

Jan. 31, 1956

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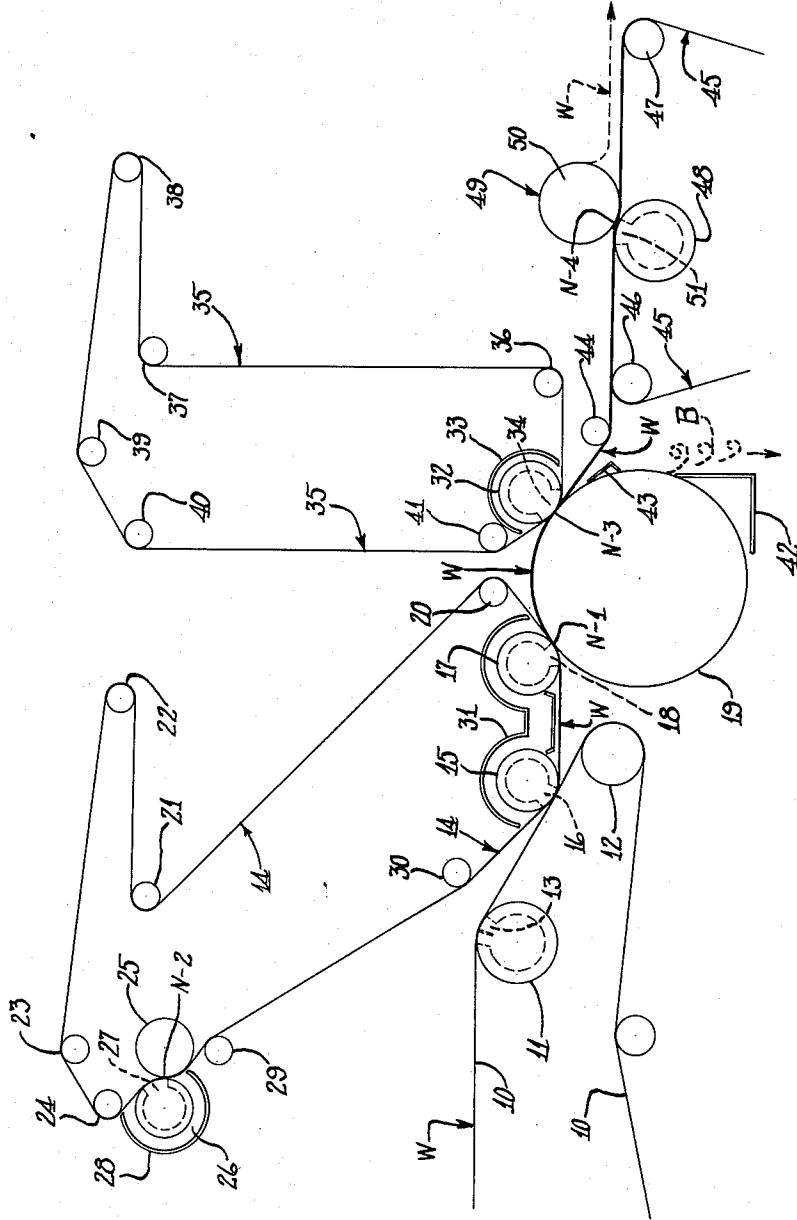
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SUCTION PICK-UP AND TRANSFER PRESS FOR PAPER MACHINES

Filed Feb. 5, 1953

2 Sheets-Sheet 1

FIG. 1



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SUCTION PICK-UP AND TRANSFER PRESS FOR PAPER MACHINES

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Application February 5, 1953, Serial No. 335,341

8 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 wire to one or more presses, and more particularly, to a method and apparatus for conveying the web from the forming wire to at least one suction press without any open draws and transfers the web from a conveying felt to the surface of a bare roll provided with a self-dumping doctor arrangement.

In the operation of certain types of paper machines, for the purpose of making certain weights or grades of paper, it is necessary for the machine to run for a considerable period of time, preferably with only a narrow tail or strip of paper web leaving the press section and being threaded through the driers and calender. Devices or methods for picking up this narrow tail from the forming wire itself, so as to pass the same through the press section and onto the driers and calender, have not been wholly successful because, particularly in the case of certain types of paper, there is a tendency for the remainder of the web to be picked up along with the tail, and such additional web portions are usually picked up erratically so as to cause additional trouble during the starting up operation.

