Nov. 3, 1959 L. HORNBOSTEL 2,911,040

PRESS SECTION

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Fig. 1

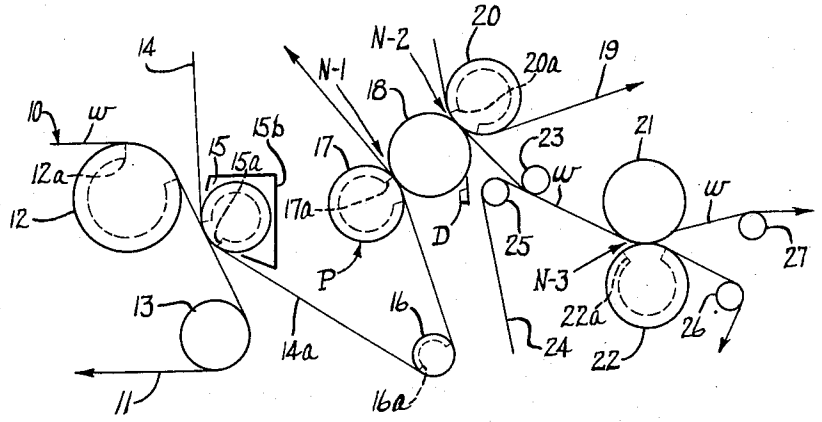
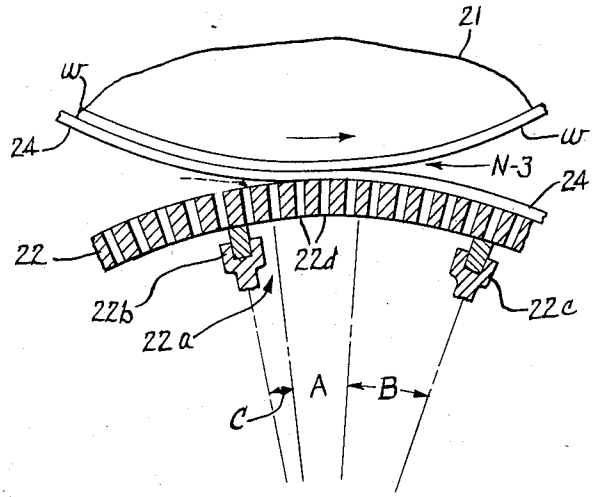


Fig. 2



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PRESS SECTION

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7 Claims. (Cl. 162—305)

This invention relates to paper machines, and more particularly, to a suction press for a paper machine wherein improved dewatering and web guidance is obtained.

In the paper making art it is conventional practice to pass a moist paper web supported on a press felt through one or more suction presses, whereby moisture is removed from the web by mechanical nip pressure of a pair of cooperating press rolls, together with suction exerted at the press nip. Generally, Fourdrinier type paper making machines are designed to dry a web sufficiently by suction while still on the forming wire so that suction alone in a later press section is not effective to further dewater the web. Accordingly, the use of mechanical pressure either alone or in conjunction with suction is necessary for further dewatering. Press felts are generally used to convey the web from the forming wire to the paper machine press section, and the felts also serve to absorb moisture from the web in surface contact therewith.

As will be appreciated, both the web and the felt are squeezed when passing through the press nip. Such squeezing serves to dewater both and the water squeezed therefrom flows in part into the perforations in the suction press roll at the nip. Heretofore, it has been assumed that the suction area must be covered by felts alone or by the felt and the web. The suction area in a suction press roll extends from a sealing strip at the oncoming side to a sealing strip at the offrunning side of the nip. The oncoming and offrunning sides being determined by the direction of travel of the felt and web.

An improvement in high speed press operation is described in Lloyd Hornbostel U.S. Patent No. 2,694,347 wherein the web is separated from the felt at both the oncoming and offrunning sides of the suction area (which straddles the press nip), so that improved drying action and opening of the pores of the felt may be accomplished both before and after the press nip.

The instant invention is based upon different concepts, which apply particularly to certain types of press section arrangements. It has been found that the arrangement of Lloyd Hornbostel U.S. Patent No. 2,694,347 may not be practical in certain press sections, because of the particular type of web being handled, or the moisture content of the web, or the actual positioning of the press rolls. It has also been found that during extensive surface contact between a web and a felt, the felt picks up moisture from the web and, if it is travelling on the underside, effects an accumulation of moisture along the bottom side of the felt. The instant invention is based upon this discovery and the discovery of a suction press arrangement which is particularly useful in certain press section designs and which is particularly effective in the removal of excess water from the felt.

