

Nov. 16, 1954

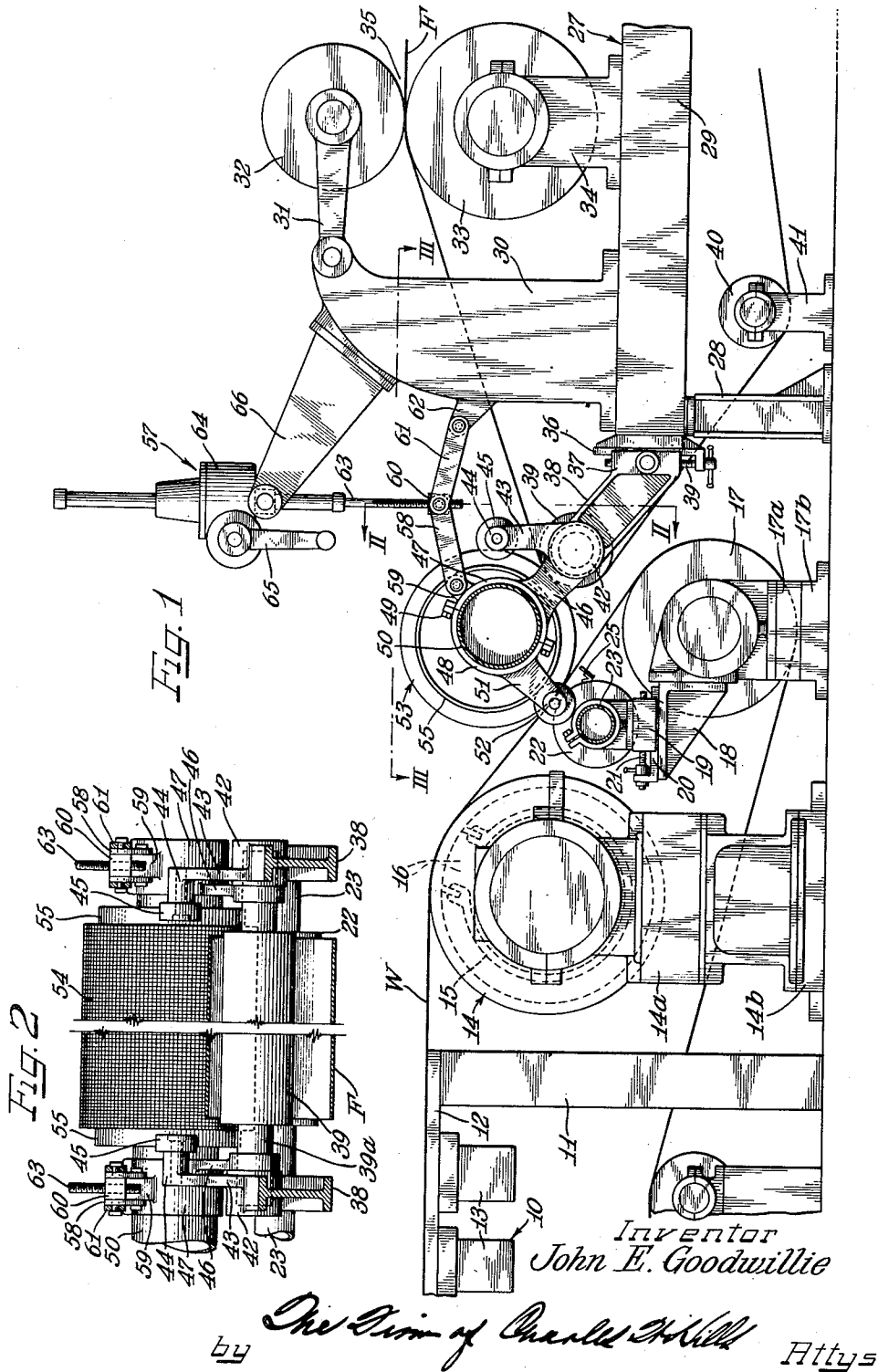
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2,694,346

