web W on the felt **14** so that the felt **14** which initially engages the top of the web on the forming wire **11** and supports the web from above during the initial reach **14***a* can function to support the web W from below at the first press nip **N–1**.

At the first press nip **N–1** the web W is still quite wet and a substantial amount of water is removed therefrom, thus resulting in adherence of the wet web to the plain-surfaced roll **18** at the offrunning side of the nip **N–1**. The suction area **17***a* preferably does not extend beyond the nip **N–1** so that it will not serve to cause the web W to tend to remain on the felt **14** at the offrunning side of the nip **N–1**. This lack of suction plus the tendency of a partially dried web to adhere to the plain surface of the roll **18** will permit the web W to remain on the surface of the roll **18** and travel therewith.

The reversal of direction of the web W in passing around the guide roll **16** is, however, a different matter. For this reason, means associated with the guide roll **16** and felt **14** for holding the web W on the felt **14** as it travels around the guide roll **16** are provided in the form of a traveling second felt **19** which covers the web W on the first felt **14** around the first guide roll **16**. The traveling second felt **19** is mounted on guide rolls **20***a*, **20***b*, **20***c*, **20***d*, **20***e*, **20***f*, and **20***g*. Guide roll **20***d* is also a tensioning roll as the two-headed arrow indicates and this roll **20***d* is employed to obtain the desired tension on the felt **19**. One of the guide rolls, namely the roll **20***a* is lapped by the felt **19** and urges the felt **19** against the bottom of the forwardly extending reach **14***a* of the first felt **14** to retain the web W thereon and still another guide roll **20***g* lapped by the felt **19** urges the felt **19** against the uprunning reach **14***b* of the first felt **14** to retain the web W thereon. It will be seen that the guide rolls **20***a* and **20***g* are positioned closely adjacent the first (**14***a*) and second (**14***b*) reaches of the pickup felt **14** to urge the felt **19** against the web guided by the pickup felt **14**. The web W is thus supported by both felts **14** and **19** when its direction of travel is substantially reversed at the guide roll **16**.

The accomplishment of the reversal in direction of the web W while protecting and guiding the same with felts is very important. By "reversal" of the web W is meant abruptly changing the travel of the web from its original direction to a second direction which forms an angle of 90° or less with the initial direction of travel. Actually, the reversal in direction preferably creates an angle of about 45° between the initial direction of travel and the reversed direction of travel so that the suction roll **17** may be conveniently positioned above and behind the guide roll **16** but in a generally compact relationship with respect to the guide roll **16**, the suction pickup roll **15** and the other elements of the paper machine generally included within the loop of the suction pickup felt **14**. This arrangement also permits the use of a single felt **14** at the suction pickup as well as the first suction press nip **N–1**.

As previously mentioned, the web W transfers to the plain surface of the roll **18** at the first press nip **N–1** and continues on the surface of the roll **18** through a second press nip **N–2** defined with another roll **20** (above and ahead of the plain roll **18**) and the web W is ultimately removed from the plain-surfaced roll **18** by a doctor **21***a* as indicated in the drawing. The nip **N–2** is downwardly inclined (about 80° from the horizontal) as shown in the drawing, and the suction area **20***a* of the roll **20** is arranged so as to straddle the nip area of the second nip **N–2**. In this arrangement the suction area **20***a* extends an appreciable distance on the oncoming and on the offrunning side of the nip **N–2** and the suction area **20***a* of the roll **20** is completely covered by a press felt **21** so that contact between the press felt **21** and the web W is made only at the nip area. The amount of felt covered suction area **20***a* at both the oncoming and the offrunning sides of the nip **N–2** is at least equal to the nip area and preferably is two or three times greater than the nip area. In other words, the nip area or actual pressure area in the nip **N–2** whereat the web is actually pressed against the felt **21** may be a given length of perhaps one inch (peripherally), whereas the suction area covered by the felt **21** will extend on the oncoming side two, three or more inches from the actual nip area, and the suction area on the oncoming side is completely covered by the felt **21** at all times. In like manner, the suction area will extend two or three inches beyond the actual nip area at the offrunning side and will be entirely covered with the felt **21**. This permits drying of the felt **21** and opening of the pores thereof at both sides of the nip so as to greatly improve the ability of the suction area **20***a* to dewater the web and remove water accumulating at the nip **N–2**. Also, the separation of the web W (adhering to the plain surface roll **18**) and the felt **21** immediately at the offrunning side of the nip **N–2** serves to break a vacuum which tends to develop between the web W and the felt **21** and thus prevent a tendency to draw water through the nip **N–2**. The suction rolls **17** and **20** are also equipped with save-alls **17***b* and **20***b*, respectively.

