Nov. 8, 1960 L. HORNBOSTEL 2,959,222

PICKUP AND PRESS SECTION

Filed June 5, 1957 2 Sheets-Sheet 1

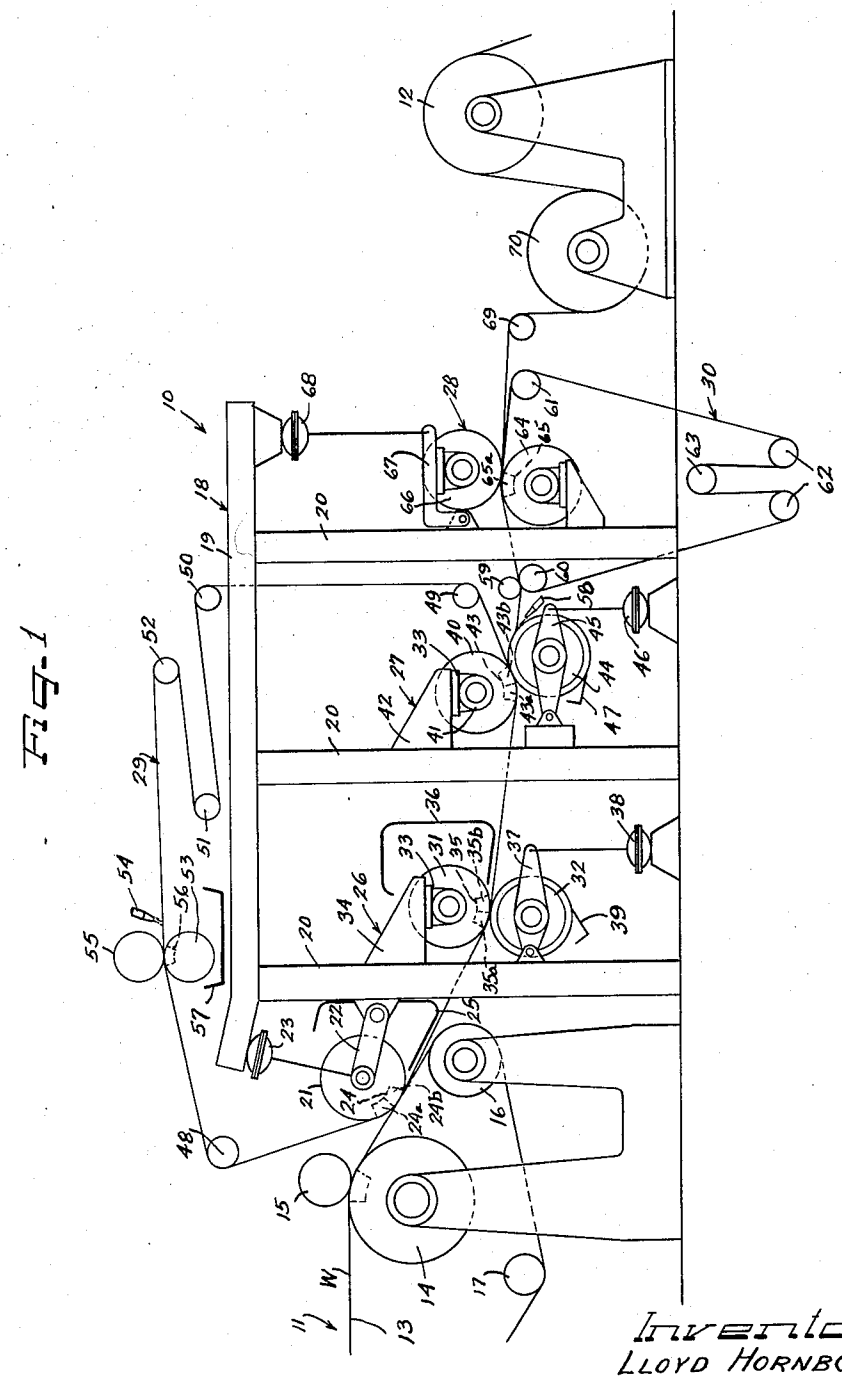


Fig. 1

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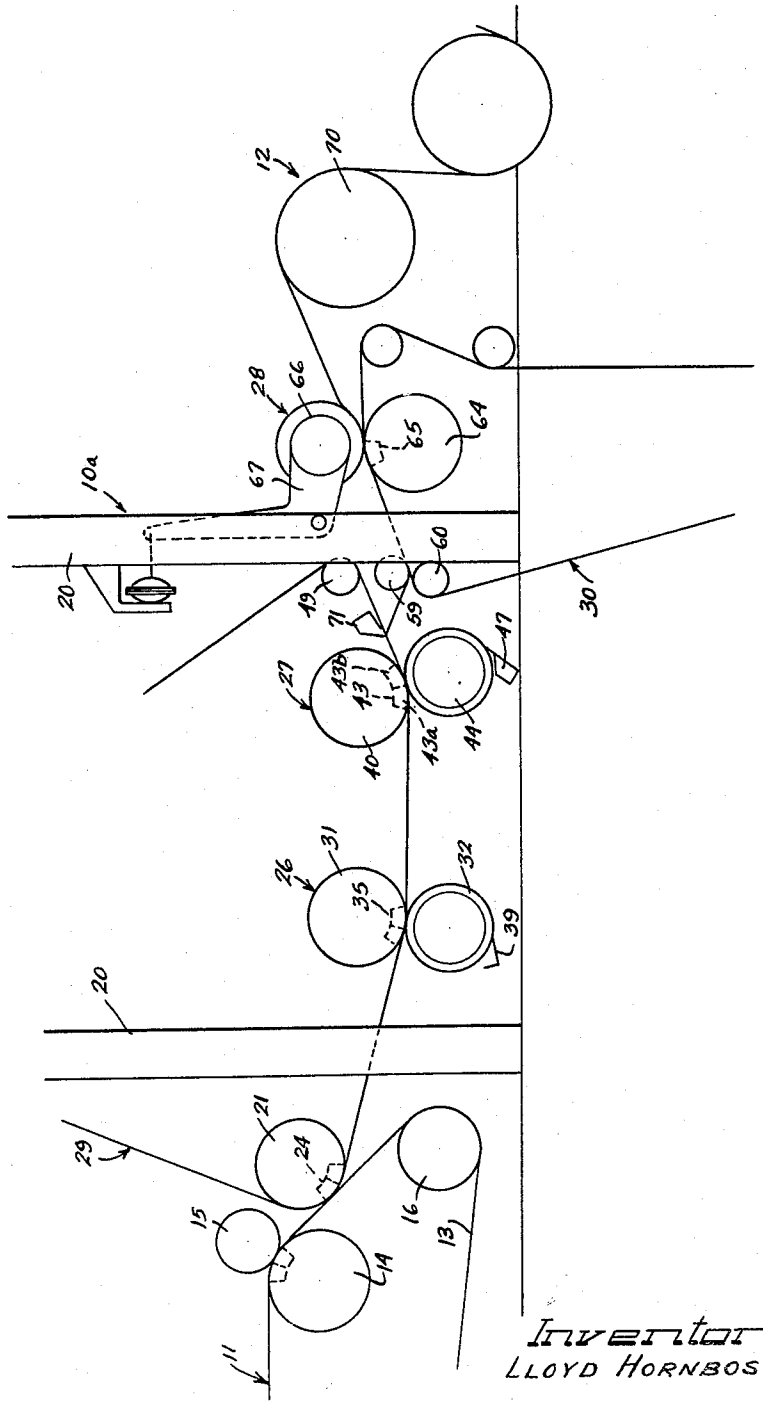


Fig. 2

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PICKUP AND PRESS SECTION

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9 Claims. (Cl. 162—360)

This invention relates to a press section for a paper-making machine which utilizes a single felt to pick up the newly formed web from the forming section of the paper machine and carries the web through a plurality of presses. Specifically, this invention relates to a straight through suction transfer and press assembly for a paper-making machine wherein a single felt supports the web through the suction pickup, primary press and secondary press treatments without permitting the web to be crushed and while permitting the wire side of the web to be treated by plain, smooth-surfaced rolls.