If, on the other hand, the entire web is passed on to the press section to a given point where all but the tail is cut off and dumped, for example, by the use of a press doctor, a large amount of waste partially dewatered web, or "broke," is built up at the doctor, thereby further complicating the operation. Disposal of the main part of the sheet, or the broke, particularly in the case of high speed wide machines constitutes a very serious operating difficulty, if a conventional doctor arrangement is used. As will be appreciated, the conventional doctor arrangement involves a suitable doctor (blade) positioned with respect to a bare roll, so as to scrape web from the surface thereof as the roll is rotated against the doctor. Because of the conventional use of felts to support and transfer paper webs through a press section, the suitable positioning of a doctor has heretofore caused an additional complication in connection with the removal of broke from the doctor.

In general, the instant invention provides an improved web pick-up and transfer arrangement, particularly suited to an advantageous doctor arrangement. Also, the instant invention provides a unique suction press and reverse press arrangement, which may be advantageously operated in conjunction with a suitable web pick-up felt and also a suitably positioned doctor. These arrangements are advantageous in that they permit the positioning of the doctor not only so as to make it a self-dumping doctor but also in a most convenient position with respect to the entire press section, from the point of view of minimizing waste in the total work done in pressing and dewatering the web.

It is, therefore, an important object of the instant invention to provide an improved paper machine press section for receiving a wet web from a paper machine forming surface and pressing the wet web, and an improved

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process for carrying out the web picked up from the forming surface and pressing the web.

Another important object of the instant invention is to provide an improved and simplified paper machine press section assembly which has a superior arrangement for starting up the machine and also a superior arrangement for conducting a web therethrough without causing the formation of tears or other defects therein.

Yet another object of the invention is to provide an improved paper machine press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a suction press roll within the loop of said pick-up felt, a bare roll below said suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, and a self-dumping doctor cooperating with said bare roll.

A further object of the invention is to provide an improved paper machine press section for receiving and pressing a wet web, comprising a first press for pressing the bottom side of the web against a bare roll surface, a reverse press separate and apart from said first press for pressing the top side of the web against a bare roll surface, a first transfer felt run for picking up a web from a paper machine forming surface and guiding the web on the underside of the run to and through a nip of said first press, and a press felt run for receiving the web exiting from said first press and supporting and conveying the web to and through a nip of said reverse press, said felt runs each being substantially horizontally aligned.

Still another object of the instant invention is to provide an improved process of removing water from a continuously moving web in a press section of a paper machine, that comprises drawing the continuously moving web from a forming section of the paper machine and continuously supporting and guiding the web in a horizontal direction, pressing only the bottom side of the web thus guided against a bare rotating surface of a first press and transferring the web to the bare rotating surface, next removing the web from the bare rotating surface and supporting and conveying the web in a horizontal direction, and then pressing only the top side of the moving web against a bare rotating surface of a reverse press.

Other objects, features and advantages of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which, by way of example only, illustrate preferred embodiments of the invention.

On the drawings:

Figure 1 is a diagrammatic representation of a preferred form of a pick-up and reverse suction press arrangement of the present invention;

Figure 2 is a diagrammatic representation of another preferred pick-up and press section arrangement of the present invention; and

Figure 3 is still another diagrammatic representation of a preferred pick-up and press section arrangement of the present invention.

As shown on the drawings:

In Figure 1, a Fourdrinier paper making machine forming wire 10 trained over a suction couch roll 11 and around a wire turning roll 12 conveys a newly formed wet web of paper W over the suction area 13 of the couch roll 11 to a pick-up felt or transfer felt, indicated generally at 14, which is urged into contact with the web W by a suction transfer roll 15 at a point on the upper run of the wire 10 between the suction couch roll 11 and the turning roll 12. The transfer roll 15 (actually a suction pick-up roll 15) has a suction area 16 acting through

the felt 14 to effect a suction pick-up or transfer of the web W onto the felt 14. As will be seen, the suction pick-up roll 15 is not backed by a roll within the loop of the wire 10 and only urges the felt 14 gently against the web W.