It will also be noted that the felt **21** passes under a guide roll **22** in a downwardly inclined plane (i. e. about 15° below horizontal).

Referring to Figure 2, it will be seen that the reference numeral **100** indicates generally a paper machine comprising a looped forming wire **111** whereon the web W′ is formed and the forming wire **111** travels over a suction couch roll **112** with suction area **112***a* for dewatering the web W′ and then around a turning roll **113** to reverse the direction of the forming wire **111**.

In the machine **100**, there is provided a looped pickup and press felt **114**, a suction pickup roll **115** (with suction area **115***a* and a save-all pan **115***b*) within the loop of

the pickup felt 114 urging the pickup felt 114 against the web W' on the forming wire 111 to transfer the web W' to the underside of the pickup felt 114, and a guide roll 116 within the loop of the pickup felt 114 and cooperating with the suction pickup roll 115 to define a downwardly inclined reach 114*a* of the pickup felt 114. The reach of the forming wire 111 contacted by the pickup felt 114 is downwardly inclined about 35° from horizontal and the first felt reach 114*a* of the pickup felt 114 is downwardly inclined about 22° in the direction of felt travel or the direction of web travel.

Above the guide roll 116 there is positioned a reverse press, indicated generally by P' and the press P' comprises a first suction press roll 117 presenting a suction area 117*a* within the loop of the pickup and press felt 114, a plain-surfaced or bare roll 118 defining a first press nip N–11 with the first press roll 117, a press felt 121, and a second suction press roll 120 with a suction area 120*a* within the loop of the press felt 121 defining a second press nip N–12 with the plain-surfaced roll 118. The press nip N–11 extends upwardly (being upwardly inclined from the horizontal about 35°) and it is aligned angularly with respect to the first reach 114*a* of the felt 114. A second reach 114*b* of the felt 114 extends upwardly to the press nip N–11 (being inclined about 83° from the horizontal) to guide the web W' from the guide roll 116 upwardly to the nip N–11. Here the first reach 114*a* and the second reach 114*b* define an angle of approximately 60°.

The first press nip N–11 is defined by a suction roll 117 having its suction area 117*a* at the oncoming side of the nip N–1 (and positioned above and behind the guide roll 116) and a plain roll 118 outside of the felt loop (and positioned above and ahead of the suction roll 117). The pickup felt 114 is also mounted on suitable guide rolls 122, 122 and the felt 114 is continuously passed through a dewatering press defined by an upper bare roll 123 and a lower suction roll 124 with appropriate suction area 124*a* and save-all pan 124*b*.

At the first nip N–11 the wet web W' is pressed against and caused to adhere to the plain-surfaced roll 118. The wet web W' continues to adhere to the plain-surfaced roll 118 at the offrunning side of the nip N–11 and passes on through the second nip N–12.

