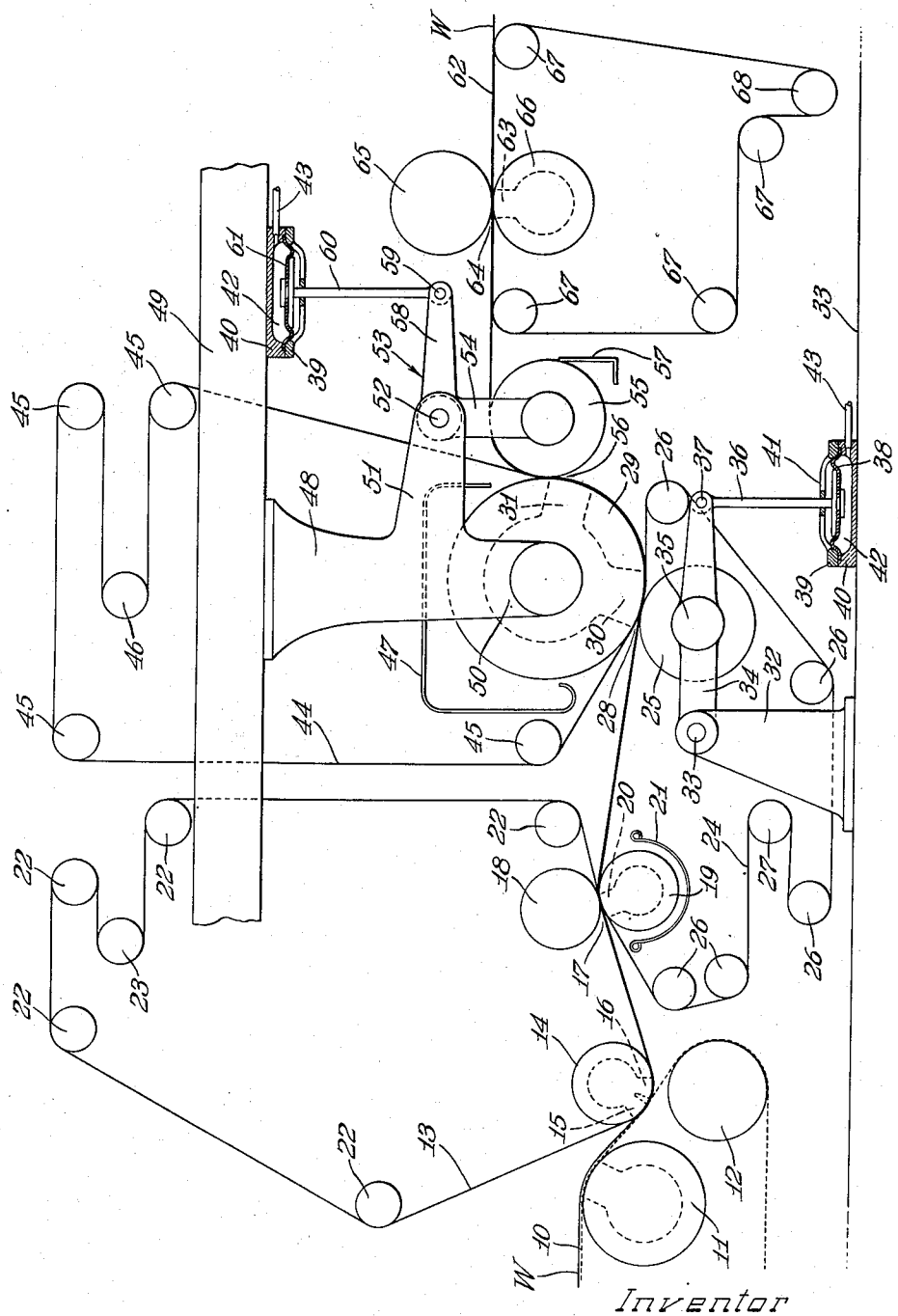
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SUCTION PRESS ASSEMBLY

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SUCTION PRESS ASSEMBLY

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The present invention relates to a multiple reverse suction press assembly for a paper making machine. Specifically the invention deals with a press section whenever a paper web is carried on a top felt from the forming surface of a paper machine to a first suction press where it is transferred to a bottom felt and conveyed to the first nip of a multi-nip reverse suction press and covered by a second top felt, conveyed thereon through the nips of the reverse press and then separated from the second felt on one of the press rolls of the reverse press for travel thereover to an additional suction press if desired.