The felt 14 picks up the web W on the under face of the felt 14 and in this manner conveys the web W along a horizontal felt run to the substantially horizontal nip N-1 defined by a suction press roll 17, having a suction area 18, and a bare roll 19 below the suction press roll 17 and cooperating therewith to define the nip N-1. As will be seen, the suction area 18 in the suction roll 17 extends from slightly ahead of the nip N-1 to approximately the line of maximum pressure at the nip N-1, but not appreciably past this line of pressure. Also, the felt 14 is generally aligned with the nip N-1 (i. e., it passes to and through the nip N-1 along an approximate tangent to the bare roll 19). As will be appreciated, for the sake of clarity in the instant diagrammatic view, the alignment of the felt 14 with the nip N-1 is shown as being only approximately horizontal, whereas in an actual operating arrangement of the instant press section the various sizes of the turning rolls, etc. will permit this arrangement to be much more close to a truly horizontal arrangement.

As the felt 14 departs from the press nip N-1 and behind the suction gland 18, the felt 14 follows the surface of the rotating roll 19 briefly and then passes around the turning roll 20, and then in succession the turning rolls 21, 22, 23 and 24. The last of these turning or guide rolls 24 cooperates with a bare press roll 25 (within the loop of the felt 14) which in turn cooperates with a suction press roll 26 to define a press nip N-2. The suction roll 26 has an enlarged suction gland 27 which extends from the press nip N-2 back an appreciable distance, and is completely covered by the felt 14, as a result of the cooperation between the guide roll 24 and the press roll 25. As will be appreciated, the suction roll 26 is actually a suction cleaning roll, which accomplishes dewatering of the web 14 as well as removal from the operating face of the web 14 of all fibers or the like material which may have been retained thereon. A save-all collector 28 is provided around the suction roll 26 to receive water thrown from the roll. The felt 14, after passage over the suction area 27, then travels over the guide roll 29 and under the guide roll 30, immediately in advance of the suction transfer roll 15.

As will be seen, the suction rolls 15 and 17 are provided with a conventional save-all collector 31, which is suitably positioned around the rolls 15 and 17 to receive water thrown therefrom during operation.

As was previously mentioned, the suction gland or area 18 in the roll 17 terminates approximately at the nip N-1 (so that it may effectively perform the function of dewatering the web W at the nip N-1), but the suction area 18 does not extend appreciably beyond the nip N-1 (so that it will not tend to retain the web W on the felt 14). Also, the felt 14 is directed away from the surface of the suction roll 17 and along the surface of the bare roll 19 briefly after the nip N-1, so as to make sure that the web W is retained upon the smooth surface of the bare roll 19.

The web W is thus transferred from the felt 14 to the surface of the bare roll 19 at the press nip N-1, and the web W then adhering to the surface of the bare roll 19 moves over the top of the bare roll 19 and through another suction press nip N-3, which in this case is defined by the bare roll 19 and another suction press roll 32, also provided with a suitable save-all collector 33. Although the suction area 34 of the suction roll 32 may be aligned with the nip N-3 substantially as shown in connection with the other nips N-1 and N-2, it has been found to be particularly preferable to employ the differently arranged suction area 34 shown. It will be seen that the suction area 34 extends an appreciable distance on both

sides of the nip N-3 (the line of maximum pressure at the region of the nip N-3), and the suction area 34 is covered, over its complete area, by a press felt generally designated at 35. The press felt 35 is suitably trained about guide rolls 36, 37, 38, 39, 40 and 41, so that the felt 35 may suitably lap or cover the entire suction area 34 of the suction press roll 32 contained within the loop of the felt 35. The felt 35 thus contacts the web W only at the press nip N-3 itself, both before and after passing through the nip N-3. In this manner, it has been found, the felt 35 may be quite effectively dried just before and after passing through the nip N-3 by the action of the suction gland 34 pulling air through the felt 35. Moreover, it has been found that unexpectedly superior dewatering of the web W may be obtained at the nip N-3 because of this arrangement, apparently because there is much less tendency for water built up on the incoming side of the nip N-3 to be drawn or sucked through the nip N-3 by virtue of a reduced pressure at the interface between the felt 35 and the web W. Separation of the felt 35 and the web W immediately after passage through the nip N-3 greatly reduces the tendency for a low pressure area to be built up at the interface between the web W and the felt 35.