Heretofore, straight through suction pickup and transfer press assemblies were unable to accommodate secondary pressing of the web while still retained on the pickup felt. Attempts to incorporate a plurality of presses for use with the pickup felt resulted in crushing of the sheet, complicated felt runs with reverse turns and the like difficulties which rendered such multiple press treatment unsatisfactory.

The present invention now provides a straight through pickup and press assembly free from reverse turning of the web and subjecting the web to a plurality of pressing operations while still supported by the pickup felt and without crushing the web. The press assembly of this invention treats the wire side of the freshly formed sheet on the hard, plain-surfaced rolls which impart a desired finish to the wire side of the sheet and then the sheet is delivered to a press felt which receives the wire side of the sheet and conveys the sheet through a third press which treats the non-wire side of the sheet with a hard, plain-surfaced roll. Therefore, the pickup and press assembly of this invention revceives the freshly formed web directly from the forming surface, subjects the web to at least three pressing operations and delivers a self-sustaining sheet which can be fed directly into the dryer section of a paper machine.

A feature of this invention is the utilization of a pair of oppositely inclined presses receiving the pickup felt therethrough and each equipped with a plain, hard-surfaced roll which is easily cleaned by a self-dumping doctor. The top roll of each of these presses is a suction roll which is suspended from brackets that are carried by a main framework having its supports spaced at a width greater than the width of the pickup felt so as to be outside of the felt area. This arrangement accommodates easy installation of new felts. The plain, hard-surfaced bottom rolls are preferably so related that the first press has a relatively softer cover on its bottom roll than the cover on the bottom roll of the second press. The bottom roll of the first press is disposed slightly in advance of or upstream from the top roll while the bottom roll of the second press is disposed somewhat behind or downstream from its top roll. This arrangement provides a desired lapping of the web and felt as it passes around the top suction rolls of each press.

Another feature of this invention resides in the utilization of swing supports for the bottom rolls of the primary and secondary presses to accommodate quick opening of the nips and accurate maintenance of desired nip pressures. The primary press is thus easily controlled to avoid crushing of the web.

It is then an object of this invention to provide a suction pickup and press assembly for a paper-making machine wherein a single pickup felt supports the web through the pickup and through a plurality of pressing operations.

Another object of this invention is to provide a suction transfer and press assembly for a paper-making machine wherein a single pickup felt carries the web from the pickup roll through a plurality of presses while the wire side of the web is subjected to finishing operations in the presses.

Another object of this invention is to provide a straight through suction pickup and press assembly which sufficiently dewaters the web so that it can be transferred from the pickup felt without the use of a suction transfer press.

Another object of the invention is to provide a straight through suction pickup and press assembly in which the direction of travel of paper is substantially unchanged and where any changes of direction of travel are under 30°.

A still further object of this invention is to provide a pickup and press section for paper-making machines wherein two felts accommodate at least three pressing operations.

Another object of this invention is to provide a straight through suction transfer and press assembly for paper machines wherein two felts accommodate at least three presses as well as a suction pickup roll and support the web so that both its wire side and non-wire side are treated by plain, hard-surfaced rolls during the pressing operations.

A still further object of this invention is to provide a straight through suction pickup and multiple suction press assembly for a paper machine wherein a top pickup felt supports the web through a plurality of presses and wherein the presses have smooth-finished surfaces and are equipped with self-dumping doctors to maintain the surfaces in a smooth, clean condition thereby eliminating the need for broke conveyors and special handling of the broke.

Other and further objects of this invention will be apparent from the following detailed description of the annexed sheets of drawings which illustrate one embodiment of this invention.