The press of the present invention includes a single relatively large suction press roll having a plurality of peripherally spaced suction areas and a plurality of independently adjustable relatively small individual plain press rolls cooperating with the suction press roll at each of the suction areas thereof to define consecutive suction press nips. The wide adaptability of the particular press of the present invention is afforded by the employment of independent fluid pressure means for selectively urging the plain press rolls into cooperating nip relation with the suction press roll, so that nip pressure may be varied as desired and as dictated by the specific type of web being manufactured.

More particularly, the present invention contemplates the provision of a reverse suction press having a plurality of pressure nips, the first of the pressure nips being adapted to receive a substantially horizontal web run and the second nip being adapted to receive a substantially vertical web run so as to promote self drainage of moisture from the web. Also, at the terminus of the vertical web run, the web is transferred to the plain press roll and from this press roll to a later press assembly, a drier assembly, or similar portion of a paper making machine.

Another feature of the present invention which aids its wide adaptability to the various types of webs is the provision of a suction pick-up roll bearing against the paper machine forming surface at an unsupported run of the surface to thereby prevent the subjection of the relatively moist web to the nip pressure while supported on the forming surface, thereby improving the quality of paper at the web end of the machine without interfering with the effectiveness of the pick-up.

It is, therefore, an important object of the present invention to provide an improved paper machine suction press assembly adaptable for employment with a wide variety of web types and weights.

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Another important object of the present invention is to provide an improved reverse suction press assembly including a single, relatively large press roll and a plurality of independently adjustable smaller press rolls cooperating therewith to define consecutive suction press nips, including an initial horizontal press nip and a final vertical press nip.

It is a further important object of the present invention to provide an improved paper machine suction press assembly, including a suction press roll cooperating with a plurality of plain press rolls to define consecutive pressure nips adapted to receive a paper web therethrough, the pressure exerted on the web being predetermined by fluid-actuated independent means variable at will to adapt the assembly to the production of webs of various types and weights.

Still another important object of the present invention is to provide an improved paper machine press section including a suction transfer roll having a suction area at an unsupported portion of the run of the web forming surface, means for subjecting the paper web so picked up to a first press section, and a second reverse press section having a first horizontal suction press nip and a second vertical suction press nip with the force component imparted to the web at the vertical press nip aiding in the transfer of the web from the reverse press felt.

Other and further important objects of the invention will be apparent to those skilled in the art from the following detailed description of the annexed sheet of drawings which, by way of a preferred example only, illustrates one embodiment of the invention.

On the drawings:

The single figure of the drawings illustrates in schematic form a paper machine suction press assembly of the present invention.

As shown on the drawings:

Reference numeral 10 refers generally to a paper machine forming wire such as that conventionally employed in Fourdrinier-type paper making machines, the wire being trained over a suction couch roll 11 and around an imperforate turning roll 12.

A moist paper web W formed on and carried by the forming wire 10 is picked up from the wire by means of a press pick-up felt 13 trained about a suction pick-up roll 14 having a first suction area 15 directly opposing an unsupported run of the wire 10 between the couch roll 11 and the turning roll 12 and a second suction area 16 for retaining the web on the pick-up felt 13. The felt 13 is next trained through a suction nip 17

defined by a first suction press including an upper plain press roll 18 and a lower suction press roll 19. The suction press roll 19 is provided with a suction area 20 at the nip 17 and slightly in advance thereof to facilitate water removal at the nip, and the roll is partially peripherally enclosed within an arcuate water save-all pan 21. Following the passage of the pick-up felt 13 through the nip 17, the felt is trained about a plurality of felt guide rolls 22 and a stretcher roll 23 for maintaining the felt in taut condition.