As will be seen, the arrangement of the three rolls 17, 19 and 32 is that of a dual press, having two press nips N-1 and N-3. In the instant dual press arrangement, however, the bare roll 19 is the bottom or lower roll, whereas the suction press rolls 17 and 32 are the upper rolls. Preferably, the suction press rolls 17 and 32 are horizontally aligned, as shown; and each of the diameters thereof (i. e., of the suction press rolls 17 and 32) are not in excess of one-half of the diameter of the bare roll 19. In other words, the diameter of the bare roll 19 is at least about twice that of either of the other two rolls 17 and 32, and is preferably about 3 times the diameter of either of the other rolls 17 and 32 (which have approximately the same diameter). The purpose of the differential in diameter sizes, which may range from about 2 to 4 times greater diameter for the bare roll 19, is to permit the arrangement of the rolls 17, 19 and 32 so that the travel of the web through the entire dual press arrangement will be substantially horizontal. This is accomplished by positioning the rolls 17 and 32 in substantially horizontal alignment and relatively close together, and positioning the bare roll 19 therebelow. As was mentioned, the reduced sizes of the guide rolls 20 and 41 in actual practice permit a substantially closer positioning of the rolls 17 and 32; but the most important feature of this aspect is that of employing a travel path for the web which does not involve abrupt changes in direction of the web from the felt 14 through the nip N-1, upon the top surface of the bare roll 19, through the nip N-3 and outwardly therefrom. Most preferably this travel path is substantially horizontal. At least, however, it is desirable to have the initial felt run 14 suitably aligned with the first nip N-1 to avoid such abrupt changes in web direction (and this is brought out in Figure 3, which does not show the substantially horizontal web travel).

In general, there is a tendency for most paper webs to adhere to a smooth bare roll surface in preference to another type of surface (such as a felt surface in the absence of the use of suction); and in the instant invention particular advantage is taken of this phenomenon. As is shown specifically in Figure 1, the nip N-1 is directed slightly upwardly in the direction of travel, and this is inherent in a dual press arrangement such as that shown in Figure 1. In general, such deflections or deviations of a nip from the horizontal of, for example, not more than about 30 degrees may be classified as being substantially horizontal, for the purposes of their effect upon the web passing therethrough; and it will be fully appreciated that such relatively minor deflections cause substantially less strain or distortion than is caused in

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greater changes of direction such as deflections of 90 degrees or even complete reversals in direction. In any event, care should be taken in arranging the suction press roll 17 and the bare roll 19 and the cooperating felt 14 so that the web will, in fact, transfer to the bare roll surface. This is accomplished by terminating the suction area 18 approximately at the nip N-1 and/or causing the felt 14 to follow briefly the rotating bare roll surface just beyond the nip N-1. In this manner, the tendency for the web to follow the felt 14 which was initially created by the effect of the suction area 18 may be overcome and the web adheres to the smooth bare roll surface instead.

On the descending or down-going side of the bare roll 19, of the nip N-3, a somewhat different situation exists. First, the web W is adhering to the surface of the bare roll 19 as it enters the nip N-3 and the felt 35 and the web W have not come into contact yet, so there is no increased attraction for the web W toward the felt 35 that is created prior to entrance of both into the nip N-3. The contact between the web W and the felt 35 at the nip N-3 is, of course, very brief; and at the exit of the nip N-3 the felt 35 turns away abruptly following the surface of the press roll 32, whereas the web W is directed downwardly generally. The effect of gravity, inertia and the initial adherence of the web to the bare surface is thus combined with the abrupt departure of the felt 35 from the line of travel through the nip N-3 to effect a suitable separation of the web W from the felt 35 immediately after the passage through the nip N-3.

Under the ordinary conditions of start-up, the suction may be turned on in the pick-up roll 15 (and optionally also in the press rolls 17 and 32) and the entire web W is transferred to the bottom face of the felt 14 and thence across to the surface of the bare roll 19. The web W passes through the nips N-1 and N-3 and tends to remain on the bare roll surface 19, so as to descend thereon toward the doctor 42. The doctor 42 is preferably positioned on the descending side of the bare roll 19 so that it is a self-dumping doctor (although this would also be the case if the doctor were positioned on the lower upcoming side of the bare roll 19). The positioning of the doctor 42 on the descending side of the roll 19 places it approximately at the region wherein the entire web W will be removed from the surface of the bare roll 19 during operation. During start-up, the web follows the surface of the bare roll 19 on the downcoming side and is scraped therefrom by the doctor 42, so as to produce "broke" B indicated in light dotted lines. The broke B will, of course, fall naturally into a suitable save-all or the like collector which is not here shown.