On the drawings:

Figure 1 is a somewhat diagrammatic, fragmentary, side elevational view of the pickup and press assembly of this invention.

Figure 2 is a fragmentary, diagrammatic view of a slightly modified suction pickup and press assembly according to this invention.

As shown on the drawings:

In Figure 1, reference numeral 10 designates generally a preferred form of suction pickup and press assembly. This assembly 10 is positioned between the Fourdrinier forming part 11 and drying section 12 of a Fourdrinier paper machine. As shown, the Fourdrinier forming part includes the conventional traveling forming wire 13, a suction couch roll 14 within the loop of the wire 13, a lump breaker roll 15 coacting with the couch roll 14, a wire turning roll 16, and a bottom directing wire roll 17. A web W formed on the upper run of the forming wire 13 passes between the couch roll 14 and the lump breaker roll 15 together with the wire. The wire and the web travel along a downward inclined run of the wire between the couch roll 14 and turning roll 16.

The pickup and press section 10 has a main framework 18 including a top horizontal framework 19 supported on vertical posts 20. A suction pickup roll 21 is supported on swing arms 22 from two of the posts 20 and the position of these swing arms 22 is controlled by a loading device 23 carried by the top beam 19. The loading device can take the form of a pneumatic supported diaphragm or a hydraulic or pneumatic cylinder assembly. A suction gland 24 in the perforated suction pickup roll 21 defines a plurality of suction areas 24*a* and 24*b* at the bottom of the roll. The first suction area 24*a* has a lower vacuum than the second suction area 24*b*. A saveall tray 25 is provided to receive water that might be discharged from the cylinder of the roll 21.

A primary press assembly 26, a secondary press assembly 27, and a third press assembly 28 are provided in the press section 10 and are supported by the framework 18 as shown. A looped pickup felt 29 is trained under the suction transfer roll 21, through the nip of the first press 26, and thence through the nip of the second press 27 to carry the web W along its underrun. The web is separated from the pickup felt 29 after it passes through the nip of the second press 27. The third press 28 is equipped with a press felt 30 which receives the web from the second press 27.

The first press 26 includes a top suction press roll 31 and a rubber-covered plain bottom press roll 32. The top roll 31 is supported on bearings 33 from brackets 34 supported by the posts 20. The roll 31 is equipped with a suction gland 35 which defines a low suction area 35*a* and a high suction area 35*b* at the bottom of the roll. A water collecting pan or saveall tray 36 is mounted adjacent the roll 31 to receive water that is discharged from the holes in the roll and thereby prevents rewetting of the felt.

The bottom roll 32 is supported from swing arms 37 pivotally mounted on the posts 20. A loading device 38 similar to the device 23 for the roll 21, positions the swing arms 37 to control the nip pressure and to provide a nip which can be easily opened for threading of the web.

A self-dumping doctor 39 scrapes the broke from the surface of the roll 32. This roll surface is preferably composed of hard rubber of a type which is known as self-releasing and will not stick to the web or felt.

The second press 27 includes a top suction roll 40 supported on bearings 41 from brackets 42 carried by adjacent posts 20. A suction gland 43 in the roll 40 defines a low suction area 43*a* and a high suction area 43*b*, at the bottom of the roll. The press 27 has a plain, hard-surfaced bottom roll 44 mounted on swing arms 45 from adjacent posts 20 and having the position thereof controlled by a loading device 46 in the same manner as the roll 32. A self-dumping doctor 47 coacts with the roll 44 to remove broke therefrom.

The surface of the roll 44 is preferably of greater durometer hardness than the roll 32 and a granite or stonite covered roll of the self-releasing type is preferred. Alternatively, in certain applications, an open or wire covered press roll may be used at 44 and 32. In any embodiment, however, the rolls 44 and 32 are "plain rolls" in the sense that they do not have felt covering them and their surfaces directly contact the web as shown in the drawing.