WEB TRANSFER ASSEMBLY

Filed March 25, 1950

3 Sheets-Sheet 1



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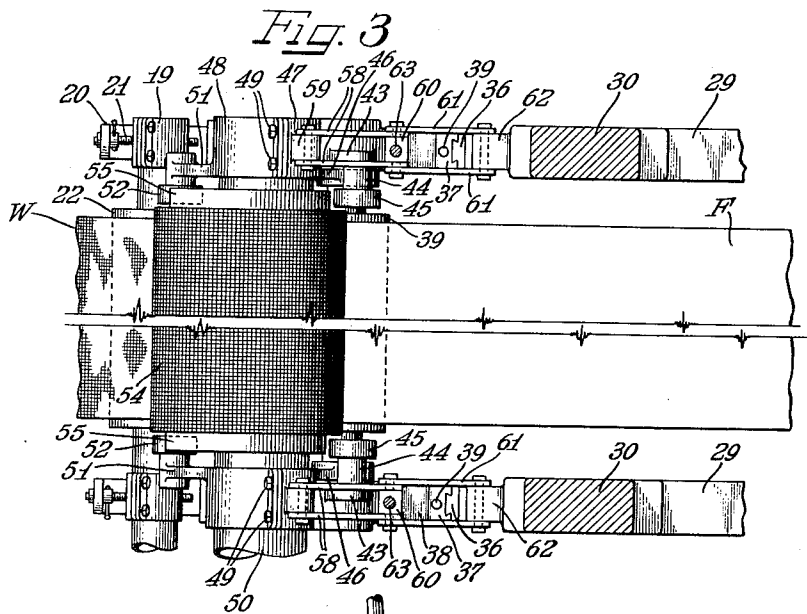
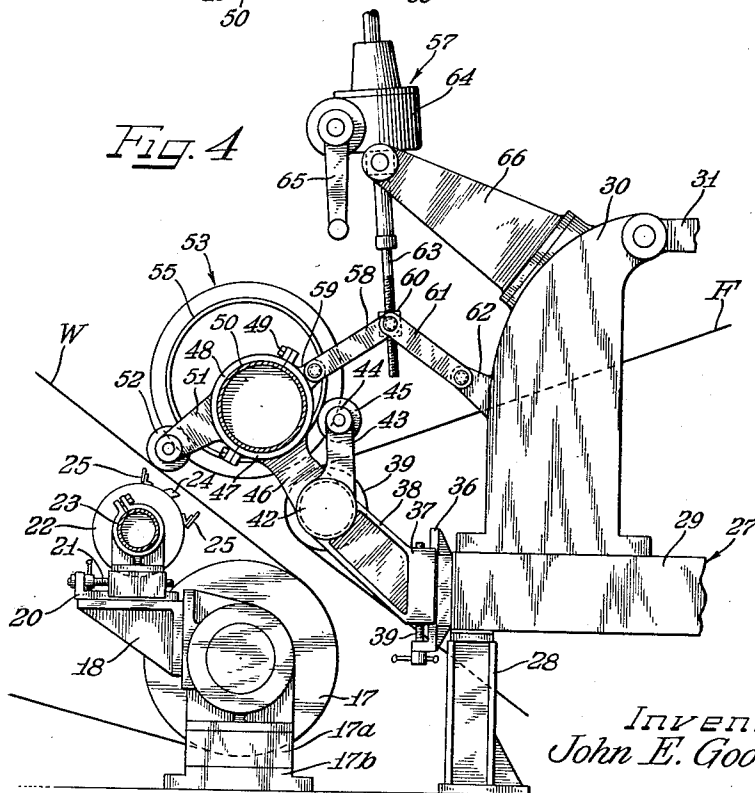
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3 Sheets-Sheet 2