The doctor 42 is positioned so as to effect a self-dumping of the substantial bulk of the web during start-up, so that a suitable tail may be stripped from the descending side of the bare roll 19 and fed on through the rest of the machine. For example, the tail might be stripped from the bare roll 19 by means of a small auxiliary doctor 43 positioned as indicated in Figure 1 or, instead, the tail might be stripped by a suitable slitting device (not shown) or the like. The important point here being that the self-dumping doctor 42 removes the bulk of the web W without the necessity of an inconvenient build-up of broke, because of the overall arrangement of the press rolls and felts here shown.

The tail (during start-up) or the web (during full operation) is then drawn away from the bare roll surface of the exit of the nip N-3, through an open draw, around the guide roll 44 and onto a suitable press felt indicated generally at 45. Once the machine is in operation, the tail or the entire web W has sufficient coherence after passing through the nip N-3 that it may be directed away from the bare roll surface, as here shown, and it will continue to pull itself away from the descending side of the bare roll surface.

The web W is received on the press felt 45, which is maintained in substantially horizontal alignment by

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means of the guide rolls 46 and 47 and the lower suction press roll 48 of the reverse press indicated generally by the reference numeral 49. As will be seen, the reverse press 49 consists of a top bare roll 50 and a bottom felt covered suction press roll 48, having a suction area 51 which is suitably positioned at the nip N-4 defined by the rolls 48 and 50. In this manner, the top side of the web W is pressed against a bare rotating surface, of the bare roll 50, so as to accomplish reverse pressing of the web W. Unless the suction area 51 extends past the nip N-4, there may be a tendency for the web W to follow briefly the upgoing bare surface of the roll 50 (as indicated in the dotted line), but the web ultimately follows the outgoing horizontal run of the felt 45. The dotted line path of the web departing from the nip N-4 is, of course, a substantial exaggeration of the web direction actually taken during operation. From this point the web is passed on to the driers and calender (not shown).

Referring now to Figure 3, it will be seen that a dual press arrangement is employed, but this dual press arrangement is substantially different from that shown in Figure 1. In Figure 3, a forming wire 100 is trained over a suction couch roll 101 and around a wire turning roll 102, so as to convey the newly formed wet web W' over the suction area 103 of the couch roll to a pick-up felt 104 which is urged into contact with the web by a suction transfer roll 105 at a point on the upper run of the wire 100 between the suction couch roll 101 and the turning roll 102. This arrangement is substantially as shown and described in connection with Figure 1, and the pick-up felt 104 turns around the guide roll 106 and over the suction area 107 of the suction pick-up roll 105, whereat it picks up the web on its under face and moves the web up a sharp incline to the first press nip N-11. The first press nip is defined by a suction press roll 108 (within the loop of the felt 104 and provided with a suitable save-all collector 109) and a bare roll 110. As was pointed out in the disclosure in connection with Figure 1, the suction area 111 of the suction press roll 108 extends prior to the nip N-11, but not appreciably past the nip N-11; and the felt 104 is guided by the guide roll 112 so as to follow briefly the rotating surface of the bare roll 110, and to assure the adherence of the web W' to the surface of the bare roll 110. In Figure 3, the arrangement shown is a dual press arrangement wherein substantially horizontal web travel therethrough is not employed. This arrangement is employed in instances when the particular web W' may not adhere particularly well to the under face of the pick-up felt run 104, if the same is maintained horizontal, and the felt run 104 is then directed upwardly so as to reduce the overall distance of the run and to assist in maintaining the web W in contact with the felt 104 up to the press nip N-11. It will be noted, however, that the felt run 104 is preferably aligned with the nip N-11 as it guides the web W' to and through the nip N-11, as here shown.

As described in connection with Figure 1, the web W' of Figure 3 passes over the top of the bare roll 110, while adhering thereto, and on the descending side of the bare roll 110 of the web W' passes through a second suction press nip N-12. The suction press nip N-12 is defined by the bare roll 110 and a suction press roll 113 which cooperates with a looped felt 114 and to the bare roll 110 in substantially the same manner that the suction press roll 32 cooperates with the felt 35 and the bare roll 19 in Figure 1. In other words, the suction press roll 113 has a large suction area 115 extending appreciably before and after the nip N-12, and completely covered by the felt 114 (suitably guided by means of guide rolls such as the rolls 116 and 117). As shown, the felt 114 contacts the web W' only along the line of maximum pressure at the nip N-12 and the result is the continued adherence of the web W' to

the surface of the bare roll 110. The cooperation of the doctor 118 with the bare roll 110 is exactly the same cooperation as that described in connection with the bare roll 19 and the doctor 42 in Figure 1, and it need not be further described herein.