The felt 29 is directed around the guide roll 48 to the suction pickup roll 21 where it laps the roll and is directed lightly against the freshly formed web on the downwardly inclined portion of the traveling forming wire 13 between the suction couch roll 14 and turning roll 16. The suction area 24*a* of the gland 24 in the roll 21 provides a pressure differential which picks the web off of the wire 13 and transfers it onto the bottom face of the felt 29. The felt with the web thereon then passes under the suction area 24*b* where initial dewatering of the web

is effected. This suction area 24*b* is at a higher vacuum than the area 24*a*. The felt with the web thereon then continues to travel in substantially the same downwardly inclined path as the forming wire but in spaced relation to the wire. The substantially parallel arrangements of downward inclined paths of the felt and wire facilitates transfer of the web without disrupting the fibers as they leave the wire. The web is then lapped under the top suction roll 31 of the first press 26 and is acted on by the low vacuum suction area 35*a* as it enters the nip of the press. The wire side of the web is then contacted by the hard surface of the roll 32 and is subjected to a smoothing operation. As the web and felt advance through the nip of the press 26, they are subjected to the high vacuum area 35*b* to effect dewatering. Water discharged from the holes of the roll 31 is received in the collecting pan 36 which overlies the bottom run of the felt thereby preventing rewetting of the felt.

The felt and web then continue along a substantially horizontal path to the second press 27 where the first suction area 43*a* acts on the felt and web before they enter the nip of the second press. A low vacuum water removal is effected to maintain the nip relatively dry. The web then contacts the hard surface of the plain roll 44 and passes through the nip and under the high vacuum suction area 43*b* of this second press. After passing through the nip of the second press, the sheet adheres to the bottom roll 44 and is supported alone on the top portion of this roll. The felt is directly upwardly from the formed sheet around a guide roll 49 and thence upwardly around another guide roll 50, a stretcher roll 51, guide roll 52, and through the nip of the pair of wringer rolls 53. A water jet 54 cleans the felt before it enters the nip of wringer rolls and the bottom wringer roll is preferably equipped with a suction gland 56. A water collecting pan 57 under the wringer rolls prevents water from dropping on the underrun of the felt. After passing through the wringer rolls, the felt is trained around the guide roll 48 and back to the suction transfer roll 21.

The paper web on the bottom roll 44 is released from the roll by air jet means 58 or the like and passes under a paper roll 59 to be deposited on the top run of the bottom press felt 30. This press felt is trained around an oncoming guide roll 60 adjacent the paper roll 59, thence through the nip of the press 28, around a guide roll 61, and under a pair of bottom guide rolls 62 and over the stretcher roll 63.

The third press includes a bottom suction roll 64 with a suction gland 65 defining a suction area 65*a* spanning the nip of the press. A plain-surfaced roll 66 provides the top roll of the press and is supported on swing arms 67 from adjacent posts 20. The swing arms are controlled by a loading device 68 similar to the devices 23 and 38 previously described.

The web is carried on the top run of the felt 30 over the suction area 65*a* and through the nip of the press 28 where the hard surface of the top roll 66 will smooth the non-wire side of the web. After passing through the nip of the third press, the web is sufficiently dewatered to enter the press section 12 and is directed around a guide roll 69 onto the first drying cylinder 70 of the drier section 12.

It will be noted that the primary and secondary presses 26 and 27 are oppositely inclined with the top rolls 31 and 40 thereof being disposed closer together than the bottom rolls 32 and 44. This arrangement positions the respective sections of the presses so that the web and felt will be directed therethrough in proper lapped relation to the top rolls and suction areas thereof without requiring additional guide rolls. The self-loading devices for the rolls 21, 32, 44 and 66, are quick-operating to position the rolls as desired for applying the proper pressure to the web and felts. The roll 32 is accurately adjusted to regulate the nip of the first press so it will not crush the sheet which has just been picked off of its forming surface.

The nip can be opened wide to facilitate threading of the newly formed sheet onto the press section.