As mentioned previously, the wet web adheres well when pressed against a plain-surfaced roll, but it does not ordinarily adhere well to a felt at least during a reversal of direction of the felt. In this instance, the suction pickup felt 114 is substantially reversed in direction around the guide roll 116 and means are provided for causing the wet web W' to adhere to the felt 114 as it is reversed in direction around the guide roll 116. Such means in this case include a suction gland 116*a* in the guide roll 116 which extends from approximately the point of contact *p*–1 between the felt 114*a* and the roll 116 at the oncoming side to the point of contact *p*–2 between the felt reach 114*b* and the roll 116 at the offrunning side. In this way the suction forces applied to the suction area 116*a* serve not only to assist in further dewatering of the felt and the web but also to retain the web W' on the felt 114. It will be noted in this arrangement that water is not drawn from a felt through the web, but rather from the web W' through the felt 114. Because of the simplicity of operation and the added dewatering effect obtained (without the necessity for employing a press) the suction gland 116*a* affords a preferred means for retaining the web W' on the felt 114 lapped about the guide roll 116, but it will be noted that the guide felt 19 of the embodiment 10 also assists in dewatering the web.

As previously mentioned, the web W' transfers to the plain surface of the roll 118 at the first press nip N–11 and continues on the surface of the roll 118 through a second press nip N–12 defined with another roll 120 (above and ahead of the plain roll 118) and the web W' is ultimately removed from the plain-surfaced roll 118 by a doctor 121*a* as indicated in the drawing. Actually, the doctor is used primarily to dispose of "broke" during machine startup and once the machine has been started up the web W' is sufficiently self-sustaining to strip itself from the plain-surfaced roll 118 and pass over the guide rolls 125 and 126 and through a third nip N–13 defined by an upper plain-surfaced roll 127 and a lower suction roll 128 wrapped by a felt 129 mounted on guide rolls 130 and 131. The suction roll (equipped with a suction area 128*a*) defines with the bare roll 127 a press nip N–13 whereat the top side of the felt is exposed to a bare surfaced roll. From the nip N–13 the web W' passes downwardly to the dryer system indicated by the dryer roll 132, felt 133 and guide roll 134 in the usual manner. The press defined by the rolls 127 and 128 can, of course, be employed in the embodiment 10 after the second press nip N–2 in the manner herein described.

It is important, however, to note that the second nip N–12 is downwardly inclined (about 35° from the horizontal) as shown in the drawing, and the suction area 120*a* of the roll 120 is arranged so as to straddle the nip area of the second nip N–12. As in the previous arrangement for the suction area 20*a*, the suction area 120*a* extends an apreciable distance on the oncoming and on the offrunning side of the nip N–12 and the suction area 120*a* is completely covered by the press felt 121 so that contact between the press felt 121 and the web W' is made only at the nip area. The amount of felt covered suction area 120*a* at both the oncoming and the offrunning sides of the nip N–12 is at least equal to and preferably greater than the actual nip or pressure area. In actual practice it is two to about ten times greater than the nip area (on each side). The felt 121 at the offrunning side of the nip N–12 is looped about a guide roll 135 so as to define an offrunning reach of the felt 121 that is downwardly inclined (i. e. about 25° below horizontal).

Referring to Figure 5, which shows the press nip arrangement between the rolls 118 and 120, it will be seen that the oncoming sealing strip 120*c* in suction roll 120 is spaced an angle *a*–1 from the center of the nip N–12 of about 20° (and preferably within the range of 10° to 30°); and the offrunning sealing strip 120*d* is spaced a similar distance *a*–2 from the center of the nip N–12. The leading edge *x* of the save-all pan 120*b* is spaced an angle *a*–3 of approximately 20° (and preferably 10° to 40°) from the offrunning sealing strip 120*d*. In this way the leading edge *x* is in close running relation to the shell of the roll 120 and also in close running relation to the felt 121 at the point where the felt 121 is separated from the roll shell (approximately opposite the offrunning sealing strip 120*d*), so that the save-all pan 120*b* may receive as much water as possible which will be thrown from the roll shell by centrifugal force. Also, the incline of the felt 121 permits a corresponding incline to the bottom of the save-all pan 120*b* so that collection of liquid 1 in the bottom of the pan may take place and the liquid 1 may be drawn off from the bottom of the pan without spilling over onto the felt 121. The felt 121 is inclined downwardly from the horizontal an angle *a*–4 which is sufficient to permit adequate collection of the liquid 1 in the save-all pan 120*b* and the angle *a*–4 may range from a practical minimum of about 15° to a practical maximum of about 70°. Above 70° the felt 121 is running downwardly in a substantially vertical direction and forward progress through the paper machine cannot be accomplished. It will be appreciated that the paper web must be continuously moved in the general forward direction of the paper machine and a substantially vertical run of felt will interfere with the forward movement of the web. For this reason the felt 121 is downwardly inclined an angle *a*–4 of 20° to 35° preferably. The downward incline of the felt 121 effects