The web W' (or the tail during start-up) is thus directed away from the bare roll 110 on the descending side thereof and the web is passed over a guide roll 119 and into the drier assembly, indicated generally at 120 (shown partially as the initial drier drum 120 and a dried web 122 guided by the roll 123).

Referring now to Figure 2, it will be seen that a dual press arrangement is not used in the embodiment here illustrated. In Figure 2 the forming wire 200 trained over a suction couch roll 201 and around a wire turning roll 202 conveys the newly formed wet web W'' over the suction area 203 of the couch roll 201 to a pick-up felt 204 which is urged into contact with the web by a suction transfer roll 205 at a point on the upper run of the wire 200 between the suction couch roll 201 and the turning roll 202, substantially as described hereinbefore. The pick-up felt 204 passes over a suitably positioned guide roll 206 and then over the suction area 207 of the suction pick-up roll 205, so as to be urged gently against the web on the wire 200 and to effect a suction transfer of the web onto the pick-up felt 204. The pick-up felt 204 then carries the web on the under face thereof in a substantially horizontal direction to the first press nip N-21, which is defined by a suction press roll 207 (within the loop of the felt 204) and a bare roll 208 positioned beneath the suction press roll 207. As was previously indicated, the bare roll in each embodiment of the invention is preferably positioned below the suction press roll with which it defines the first press nip, so that effective transfer of the web to the bare roll surface may be made at this point most conveniently. In the instant arrangement of Figure 2, the felt 204 has a substantially horizontal run extending from the forming wire 200 to and through the first press nip N-21 until it reaches a guide roll 209 about which it turns upwardly (for example, to be processed by the cleaning suction roll of the type shown in Figure 1). The rolls 205 and 207 are provided with a common save-all collector 210 in a conventional arrangement. The suction area 211 of the suction press roll 207 is arranged in substantially the manner described in connection with the suction areas at the first suction press nip in Figures 1 and 3, in that the instant suction area 211 extends from appreciably behind the nip N-21 approximately up to the nip N-21, but not appreciably therebeyond. For the reasons hereinbefore mentioned, the web W'' tends to adhere to the descending side of the bare roll 208, and a doctor 212 cooperates with the bare roll 208 in exactly the manner hereinbefore described in connection with the cooperation of the bare rolls 19 and 110 with their respective doctors 42 and 118. As shown in Figure 2, the web passes from the surface of the bare roll 208 around a guide roll 213 and onto a press felt 214 horizontally aligned by means of the guide rolls 215 and 216 and a suction press roll 217 within the loop of the felt 214. The felt 214 thus supports and guides the web in a horizontal direction up to and through the second suction press nip N-22, which is a reverse press nip in that it effects a pressing at the top of the web against a rotating bare surface of the bare roll 218 which is positioned directly above the suction press roll 217 and cooperates therewith to form the suction press nip N-22. Again, the suction area 219 in the suction press roll 217 is positioned so as to extend from approximately the nip N-22 back a short distance so as to effect removal of the water tending to build up on the back side of the nip N-22.

This application is a continuation-in-part of my ap-

plications Serial No. 773,143, filed September 10, 1947, now Patent No. 2,653,522; Serial No. 182,579, filed August 31, 1950, now Patent No. 2,694,347; and Serial No. 186,999, filed September 27, 1950, now Patent No. 2,653,523.

Modifications and alterations may be made without departing from the scope and spirit of the instant invention.

I claim as my invention:

1. In a paper machine, a press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a first suction press roll within the loop of said pick-up felt, a first bare roll below said first suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, a second suction press roll above said bare roll and cooperating therewith to define a second press nip, said second suction press roll having a suction gland extending on both sides of said second press nip and completely covered by a press felt so as to effect contact between the web and said press felt at the press nip only and effect drying of the felt on opposite sides of the press nip, a self-dumping doctor cooperating with said bare roll on the descending side thereof, a reverse press for pressing the top side of the web against a bare roll, and a transfer felt run receiving the web exiting from said second press nip and supporting and conveying the web to and through a nip of said reverse press.