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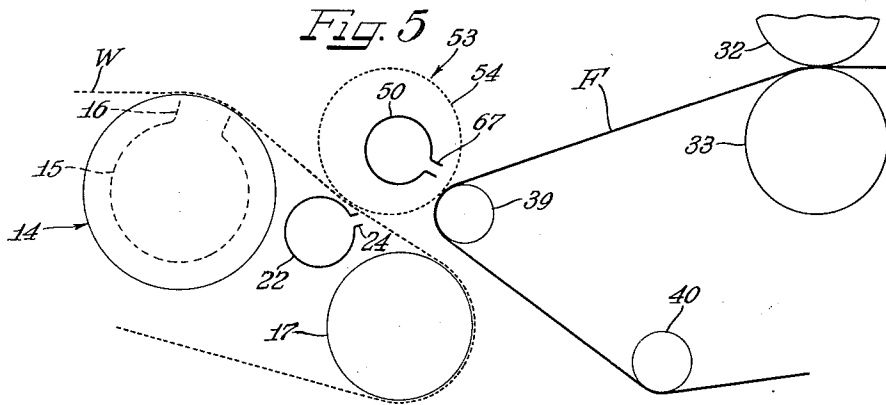
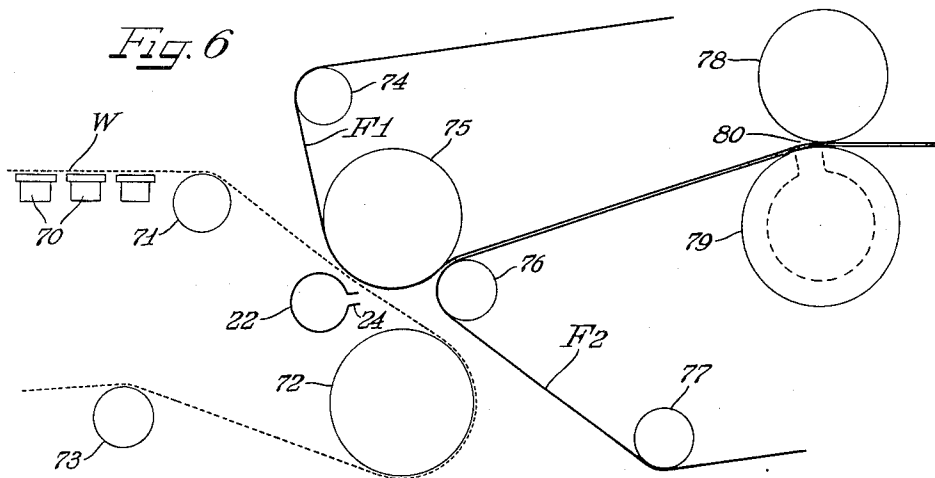
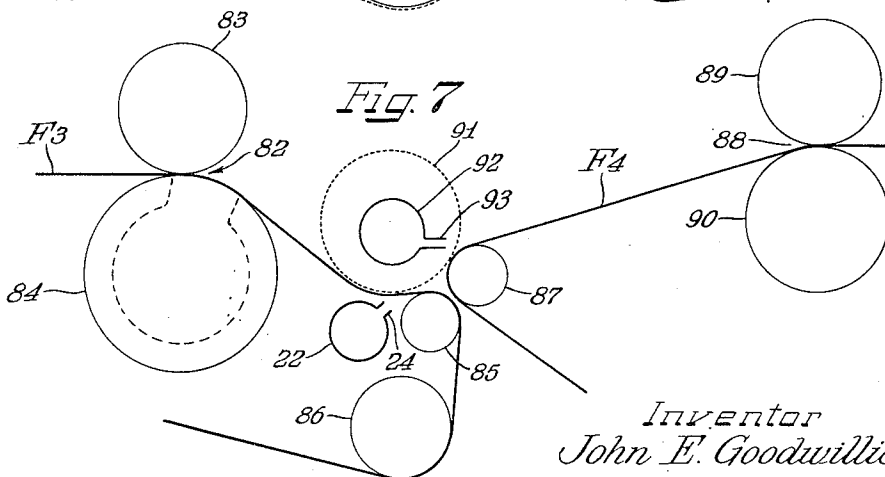
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WEB TRANSFER ASSEMBLY

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3 Sheets-Sheet 3



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2,694,346

WEB TRANSFER ASSEMBLY

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6 Claims. (Cl. 92-49)

The present invention relates to a web transfer assembly and method. More particularly, the present invention relates to the transferring of a paper web from a web conveying means by a gaseous blast acting upon the web itself.

The prior art has utilized three generally accepted methods of transferring moist paper webs or sheets, as from a forming wire to a felt or from one felt to another. One such method is by the utilization of an open draw of unsupported web, but this method is proved unsatisfactory due to the tensioning of the web at the open draw with consequent breaking or tearing of the web caused by web defects.