In the instant invention, the felt and web are separated immediately upon leaving the nip, with the felt

being retained on the entire suction area at the offrunning side so as to permit air to open the pores of the felt, in substantially the manner described in Lloyd Hornbostel U.S. Patent No. 2,694,347. In this invention, however, on the oncoming side the felt urges the web up against the surface of a bare press roll, so as to leave uncovered substantially the entire suction area in the suction roll at the oncoming side of the nip. This results in a sweeping effect of the air following the bottom of the web and passing in through the perforations in the suction roll at the oncoming side. This sweeping of air results in the removal of water tending to accumulate along the bottom side of the felt, so that a substantial amount of water is drawn from the felt as it enters into the press nip. It has been found that this results in unique advantages in the operation of certain press sections, and particularly press sections wherein it is of advantage to pick up the web from a prior nip almost immediately after that nip with the instant felt in question. In such an arrangement the relatively wet web passes from the first nip and is received immediately by the felt. This felt then carries the web into the suction press of the instant invention.

It is, therefore, an important object of the instant invention to provide an improved suction press.

It is a further object of the instant invention to provide an improved paper machine suction press comprising a pair of press rolls defining a press nip therebetween, at least one of said rolls being a suction roll having a suction area straddling said nip, and a looped felt lapping said suction roll, said felt being separated from the suction roll surface to permit air to sweep between the felt and the suction roll immediately before the nip and after the oncoming limit of the suction area.

Other and further objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed disclosure thereof and the drawings attached hereto and made a part hereof.

On the drawings:

Figure 1 is a diagrammatic elevational view of a paper machine press section embodying the instant invention; and

Figure 2 is a fragmentary detail elevational view with parts broken away and parts shown in section of a press nip and its immediate environment for the suction press of the instant invention.

As shown on the drawings:

In Figure 1, the reference numeral **10** indicates generally a paper machine comprising a looped forming wire **11** whereon a web W is formed and the forming wire **11** travels over a suction roll **12**, which is a couch roll with suction area **12***a*; and the wire **11** passes around a turning roll **13** to reverse the direction thereof.

In the machine **10**, there is provided a looped pickup felt **14**, a suction pickup roll **15** (with suction area **15***a* and save-all pan **15***b*) within the loop of the pickup felt **14** urging the pickup felt **14** against the web W on the forming wire **11** to transfer the web W to the underside of pickup felt **14**, and a guide roll **16** within the loop of the pickup felt **14** and cooperating with the suction pickup roll **15** to define a downwardly inclined reach **14***a* of the pickup felt **14**. The guide roll **16** is provided with a suction area **16***a* for retaining the web W upon the felt **14** as it is reversed around the guide roll **16**.

Above the guide roll **16** there is positioned a reverse press, indicated generally by the reference numeral P, comprising a first suction press roll **17** presenting a suction area **17***a* within the loop of the pickup felt **14**, a plane surfaced or bare roll **18** defining a first press nip N–1 with the first suction press roll **17**, a press felt **19**,

a second suction press roll **20** with a suction area **20***a* within the loop of the press felt **19** defining a second press nip N–2 with the plane surfaced roll **18**. The press nip N–1 extends generally upwardly and is aligned angularly with respect to the first felt reach **14***a* of the felt **14**. The suction area **17***a* extends from the oncoming side to just about the main nip or pressure area for the nip N–1. The web W is transferred at the nip N–1 onto he bare roll surface and on this surface the web W remains as it passes through the second nip N–2. At the second nip N–2, the suction area is arranged (in accordance with the principle of Hornbostel U.S. Patent No. 2,694,347) in that the suction area **20***a* straddles the press nip N–2 and the press felt **19** covers the entire suction area **20***a*, but is itself uncovered by the web for the greater portion of its travel at both the oncoming and offrunning sides of the nip N–2.

Next in Figure 1, there is shown an upper plane roll **21** and a lower suction roll **22**, with suction area **22***a*, defining a press nip N–3. If an attempt is made to feed the web W directly from the second nip N–2 to the third nip N–3, without the support of a felt, there is a tendency for the web to waver in its course of travel, and this may lead to breaks in the web at this area. Accordingly, it is particularly advantageous to pass the web W beneath a small guide roll **23** which urges the web W against the top side of a press felt **24** at or near a felt roll **25**. The press felt **24** is urged gently against the web W at the roll **23**. The rolls **23** and **25** are mounted immediately after the nip N–2, so that the web W may pass therethrough without the slightest waver in its travel. It may be mentioned also that a doctor D is mounted on the bare roll **18** for the usual purposes in keeping the roll **18** clean and also for handling of "broke" during startup. The web W is thus taken from the surface of the bare roll **18** prior to the doctor D and passed between the rolls **23** and **25**. Thereafter, the web W is carried by the felt **24** into the nip N–3.

As will be noted from Figure 1, the felt **24** turns around a guide roll **26** at the offrunning side of the nip N–3 so that the felt covers the entire offrunning side of the suction area **22***a*, but is uncovered by the web W during most of its run on the offrunning side of the suction area **22***a*, because the web W is guided away by a roll **27** (and by its natural tendency to adhere to the bare roll surface **21**). This feature of the arrangement for the press rolls **21** and **22** is similar to that described in Hornbostel U.S. Patent No. 2,694,347, and will also be brought out in Figure 2 of the instant description.