2. In a paper machine, a press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a first suction press roll within the loop of said pick-up felt, a bare roll below said suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, and a second suction press roll above said bare roll and cooperating therewith to define a second press nip, said second suction press roll having a suction gland extending on both sides of said second press nip and completely covered by a press felt so as to effect contact between the web and said press felt at the press nip only and effect drying of the felt on opposite sides of the press nip.

3. In a paper machine, a press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a first suction press roll within the loop of said pick-up felt, a bare roll below said suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, a second suction press roll above said bare roll and cooperating therewith to define a second press nip, said second suction press roll having a suction gland extending on both sides of said second press nip and completely covered by a press felt so as to effect contact between the web and said press felt at the press nip only and effect drying of the felt on opposite sides of the press nip, and a self-dumping doctor cooperating with said bare roll on the descending side thereof.

4. In a paper machine, a press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a first suction press roll within the loop of

said pick-up felt, a bare roll below said suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, and a second suction press roll above said bare roll and cooperating therewith to define a second press nip, said second suction press roll having a suction gland extending on both sides of said second press nip and completely covered by a press felt so as to effect contact between the web and said press felt at the press nip only and effect drying of the felt on opposite sides of the press nip, said first and second suction rolls being horizontally aligned and each having a diameter of not more than one-half the diameter of said bare roll.

5. In a paper machine, a press section for receiving a wet web from a paper machine forming surface and pressing the wet web, comprising a looped pick-up felt, a suction pick-up roll in the loop of said pick-up felt directing the felt against the web on the forming surface for transferring the web to the under face of said pick-up felt, a first suction press roll within the loop of said pick-up felt, a first bare roll below said first suction press roll and cooperating therewith to define a press nip for transferring the web to the bare roll surface, a second suction press roll above said bare roll and cooperating therewith to define a second press nip, said second suction press roll having a suction gland extending on both sides of said second press nip and completely covered by a press felt so as to effect contact between the web and said press felt at the press nip only and effect drying of the felt on opposite sides of the press nip, a self-dumping doctor cooperating with said bare roll on the descending side thereof, a reverse press for pressing the top side of the web against a bare roll, and a transfer felt run receiving the web exiting from said second press nip and supporting and conveying the web to and through a nip of said reverse press, said first, second and reverse press nips being horizontal and said pick-up and transfer felts being horizontally aligned with said nips.

6. In a paper making machine including a forming surface for a wet paper web, a looped combination pick-up and press felt, a suction pick-up roll in the loop of said felt positioned to transfer a wet web on the forming surface to the felt, a first suction press roll in the loop of said felt positioned to receive the felt with the web thereon in a straight run from the pick-up roll, a bare press roll coacting with the first suction press roll to define a first nip therewith and to receive the wet web directly thereon around the top thereof, a second suction press roll coacting with the bare roll to define therewith a second nip beyond said first nip and receiving the web on the bare roll, a second felt trained around said second suction press roll and through said second nip to cover the web in the second nip, the top side of said web being open between the first and second nips, means separating the second felt from the web as the web emerges from the second nip on the bare roll, means for directing the web

off of the descending side of the bare roll, and a self-dumping doctor on said descending side of the bare roll beyond the point where the web is removed from the roll.

7. In a paper machine, a press section for receiving a wet web from a paper machine forming wire and for pressing said web, comprising a first press for pressing the forming wire side of the web against the bare roll surface of a bare roll, said press having a pair of press rolls cooperating with said bare roll to define therewith a pair of press nips, a self-dumping doctor cooperating with said bare roll, a suction pick-up roll adjacent the forming wire of the paper machine, and a pick-up felt looped about one of said press rolls and said suction pick-up roll, said suction pick-up roll directing the felt against the wet web on the paper machine forming wire to transfer the web to the underside of the felt and thereby guide the wet web through one of said press nips.

8. In a paper making machine including a forming surface for a wet paper web, a looped combination pick-up and press felt overlying said forming surface, a suction pick-up roll in the loop of said felt positioned to receive a wet web from the forming surface, a suction transfer press roll in the loop of the felt positioned to receive the felt with the web thereon from the pick-up roll, a bare press roll coacting with said suction transfer press roll to define a nip therewith to receive the wet web directly thereon around the top thereof, means for directing the web off of the bare roll beyond said nip, and a self-dumping doctor on the descending side of the bare roll beyond the point where the web is removed from the roll.

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