From the above description it will be noted that the web is subjected to at least three suction treatments and two press operations while it is still supported by the pickup felt without subjecting the web to any reverse turns or acute turns. At the same time, the wire side of the web is subjected to a plurality of smoothing operations. The single press felt **30** supports the web so that its non-wire side is subjected to a smoothing operation at the third press.

In the diagrammatic modified showing of Figure 2, corresponding parts to the parts described in Figure 1, have been marked with the same reference numerals.

In Figure 2, the alternate suction press and transfer assembly **10***a* includes a modified second press **27** with a suction gland **43** so arranged that the high vacuum area **43***b* extends beyond the nip and is effective to retain the web on the felt **29** instead of permitting the web to follow the roll **44**. The web and felt then travel along and upwardly inclined path to the guide roll **49**. However, an air jet **71** is provided in the loop of the felt between the suction roll **40** and guide roll **49** to furnish air to release the web from the underface of the felt. The web W then passes under the paper roll **59** which is positioned over the top run of the felt **30** at the guide roll **60**. The felt **30** then carries the web through the nip of the third press **28** in the same manner as described above.

The alternate suction transfer and press assembly **10***a* thus operates in the same manner as the assembly **10** except for the retention of the web on the pickup felt **29** beyond the press **27**.

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

I claim as my invention:

1. A straight through suction transfer and press assembly adapted to receive a wet web from a paper-making machine forming surface and to deliver a self-sustaining sheet to the dryer section of the paper machine which comprises, a looped pickup felt, a suction pickup roll in the loop of the felt directing the felt against a web on the paper machine forming wire and effective to transfer the web to the felt, a first press having a nip receiving the pickup felt and web therethrough and including a suction press roll with a suction area acting through the felt on the web and a plain roll acting on the wire side of the web to smooth the web, a second suction press assembly having a nip receiving the felt and web from the first press assembly and including a suction roll within the loop of the pickup felt acting through the felt on the web and a plain roll acting on the wire side of the web to smooth the web, a third press, a press felt trained through the nip of the third press, means for transferring the web to the press felt for travel therewith through the third press, said third press including a suction roll acting through the press felt on the web, and a plain roll acting on the non-wire side of the web to smooth the web.

2. A straight through suction transfer and press roll assembly which comprises a looped pickup felt, a suction pickup roll in the loop of the pickup felt, first and second suction presses having suction rolls in the loop of the same pickup felt, and plain-surfaced rolls coacting with the suction press rolls outside of the loop of the same pickup felt to smooth the wire side of a web on the felt.

3. A straight through suction pickup and press assembly for a Fourdrinier type paper-making machine having a forming wire with a downwardly inclined run between a suction couch roll and a turning roll which comprises a looped pickup felt, a suction pickup roll in the loop of said felt directing the felt against a web on the downwardly inclined run of the forming wire between the couch roll and turning roll, a first press having a nip receiving the felt and web from the suction pickup roll and directing the felt at a small angle relative to said downwardly inclined run of the wire, a second press having a nip receiving the web and felt from the first press, said first and second presses including suction rolls in the loop of the pickup felt acting through the felt on the web, said first and second presses having plain bottom press rolls acting on the wire side of the web, and said pickup felt forming the sole support for the web from the wire through both presses.

4. A straight through suction pickup and transfer press assembly for paper-making machines which comprises a single looped pickup felt, three suction rolls in the loop of said felt including a suction pickup roll and a pair of suction press rolls, a plain roll coacting with each suction press roll providing therewith a nip receiving the felt and web thereon from the suction pickup roll, each of said plain rolls acting directly on the wire side of a web on the felt, and self-dumping doctors coacting with said plain rolls.