A lower press felt 24 is trained through the nip 17 in conjunction with the pick-up felt 13, the lower press felt being trained about the suction press roll 19 and a plain lower press roll 25 of a second or reverse suction press. The felt 24 is maintained in proper, taut running condition by a plurality of guide rolls 26 and a stretcher roll 27. It will be seen that the suction area 20 of the suction press roll 19 serves to transfer the web from the pick-up felt 13 to the lower press felt 24 at the press nip 17, and the felt 24 serves to convey the web to a second or reverse suction press nip 28. The reverse nip 28 is defined by the plain press roll 25 within the loop of the lower press felt 24 and a superimposed suction press roll 29 having a first suction area 30 at the nip 28 and slightly forward thereof along the direction of travel of the lower press felt 24. The roll 29 is also provided with a second suction area 31 for a purpose to be hereinafter more fully described.

The solid press roll 25 is supported from a pair of upright pedestals 32 laterally spaced outside the run of the felt 24 and bearing directly upon a floor 33. The pedestal 32 carries at its upper end a pivot pin 33 attaching to the pedestal an elongated arm 34 journalling intermediate its length, as at 35, the roll 25. The free end of the arm 34 remote from the pedestal 32 carries a depending actuating arm 36 pivoted thereto as at 37 and secured to a flexible diaphragm 38 peripherally clamped between an upper casing section 39 and a lower casing section 40. The upper casing section 39 is provided with a central spider 41 journalling the arm 36 for reciprocal vertical movement as determined by fluid pressure within a diaphragm chamber 42 defined by the diaphragm 38 and the lower casing section 40 and communicating with a source of fluid, such as air, under pressure through a conduit 43. It will be seen that the pressure at the nip 28 defined by the plain bottom press roll 25 and the suction press roll 29 may be varied as a function of and in direct proportion to fluid pressure in the diaphragm pressure chamber 42.

An upper press felt 44 is lapped about the upper suction press roll 29 and passes through the press nip 28 in conjunction with the lower press felt 24. The felt 44 is guided by press guide rolls 45 and by a stretcher roll 46 to lap both suction areas 30 and 31 of the suction roll 29. An upper save-all water pan 47 is disposed adjacent the suction roll 29 within the loop of the felt 44 to receive water from the suction press roll 29. It will be appreciated that the pan 47 is thus provided to receive water flung from the roll 29 by centrifugal force during rotation thereof.

The roll 29 is supported in position to overlie the lower plain press roll 25 by means of a pair of spaced depending support pedestals 48 secured to an overhead beam 49 and carrying a dependent lower arm 50 journalling the roll 29 for rotation. An angularly displaced side arm 51 is provided on each of the pedestals 48 to pivotally carry, as at 52, an angular support arm 53 having a lower leg 54 supporting for rotation a second plain press roll 55 cooperating with the suction roll 29 to define an additional reverse suction press nip 56. A doctor blade 57 is disposed vertically for cooperation with the roll 55 to insure the clean removal of the broke or fibrous residue from the surface of the plain roll 55.

A second horizontally extending leg 58 formed integrally with the arm 53 is pivoted, as at 59, to a dependent actuating arm 60 secured to a diaphragm 61 substantially identical with the diaphragm 38 hereinbefore described. The diaphragm 61 is peripherally confined within a casing having a lower casing section 39 and an upper casing section 40 identical with those sections 39 and 40 hereinbefore described, the diaphragm cooperating with the section 40 to define therewith a pressure diaphragm chamber 42 communicating with a source of fluid under pressure or vacuum through a conduit 43.

It will be evident that the suction area 30 of the suction roll 29 at the nip 28 serves to transfer the web from the lower press felt 24 to the upper press felt 44, and that the felt 44 serves to transfer the web about the periphery of the roll 29 to the second pressure nip 56. At the nip 56, the web is transferred to the plain press roll 55, inasmuch as the suction area 31 is in advance of the vertical nip 56. The felt run from the nip 56 is somewhat inclined laterally along the direction of web travel while still being substantially vertical, so that those vertical and lateral components imparted to the web while on the felt aids in transferring the web to the roll 55. From the roll 55, the web is transferred through an open draw to a final press felt 62 lapping the suction area 63 of a suction press nip 64 defined by an upper plain press roll 65 and a lower suction press roll 66. The felt 62 is guided by a plurality of felt guide rolls 67 and a stretcher roll 68.