Referring now to Figure 2, it will be seen that the bare roll **21** carries the web W away from the nip N–3, immediately after pressure is relieved at the nip N–3, so that the felt **24** covering the offrunning suction area is uncovered by the web during the majority of its travel at the offrunning side of the nip N–3.

As is indicated the nip pressure is applied during an area expressed by the angle A shown in Figure 2, and the felt **24** is uncovered by the web W at the offrunning side through an angle B. The angle B is greater than the angle A. The suction area **22***a* for the suction roll **22** extends, as shown in Figure 2, from an oncoming limit defined by the oncoming sealing strip **22***b* to an offrunning limit defined by the offrunning sealing strip **22***c*. In actual practice, the offrunning area B is two to ten times greater than the nip area A and the oncoming area C is of substantially smaller size than A or B.

An important feature here, however, is that the oncoming area C of the suction roll **22** is not covered by either the felt **24** or the combination of the felt and the web W. Instead, the suction area C is substantially uncovered by both the felt **24** and the web W. The web W is urged by the felt **24** against the bare roll **21** at the oncoming side. During the travel of the felt **24** from the initial guide rolls **23**, **25** of Figure 1 to the nip N–3, a substantial amount of water is picked up by the felt **24** from the web W. Since the felt **24** is beneath the web W, there is a tendency for loose water to accumulate at the underside of the felt **24**. This water would otherwise be forced back into the web W and the felt **24** at a press nip, if it were not for the present arrangement, which permits air to sweep beneath the felt **24** and into the oncoming area C of the suction area **22***a*. The sweeping of air tends to move loose water from the bottom of the felt **24** and also to open up the bottom portion of the felt **24** and even draw water therefrom. In this way, the felt **24** has had an additional drying effect imparted thereto prior to the nip N–3, so that it will not tend to force water back into the web W at the nip N–3. Instead, the water will tend to flow primarily from the web W through the felt **24** and into the shell perforations **22***d* at the nip area A.

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

I claim as my invention:

1. A paper machine suction press comprising a pair of press rolls defining a press nip therebetween, at least one of said rolls being a suction roll having a suction area straddling said nip, and a looped felt lapping said suction roll, said felt being separated from the suction roll surface to permit air to sweep between the felt and the suction roll immediately before the nip and after the oncoming limit of the suction area, said felt further covering the offrunning side of said suction area.

2. In a paper machine, a bare press roll, a suction press roll defining a press nip therewith, said suction roll having a suction area straddling said nip, a looped press felt lapping said suction roll and carrying a paper web through said nip, and guide means for the felt separating the felt from the suction roll immediately before the nip and after the oncoming limit of the suction area, said felt further covering the offrunning side of said suction area.

3. A paper machine suction press comprising a pair of press rolls defining a press nip therebetween lying in a plane generally tangential to booth said rolls, at least one of said rolls being a suction roll having a suction area straddling said nip, a looped felt lapping said suction roll, said felt being separated from the suction roll surface to permit air to sweep between the felt and the suction roll immediately before the nip and after the oncoming limit of the suction area, said felt covering the offrunning side of the suction area completely, and web guide means mounted on the side of said plane opposite said suction roll to maintain the felt uncovered for most of its run over the suction area at the offrunning side.

4. A paper machine comprising a first pair of press rolls defining a first press nip therebetween, means feeding a web through said first nip, a second pair of press rolls defining a second press nip therebetween, at least one of said second pair of press rolls being a suction roll having a suction area straddling said second nip, and a looped felt receiving the web at the offrunning side of said first nip and lapping the suction roll to feed the web through the second nip, said felt being separated from the suction roll surface to permit air to sweep between the felt and the suction roll immediately before the nip and after the oncoming limit of the suction area.

5. A paper machine comprising a first bare roll, a first suction roll defining a first nip therewith, a second bare roll, a second suction roll defining a second nip therewith, each suction roll having a suction area straddling its nip, a first felt feeding a web through the first nip and covering the entire suction area of the first suction roll, means maintaining the first felt uncovered by the web for most of its run on both the oncoming and offrunning sides of the first suction area, and second felt receiving the web from the first nip and feeding the web

into the second nip, said second felt being separated from the surface of the second suction roll to permit air to sweep between the felt and the suction roll immediately before the nip and after the oncoming limit of the suction area.

6. A paper machine suction press, comprising a bare roll and a suction roll defining therebetween a nip, and a looped press felt lying against the bare roll in advance of the nip and against the suction roll after the nip.

7. A paper machine suction press, comprising a bare roll and a suction roll defining therebetween a nip, and a looped press felt lying against the bare roll in advance of the nip and against the suction roll after the nip, the press felt additionally being separated from the suction roll in advance of the nip and carrying a paper web therethrough, the web being separated from the felt after the nip and being normally in contact with the bare roll.

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