5. In a Fourdrinier type paper-making machine having a forming section with a traveling forming wire and a dryer section spaced from the discharge end of the forming wire, the improvement of a straight through suction pickup and suction press roll assembly in the space between the forming wire and the dryer section of said machine, said assembly including a pickup felt and a press felt, a suction transfer roll in the loop of the pickup felt for directing the pickup felt against the forming wire to receive a web therefrom, a plurality of suction presses having nips receiving the pickup felt therethrough, each of said suction presses having a suction roll in the loop of the pickup felt and a plain roll outside of the loop of the pickup felt for directly acting on the wire side of the web carried by the pickup felt, a third press having a nip receiving the press felt therethrough, means for transferring the web from the pickup felt to the press felt with the wire side of the web directly supported on the press felt, and said third press having a plain roll acting on the non-wire side of the web on the press felt to smooth the web.

6. A straight through pickup and press assembly for paper-making machines which comprises a looped pickup felt, a suction pickup roll and a plurality of suction press rolls in the loop of the same pickup felt arranged to successively act through the felt on an advancing fibrous web without changing the direction of travel of the web more than 30 degrees, and plain, hard-surfaced web-finishing rolls outside the loop of the same pickup felt coacting with the suction press rolls in nip-defining relation.

7. In a Fourdrinier paper-making machine having a forming wire with a downwardly inclined run between a couch roll and a turning roll and a dryer section spaced downstream from the inclined run of the forming wire, the improvement which comprises a straight through pickup and press assembly in the space between the couch roll and dryer section including a looped top pickup felt having an active bottom run, a looped bottom press felt having an active top run downstream from the bottom run of the pickup felt, a suction pickup roll and a plurality of top suction press rolls in the loop of the top pickup felt acting through the active bottom run thereof, said pickup roll directing the bottom run of the pickup felt over the downwardly inclined run of the forming wire to receive a web therefrom, a plain bottom roll outside of the loop of the pickup felt coacting with each suction press roll in nip-defining relation adapted to smooth the wire side of the web on the underrun of the pickup felt, one of a pair of top suction press rolls and plain bottom rolls being downstream of another pair of said suction press and plain rolls and defining a nip receiving the pickup felt and web from said other pair, a bottom suction press roll in the loop of the press felt acting through the top run thereof, a plain top press roll coacting with the bottom suction press roll in nip-defining relation, swing arms supporting said pickup roll, said bottom plain rolls, and said top plain roll, fluid pressure actuated loading de-

vices coacting with said swing arms to adjust the positions of said rolls, and means for transferring the paper web from the bottom run of the pickup felt to the upper run of the press felt for travel thereon over the bottom suction press roll to the dryer section.

8. A straight through suction pickup and press assembly for paper-making machines which comprises a looped top pickup felt, a looped bottom press felt downstream from said pickup felt, a suction pickup roll in the loop of the top pickup felt positioned to guide the underrun of the felt over a Fourdrinier forming wire, a plurality of suction press rolls in the loop of the pickup felt in spaced relation downstream from said pickup roll to guide the underrun of the pickup felt with the paper web thereon and to act through the felt, a suction press roll in the loop of the press felt receiving the upper run of the felt thereover, a plain roll coacting with each of said suction press rolls to successively smooth the wire and non-wire sides of the web as it is carried by the respective felts, and fluid pressure actuated loading means for each of said plain rolls to regulate the nip pressures of the suction presses.

9. A straight through suction pickup and press assembly for a paper-making machine which comprises a looped pickup felt, a looped press felt, a suction pickup roll in the loop of the pickup felt, a plurality of presses having nips receiving the pickup felt therethrough, an additional press having a nip receiving the press felt therethrough, said suction pickup roll and said presses being arranged so that a web of paper picked up from the paper-making machine is carried by the pickup felt and by the press felt in a substantially straight line without being subjected to changes of direction as it passes through the nips of said presses.

References Cited in the file of this patent

UNITED STATES PATENTS

2,653,523	Hornbostel	Sept. 29, 1953
2,686,463	Hornbostel	Aug. 17, 1954
2,694,348	Beachler	Nov. 16, 1954
2,696,149	Hornbostel	Dec. 7, 1954
2,744,453	Hornbostel	May 8, 1956
2,882,968	Beachler	Apr. 21, 1959