A second method has utilized a felt contacting the web for lifting the web by the preferred adherence of the web to the pick-up. However, in this second method, the web will be lifted by the pick-up felt only if the moisture content of the web and the moisture content of the felt are such as to cause the web to seal to the bottom surface of the felt in preference to remaining with the initial conveying means, such as the forming wire. This second arrangement thus necessitates the transfer of large quantities of water with the web, thereby possibly causing deterioration of sheet strength due to the excessive moisture content necessary in the web.

The third method involves the employment of a vacuum type transfer having a suction roll within the loop of a felt contacting the initial conveying means, such as the forming wire, followed by means for removing the web from the felt, either at an auxiliary transfer press or by bypassing the top felt through a press. Such arrangements require vacuum equipment, relatively long press felt runs, and the like, and thus are quite expensive and complicated.

The present invention now provides a simplified means and method for transferring a paper web from one conveying means to another. Transfer of the web is independent of the moisture content of either the web or the pick-up conveying means, no suction is required to effect the transfer, and an open web draw is eliminated with a consequent lessening of tension on the sheet.

Generally, the present invention utilizes a bridging roll or other conveying means spanning the gap between the two primary conveying means, one of which initially carries the web and the other of which is adapted to receive the web. A gas or vapor pressure stream is utilized to transfer the web from the first conveying means to the bridging means and, if necessary, to remove the web from the bridging means to the second conveying means. Preferably, the initial conveying means and the bridging means are perforate or porous, so that the pressured gas may be directed against the web through these means, so as to act against the broad surface of the web and in the desired direction.

One specific form of bridging means which has proved suitable for use with the present invention is a foraminous roll, such as a wire covered dandy roll or the like. Such a roll may be employed to bridge the gap between the first and the second conveying means with the perforate surface of the roll accommodating a gas blast there-through.

In one preferred embodiment the perforate dandy roll rides upon a web forming wire and an initial press felt to bridge the gap therebetween. Means are provided for directing a pressured gas stream through the forming wire itself against the web to transfer the web from the wire to the dandy roll and a second gas stream is utilized to remove the web from the dandy roll onto the press felt.

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Means are also provided for lifting the dandy roll from its contact with both the forming wire and the press felt to facilitate changing of either the wire or the felt.

It is, therefore, an important object of the present invention to provide an improved web transfer assembly utilizing a pressured gas stream for effecting a web transfer from one conveying means to another.

Another important object of the present invention is to provide an improved method of transferring a web from one conveying means to another spaced therefrom by the utilization of gas pressure directed against the web through the conveying means to lift the web therefrom against a traveling backing surface bridging the gap between the web conveying means.

It is a further important object of the present invention to provide an improved web transfer assembly including a porous web conveying member, a second web conveying member in spaced relation to the first member, and a web transfer member bridging the gap between said conveying members, means being provided for transferring the web to the transfer member by means of an air blast directed against the web.

Still another important object of the present invention is to provide a method of transferring a moist paper web from a foraminous forming web to a conveying means by directing a gas under pressure through the forming wire against the web carried thereby to transfer the web to a bridging roll extending between the wire and the forming means and directing an additional gas under pressure against the web on said bridging roll to transfer the web from the roll to the conveying means.

Yet a further important object of the present invention is to provide an improved web transfer assembly for transferring the moist paper web from a forming wire to a press felt including a dandy roll having a foraminous surface contacting both the forming wire and the felt, means for directing a stream of gas under pressure through the wire against the web thereon to transfer the web to the dandy roll surface, and a second means for directing a pressured gas stream through the foraminous dandy roll surface to transfer the web therefrom to the felt.

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 fragmentary, side elevational view illustrating a web transfer assembly of the present invention;

Figure 2 is a broken transverse cross sectional view, with parts shown in end elevation, taken along the plane II-II of Figure 1;

Figure 3 is a fragmentary broken cross sectional view with parts in top plan, taken along the plane III-III of Figure 1;

Figure 4 is a fragmentary side elevational view similar to Figure 1 illustrating the transfer assembly in an adjusted position;

Figure 5 is a schematic view illustrating the web transfer assembly of Figure 1;

Figure 6 is a schematic view illustrating a modified form of web transfer assembly of the present invention; and

Figure 7 is a schematic view similar to Figures 5 and 6 illustrating another modified form of web transfer assembly of the present invention.