From the structure hereinbefore described, it will be seen that the present invention provides a complete suction press assembly including a pick-up felt for removing a web from the wet end of a paper forming machine, a first press section for subjecting one side of the web to suction, a second press section for subjecting the reverse surface of the web to the action of a pair of consecutive suction areas, and a final press section for again subjecting the first side of the web to suction. The pick-up felt removes the moist web from the forming wire at an unsupported wire run, thus preventing the subjection of the moistened web to a press nip while still supported on the wire. The still relatively moist web is confined at the first press section between a pair of cooperating felts 13 and 24 to prevent possible web damage due to nip pressure, and the first of the reverse press nips is likewise effective on the web while the web is confined between a pair of felts. The second reverse press nip 56 is substantially vertical to aid in water removal in conjunction with the suction area 31 of the roll 29, while the vertical nip 56 makes possible imparting of both lateral and vertical components to the web to aid in transferring the web to the plain press roll 55.

The present invention also provides novel means for providing a dual reverse suction press employing a single large suction press roll and means for independently controlling the pressure at each press nip by the urging of plain press rolls against the single suction press roll under fluid pressure.

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

I claim as my invention:

1. In a press assembly for a paper making machine, a first press section, a dual reverse press section including a pair of consecutive suction press nips, a press felt trained through said first press section, a second press felt trained through each of the nips of the reverse press section, and a third felt trained through said first press section and the initial nip of said reverse press section to transfer a web from said first felt to said second felt.

2. In a paper machine press assembly, a first suction press nip, a first felt trained through said first nip, a later reverse press section including a pair of consecutive reverse press nips, a second press felt trained through each of said reverse press nips, a third press felt trained through said first press section and the first nip of said second reverse press section for cooperation consecutively with said first felt and said second felt, said third felt at the first section lapping a suction area at the nip thereof to transfer a web from said first felt to said third felt and said third felt coacting with said second felt as said second felt laps a suction area at said first reverse press nip to remove the web from said third felt.

3. In a press assembly for a paper making machine having a looped forming wire for conveying a moistened paper web, a press assembly including a first press section having a suction nip and a reverse press section having consecutive suction nips, a pick-up felt trained through the nip of said first press section and bearing against an unsupported run of said forming wire to remove the web therefrom, a second press felt trained through both nips of said reverse press, and a third press felt trained through the suction nip of said first press section to remove the web from said pick-up felt at said nip and trained through the first nip of said reverse press section to transfer said web to said second felt.

4. A press assembly for a paper making machine adapted to successively subject opposite faces of a paper web to suction while the web is pressed which comprises a first looped pick-up felt, a suction roll in the loop of said first felt having a first suction area arranged to pick up a moist paper web from its forming surface and a second suction area arranged for holding the web on the under face of the felt, a bottom press felt arranged to cover the web on the under face of the first pick-up felt, a first suction press having a suction roll acting through said bottom felt and a plain press roll squeezing the web between the first pick-up felt and the bottom felt against the suction area of said suction roll, a multi-nip reverse press including a single suction roll and independently adjustable plain rolls at each suction area of the suction roll, a second top felt trained around said single suction roll of the reverse press and over the suction areas thereof, said bottom felt passing through the first nip of the reverse press for conveying the web thereon to the second top felt, means for partially lapping the bottom felt around the second top felt on the suction roll of the reverse press to assist in transfer of the web to the second top felt, and a second plain roll coacting with the single suction roll of the reverse press to define a vertical passage nip receiving the second top felt and web therethrough, and means directing said second top felt to partially lap the web around said second plain roll for transfer of the web to the second plain roll, and a water-collecting pan disposed around the top portion of the single suction roll of the reverse press to receive water therefrom and prevent remoistening of the felt and web.

5. In a press assembly for a paper making machine, a first press section, a dual reverse press section including a pair of consecutive suction press nips, a press felt trained through said first press section, a second press felt trained through each of the nips of the reverse press section, a third felt trained through said first press section and the initial nip of said reverse press section to transfer a web from said first felt to said second felt, and means for varying the nip pressure at said dual reverse press by the utilization of fluid under pressure.

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