rapid separation of the felt from the shell of the roll **120** so that water thrown therefrom by centrifugal force will have to pass through the atmosphere (and can be caught in the save-all **120***b*). Preferably also the nip N–**12** is downwardly inclined from the horizontal an angle *a*–**5** ranging from a minimum of about 20° to a maximum of about 75° (and the best results are obtained when *a*–**5** is 25°–45°), so that the felt **121** may be conveniently aligned in a plane generally tangential to the point on the roll shell opposite the offrunning sealing strip **120***d*. As an additional feature, it will be noted that a secondary save-all pan **120'***b* may be positioned beneath the felt **121** so as to catch any moisture which may be thrown from the felt **121**. This is an additional feature which is possible in the instant press N–**12**, because the web W' is separated from the felt **121** at the press nip N–**12**. In this respect the assembly of Figure 5 differs from that of Figure 3.

Referring to Figure 3 which shows the assembly relating to the pickup roll **115**, it will be noted that the wire **111** is inclined downwardly from the horizontal an angle *a*–**6** of approximately 35°, but this angle may be varied from approximately 20 to as much as 75°, although it is preferably within the range of 25°–40°. The oncoming **115***c* and offrunning **115***d* sealing strips in the roll **115** are spaced approximately an angle *a*–**7** of 20°, but may be spaced from 10° to 30°. In general the width of the suction area is not as great in the suction pickup roll at least for the high suction area which effects the actual pickup of the web W'. The leading edge *x'* of the save-all **115***b* is spaced an angle *a*–**8** from the offrunning sealing strip **115***d* of about 20° and preferably within the range of 10° to 40° so as to be in close running relationship to the roll shell as well as the felt **114** and to receive water thrown by centrifugal force from the shell of the roll **115**. The downwardly inclined felt **114** with the web W' therebeneath is inclined downwardly from the horizontal an angle *a*–**9** of about 22°, but this angle may range from a practical minimum of about 15° (which permits suitable mounting of the save-all pan **115***b* and collection of liquid *l'* therein) to a practical maximum of about 70° (above which no appreciable forward movement of the web W' is accomplished). Preferably the angle *a*–**9** is 20° to 35°.

Referring to Figure 4, it will be noted that the transfer of the web W' from the felt **114** to the bare surfaced roll **118** is shown at the nip N–**11**, which is the first press nip. The nip N–**11** is preferably inclined upwardly from the horizontal by an angle *a*–**10** of 30 to about 85°, and preferably about 35 to 45°. In this way the water freed from the web W' at the nip N–**11** may flow rapidly and freely downwardly and over the suction area **117***a* which is mounted with the offrunning sealing strip **117***c* substantially aligned with the center of the nip N–**11** and the oncoming sealing strip **117***d* spaced about 20° therefrom (and preferably within the range of 10 to 30°).

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, a looped felt, a suction roll within the loop of said felt with a suction area covered by the felt, a supporting member having a foraminous surface carrying a wet web thereon and urging the web against the felt covered suction area, means guiding said felt away from the suction area in a downwardly inclined plane, and a save-all pan interposed between the suction roll and the felt in close running relation to the suction area on the offrunning side thereof.