As shown on the drawings:

In Figure 1, reference numeral 10 refers generally to the wet end of a paper web forming machine, such as a Fourdrinier machine including frame uprights 11 carrying longitudinal frame members 12 and suction boxes 13 secured to the members 12 to underlie a foraminous forming wire W adapted to carry on its upper surface a wet paper web.

The wire W is wrapped about a portion of the periphery of a suction roll 14 having an interior suction gland 15 defining a suction area 16 underlying that portion of the wire lapped thereabout. From the suction roll 14, the wire W is trained about a plain, solid-surface turning roll 17 supported for rotation on spaced posts 17a removably secured to a pedestal 17b. The suction roll 14 is similarly journaled for rotation by a pair of

spaced posts 14a lying outside the longitudinal edges of the wire W and removably mounted on pedestals 14b.

Each post 17a for the turning roll 17 carries a platform 18 slidably journaling for longitudinal movement therealong a post 19 mounted on a slide 20 and adjustable on the slide by means of a hand screw 21. The post 19 carries therebetween a gas conduit or pipe 22 having reduced end portions 23 received by the post 19 and slidable therewith. The conduit 22 is provided with an elongated outlet nozzle 24 extending along the length thereof and deflectors 25 immediately adjacent to and coextensive with the nozzle 24 on each side thereof for a reason to be hereinafter more fully explained.

In Figure 1, reference numeral 27 refers generally to an initial press assembly for receiving a moist paper web from the wire W. The press assembly 27 includes a pair of spaced vertical supports 28 carrying at their upper ends longitudinal beams 29 having secured thereto spaced press stands 30 carrying at their upper portions pivotally attached press roll arms 31 which journal for rotation and pivoting movement an upper press roll 32. A lower press roll 33 is carried by spaced press stands 34 also carried by the longitudinal beams 29. The press rolls 32 and 33 cooperate to define therebetween a press nip 35 for receiving a press felt F therethrough.

Each of the longitudinal beams 29 carries at its forward end a vertical slide 36 secured thereto for receiving a slide housing 37 formed in one end of an upwardly extending inclined support arm 38. The slide housing 37 is adjustable vertically on the slide 36 by means of an adjusting screw 39. It will be understood that a pair of arms 38 are provided in spaced apart relation (Figures 2 and 3) and that these arms journal therebetween a press felt guide roll 39 receiving the felt F lapped thereabout. An additional press felt guide roll 40 is mounted beneath the beam 29 by suitable means, as on posts 41.

The arms 38 terminate in enlarged cylindrical bosses 42 receiving opposed ends of the shaft 39a of roll 39, and the bosses 42 carry upstanding trunnion arms 43 fixed thereto and terminating in inturned portions 44 rotatably journaling thereon trunnion tires 45 (Figures 2 and 3). Additional spaced arms 46 having terminal apertured bosses received by the shaft 39a of roll 39 are pivotally attached to the shaft 39a adjacent the bosses 42 of the arms 38.

The arms 46 carry semi-cylindrical clamping halves 47 for cooperation with similar clamping halves 48 secured to the halves 47 by suitable means, as by bolts 49, to retain therebetween a gas supply pipe 50 adapted for attachment to a source of gas under pressure.

An additional trunnion arm 51 is formed integrally with each of the clamping halves 48 to extend therebeyond to rotatably journal a trunnion tire 52 identical with and in longitudinal alignment with the trunnion tires 45 (Figure 3). A dandy roll 53 having a foraminous, wire covered surface 54 and generally cylindrical end chime rings 55 extending axially beyond the surface 54 is supported upon the trunnion tires 52 and the roll 39 to enclose that portion of the gas conduit 50 extending between the clamping collar halves 47 and 48 and overlying the felt F.

Pivotal movement of the conduit 50 and the arms 46 about the shaft of guide roll 39 and corresponding movement of the dandy roll 53 is accomplished by means of a lifting jack assembly 57 secured to each of the press posts 30 and each of the clamping halves 47. The assembly 57 includes spaced link arms 58 pivotally attached to an ear 59 on the clamping half 47 and to a jack block 60 (Figure 3). A second set of link arms 61 is pivoted to an ear 62 formed on the press post 30 and also to the block 60. The jack block 60 is apertured to threadedly receive a jack actuating arm 63 operatively connected through a gear housing 64 to a gear train within the housing and actuated by suitable means, as by manual lever 65. The jack housing 64 is pivotally connected to a supporting arm 66 secured to each of the posts 30.

The operation of the device of Figures 1-4, inclusive, will be readily appreciated from the description hereinbefore given. The paper web carried on the wire W is successively dewatered by the suction boxes 13 and the suction area 16 of the suction roll 14. The web is then removed from the wire for introduction onto the press felt F by means of the dandy roll 53 which bridges

the gap between the wire W and the felt F. The dandy roll, when in normal operating position as illustrated in Figure 1, is supported in its bridging position by the trunnion tires 52 bearing against each of the chime rings 55 and by surface engagement of the foraminous periphery 54 of the roll through the felt F with the roll 39.

Any desired adjustment of the roll 53 with respect to its position on the wire W, so as to lift the roll clear of the wire W may be accomplished by elevation of the threaded actuating rod 63, thereby causing upward retraction of the links 58 and 61, to raise the clamping halves 47 and 48 of the conduit 50, and correspondingly the trunnion arm 51 and the trunnion tires 52 contacting the chime rings 55 of the roll. Further movement of the roll 53, as upon further retraction of the links 58 and 61, moves the trunnion arm 51 sufficiently to bring the chime rings 55 of the roll 53 into contact with the fixed trunnion tires 45, as best shown in Figure 4. Following engagement of the chime rings 55 with the fixed trunnion tires 45, further retraction of the links 58 and 61 will cause further upward movement of the tires 52, thereby bringing about pivoting movement of the complete roll 53 about the tires 45 as a fulcrum.

This pivoting movement of the roll 53 serves to lift the roll clear of both the wire W and the felt F lapped about the roll 39, thereby facilitating both wire and felt changes. Wire changes may be further facilitated by the particular post and pedestal mounting of both the suction roll 14 and the turning roll 17 to accommodate cantilevering of these rolls, as is well known in the art.

The transfer operation of the roll 53 and the utilization of gaseous blasts such as air, carbon dioxide, nitrogen, etc. in the transfer of a web from the wire W to the felt F to carry out the method of the present invention may be best understood by reference to Figure 5 of the drawing which illustrates in schematic outline the preferred embodiment of the invention.

In Figure 5, reference numerals identical to those of Figures 1-4, inclusive, indicate identical portions of the apparatus. It will be seen from the schematic view that the web on the wire W is under the influence of the suction zone 16 during turning of the web from its straight upper run to its terminal reach between the suction roll 14 and the turning roll 17. Thus the web is retained on the wire under suction during this turning to prevent any tendency of the web to "float" off the wire. This is particularly desirable in the manufacture of light-weight or tissue webs.

It will also be seen that the roll 54 bridges the gap between the wire W and the felt F so that the web draw from the wire W to the felt F is supported or backed at all times, to thereby obviate the possibility of tearing of the web due to web imperfections and/or tension applied to the web, as at an open unsupported draw. The gas conduit 22, adapted to convey a gas under pressure, directly underlies the wire at the transfer portion and the nozzle 24 is very closely spaced from the wire at the transfer portion thereof.

It will be seen that a gas blast from the nozzle 24 will be effective to transfer the web from the wire W to the foraminous surface 54 of the roll 53. The foraminous surface of the roll 53 prevents the possibility of air "pocketing" or the formation of air pressure areas which could possibly interfere with effective web transfer. The gas blast from the nozzle 24 is also directed through the foraminous wire W in such a manner that it aids in retaining the web on the foraminous roll surface 54 during web passage from the wire W to the felt F. In addition, the cooperating rolls 17, 39 and 53 are closely spaced so as to define a restricted area therebetween which is placed under gas pressure from the conduit 22 to further aid in retaining the web on the roll 53.