2. In a paper machine, a looped felt, a suction roll within the loop of said felt with a suction area covered by the felt, a supporting member having a foraminous surface carrying a wet web thereon and urging the web against the felt covered suction area, means guiding said felt away from the suction area in a downwardly inclined plane about 15° to 70° from horizontal, and a save-all pan interposed between the suction roll and the felt in close running relation to the suction area on the offrunning side thereof presenting a leading edge about 10° to 40° behind the suction area.

3. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said felt with a suction area covered by the felt, a forming wire carrying a wet web thereon and urging the web against the felt covered suction area, and means guiding said felt away from the suction area in a downwardly inclined plane.

4. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said felt with a suction area covered by the felt, a forming wire carrying a wet web thereon and urging the web against the felt covered suction area, means guiding said felt away from the suction area in a downwardly inclined plane, and a save-all pan interposed between the suction roll and the felt in close running relation to the suction area on the offrunning side thereof.

5. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said felt with a suction area covered by the felt, a couch roll, a forming wire having a downwardly inclined reach traveling over and supported by said couch roll and said turning roll, said forming wire carrying a wet web thereon and urging the web against the felt covered suction area, means guiding said felt away from the suction area in a downwardly inclined plane, and a save-all pan interposed between the suction roll and the felt in close running relation to the suction area on the offrunning side thereof.

6. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a wet web on a forming wire to transfer the web to said pickup felt, a guide roll lapped by and within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of pickup felt therebetween, and means associated with said guide roll and the pickup felt lapped thereby for holding the web on said pickup felt as it travels around said guide roll.

7. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a wet web on a forming wire to transfer the web to said pickup felt, a guide roll lapped by and within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of pickup felt therebetween, and a suction box in said guide roll lapped by said suction pickup felt for holding the web on said pickup felt as it travels around said guide roll.

8. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a wet web on a forming wire to transfer the web to said pickup felt, a guide roll lapped by and within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of pickup felt therebetween, and a guide felt also lapping said guide roll urging the web against said pickup felt for holding the web on said pickup felt as it travels around said guide roll.

9. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with the suction pickup roll to define a first reach of said pickup felt therebetween, a pair of press rolls defining a press nip therebetween that is aligned angularly with respect to said first reach, a second reach of said felt feeding to said nip and extending therefrom to said guide roll, a second felt, and guide rolls for said second felt positioned closely adjacent said first and second reaches of

said pickup felt and urging said second felt against the web guided by said pickup felt.

10. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with the suction pickup roll to define a first downwardly inclined reach of said pickup felt therebetween, a suction roll within the felt loop and a plain roll outside the felt loop defining an upwardly extending press nip therebetween, said suction roll being positioned above said guide roll with an upwardly extending second reach of said pickup felt extending therebetween, a second felt, and guide rolls for said second felt positioned closely adjacent said first and second reaches of said pickup felt and urging said second felt against the web guided by said pickup felt.

11. In a paper machine, a first guide roll, a traveling first felt lapped thereover and presenting a downwardly inclined reach at the oncoming side of said first roll and a generally upward reach at the offrunning side of said first roll for guiding and supporting from above a paper web on said inclined reach, around said first roll and on said upward reach, a traveling second felt covering the web on said first felt around said first roll, a second guide roll lapped by the second felt and urging the second felt against said inclined reach to retain the web thereon and a third guide roll lapped by the second felt and urging the second felt against said upward reach to retain the web thereon.

12. In a paper machine, a first guide roll, a traveling looped first felt lapped thereover and presenting a downwardly inclined reach at the oncoming side of the first guide roll and an upwardly running reach at the offrunning side of the first guide roll, said reaches defining an angle of 30° to 80°, a suction press roll within the felt loop and above said first guide roll defining a press nip with another press roll receiving said upwardly running reach, and a second felt urged by other guide rolls against a web carried on said inclined reach, on the first felt around said first guide roll and on said upwardly running reach up to said nip.

13. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with the suction pickup roll to define a first reach of said pickup felt therebetween, a pair of press rolls defining a press nip therebetween that is aligned angularly with respect to said first reach, a second reach of said felt feeding to said nip and extending therefrom to said guide roll, and means associated with said guide roll and the pickup felt lapped thereby for holding the web on said pickup felt as it travels around said guide roll.

14. In a paper machine, a looped pickup felt, a suction pickup roll within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with the suction pickup roll to define a first reach of said pickup felt therebetween, a pair of press rolls defining a press nip therebetween that is aligned angularly with respect to said first reach, a second reach of said felt feeding to said nip and extending therefrom to said guide roll, and a suction box in said guide roll lapped by said suction pickup felt for holding the web on said pickup felt as it travels around said guide roll.

15. In a paper machine, a looped pickup felt, a suction pickup roll having a suction area within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of said pickup felt at the offrunning side of said suction area, a first suction press roll within the loop of said pickup felt, a plain-surfaced roll defining a first press nip with said first press roll, a press felt and a second suction press roll within the loop of said press felt defining a second press nip with said plain-surfaced roll.

16. In a paper machine, a looped pickup felt, a suction pickup roll having a suction area within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a guide roll within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of said pickup felt at the offrunning side of said suction area, a first suction press roll within the loop of said pickup felt, a plain-surfaced roll defining a first upwardly inclined press nip with said first press roll, a press felt and a second suction press roll within the loop of said press felt defining a second downwardly inclined press nip with said plain-surfaced roll.

17. In a paper machine, a looped pickup felt, a suction pickup roll having a suction area within the loop of said pickup felt urging said pickup felt against a web on a downwardly inclined reach of forming wire to transfer the web to said pickup felt, a guide roll beneath and ahead of said suction roll in the general direction of web travel and within the loop of said pickup felt and cooperating with said suction roll to define a downwardly inclined reach of said pickup felt at the offrunning side of said suction area, a first suction press roll above and behind said guide roll and within the loop of said pickup felt, a plain-surfaced roll above and ahead of said first press roll and defining a first press nip with said first press roll, a press felt and a second suction press roll above and ahead of said plain-surfaced roll and within the loop of said press felt defining a second press nip with said plain-surfaced roll.

18. In a paper machine, a looped pickup fe't, a suction pickup roll having a suction area within the loop of said pickup felt urging said pickup felt against a web on a forming wire to transfer the web to said pickup felt, a first suction press roll within the loop of said pickup felt, a plain-surfaced roll above and ahead of said first press roll and defining a first press nip with said first press roll, a press felt, a second suction press roll above and ahead of said plain-surfaced roll and within the loop of said press felt defining a second press nip with said plain-surfaced roll, said second press roll having a suction area straddling said press nip completely covered by said press felt, and means guiding said press felt away from said suction area in a downwardly inclined plane.

19. In a paper machine, a looped felt, a suction roll within the loop of said felt with a suction area covered by the felt, a plain-surfaced roll carrying a wet web thereon and urging the web against the felt covered suction area and means guiding said felt away from the suction area in a downwardly inclined plane.

20. In a paper machine, a looped felt, a suction roll within the loop of said felt with a suction area covered by the felt, a plain-surfaced roll carrying a wet web thereon and urging the web against the felt covered suction area, means guiding said felt away from the suction area in a downwardly inclined plane, and a save-all pan interposed between the suction roll and the felt in close running relation to the suction area on the offrunning side thereof.

21. In a paper machine, a looped felt, a suction roll within the loop of said felt with a suction area covered by the felt, a plain-surfaced roll carrying a wet web thereon and urging the web against the felt covered suction area to define a downwardly inclined press nip lying in a plane tangential to both rolls, said suction area extending through and beyond the nip on both the on-coming and off-going sides of said nip, said felt lapping the entire suction area and engaging the web retained

on the plain roll surface only at said nip, and means guiding said felt away from the suction area in a downwardly inclined plane.

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