Removal of the web from the foraminous surface 54 is facilitated by the provision of a gas conduit 50 having an outlet nozzle 67 directed against the interior of the foraminous surface to blast the web therefrom into the felt F. The weight of the web imparts an additional vertical component in aiding transfer of the web by the gas blast from the nozzle 67. Thus, complete web transfer from the foraminous roll surface is insured and the air blast serves to retain the web on the felt until complete transfer has been accomplished. The web on the felt F is next conveyed to the pressure nip defined by the press rolls 32 and 33.

It will be noted that the relatively weak, wet web is

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supported throughout the entire transfer operation, the web being successively carried by the wire W, the roll 53 and the felt F. Thus, the subsection of the web to tension across an open draw is eliminated.

If desired, the roll 53 may be spaced from both the wire W and the felt F through a distance greater than the thickness of the web carried thereon. The gas blast will be sufficient to move the web off of the forming wire onto the foraminous surface 54 and from the foraminous surface 54 onto the felt F without being in simultaneous contact with a pair of supporting members.

It will further be noted that the present invention provides means for transferring a web to a felt without relying upon the sealing effect of the web against the felt, thereby making possible the operation of the felt and the web in as dry condition as possible in order to fully utilize water removal within the loop of the forming wire.

In that embodiment of the invention illustrated in Figure 6 of the drawings, a forming wire W is trained about a plurality of successive suction boxes 70 and a relatively small turning roll 71 for deflecting the wire W downwardly toward a primary turning roll 72 substantially identical with the roll 17 hereinbefore described. A wire tensioning roll 73 is positioned outside the loop of the wire W on the return reach thereof, as is conventional in the art. A gas conduit 22 having an outlet nozzle 24 closely underlying that reach of the wire between the first turning roll 71 and the second turning roll 72 is adapted to effect transfer of the web carried by the wire W to an upper press felt F trained about the solid felt guide rolls 74 and 75.

The transfer to the felt F1 is accomplished substantially as hereinbefore described with the air blast being directed along that portion of the felt lapped about the relatively large guide roll 75 to insure retention of the web by the felt. A bottom press felt F2 is lapped about guide rolls 76 and 77 for cooperation with the felt F1 to confine the web therebetween. The web confined between the felts is then conveyed to a suction press including an upper press roll 78 cooperating with a lower suction press roll 79 to define therebetween a suction press nip 80.

It will be noted in this instance that the upper roll 75 serves to bridge the gap between the forming wire W and the lower press felt F2. In this instance, it is not necessary to employ a gas blast to transfer the web from the bridging roll inasmuch as the bridging roll is lapped by a felt which is later employed to aid in conveying the web to later apparatus, such as a press. However, the sealing effect of the web to the felt is not relied upon to effect the transfer, thus eliminating the disadvantages hereinbefore described.

In the embodiment of the invention illustrated in Figure 7, the method of the present invention is employed to transfer a web from a first press felt F3 to a second press felt F4. The felt F3 is trained through a suction press nip 82 defined by an upper press roll 83 and a lower suction press roll 84, and thence about felt guide rolls 85 and 86. A gas conduit 22 having an outlet nozzle 24 is positioned within the loop of the first press felt F3 with the nozzle serving to direct gas under pressure therethrough against the undersurface of a web carried thereby.

A second press felt F4 is trained about a press guide roll 87 closely spaced from the guide roll 85 of the first press felt F3 and thence through a pressure nip 88 defined by plain press rolls 89 and 90. A foraminous surfaced bridging roll 91, preferably substantially identical with the roll 53 of the embodiment of Figure 5, is employed to bridge the gap between the press felts F3 and F4. The roll 91 is provided with an interior gas conduit 92 having a discharge nozzle 93 directed through the foraminous surface 91 and along that reach of the felt F4 from the guide roll 87 to the press nip 88.

The press felt F3 is porous, as is conventional in the art, thereby permitting the passage of gas under pressure from the nozzle 24 to transfer a web from the felt to the roll 91. Subsequent transfer from the roll 91 to the felt F4 is facilitated by gas pressure issuing from the nozzle 93. Thus, there is no open, unsupported travel of the paper between the press sections, thereby eliminating the possibility of web breakage.

It will be understood that modifications and varia-

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tions 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 web transfer assembly comprising a looped porous web conveying means adapted to carry a paper web on its upper surface, a felt extending into closely spaced relation to said conveying means adapted to receive the paper web from the conveying means, a foraminous bridging roll superimposed upon and contacting the web carried by both said conveying means and said felt and driven thereby in synchronism therewith, means within the loop of said conveying means for directing pressured air therethrough to lift said web therefrom and to introduce the web onto said foraminous roll, and means within said foraminous roll and overlying said felt for directing pressured air through said roll to remove the web from the roll onto said felt.

2. In a paper making machine having a looped foraminous forming wire and a press felt spaced from the forming wire and trained through a press, a web transfer assembly comprising a gas conduit within the loop of said wire and closely underlying the same for connection to a source of gas under pressure, said conduit having an outlet nozzle coextensive in width with a web on said wire, a bridging roll having a continuous foraminous peripheral surface overlying and contacting the web supported by adjacent portions of said forming wire and said felt to be driven thereby for receiving said web from said wire under the influence of gas under pressure directed thereagainst through said nozzle, and a second conduit in the interior of said bridging roll for connection to a source of gas under pressure to direct gas through the foraminous surface of the roll to transfer the web from said roll to said felt for later introduction into said press.

3. In a paper making machine press section including a first porous press felt and a second press felt closely spaced therefrom, means for transferring a web from said first felt to said second felt comprising a dandy roll having a foraminous surface contacting each of said felts and bridging the gap therebetween, means within the loop of said first porous press felt for directing a blast of air therethrough to lift therefrom said web onto the surface of said dandy roll, and means in the interior of said dandy roll for directing through the foraminous surface thereof a blast of air to transfer a web from said foraminous surface to said second press felt.

4. In a paper making machine having a forming section, a press section spaced from said forming section, a dandy roll bridging said sections, and means for pivoting said dandy roll from its initial bridging position, said means including a jack carried by said press section for movement relative thereto, an actuating link secured to said jack, and trunnion means journaling said dandy roll for rotation about a longitudinal axis and actuatable by said jack and said actuating link for movement therewith to pivot said dandy roll from its bridging position by shifting the location of the longitudinal axis of said roll.

5. A web transfer mechanism for paper machines which comprises a paper machine forming section having a looped traveling forming wire and a turning roll for the end of the loop, a suction couch roll within the loop of the wire in advance of the turning roll for dewatering a web on the wire, said couch roll and said turning roll defining an unsupported wire reach therebetween, a press section following the forming section of said machine and including a looped web receiving felt, a felt guide roll closely spaced from the unsupported wire reach, means supporting said guide roll, a foraminous roll overlying the unsupported reach of the forming wire between the suction couch roll and the turning roll and overlying the guide roll to bridge the gap between the forming wire and guide roll, airblast means in the loop of the wire for blowing a web on the wire against the foraminous roll, spaced bearing wheels for said foraminous roll carried by said guide roll support means, and means for adjusting said wheels to shift the foraminous roll from its bridging position toward said guide roll.

6. A web transfer mechanism for paper machines which comprises a paper machine forming section having a looped traveling forming wire and a turning roll for the end of the loop, a suction couch roll within the loop of the wire in advance of the turning roll for

dewatering a web on the wire, said couch roll and said turning roll defining an unsupported wire reach therebetween, a press section following the forming section of said machine and including a looped web receiving felt, a felt guide roll closely spaced from the unsupported wire reach, means supporting said guide roll, a foraminous roll overlying the unsupported reach of the forming wire between the suction couch roll and the turning roll and overlying the guide roll to bridge the gap between the forming wire and guide roll, means in the interior of said foraminous roll for directing through the foraminous surface thereof a blast of air to transfer a web from said surface to said receiving felt, airblast means in the loop of the wire for blowing a web on the wire against the foraminous roll, spaced bearing wheels for said foraminous roll carried by said guide roll support means, and means for adjusting said wheels to shift the foraminous roll from its bridging position toward said guide roll.

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