

**March 12, 1963**

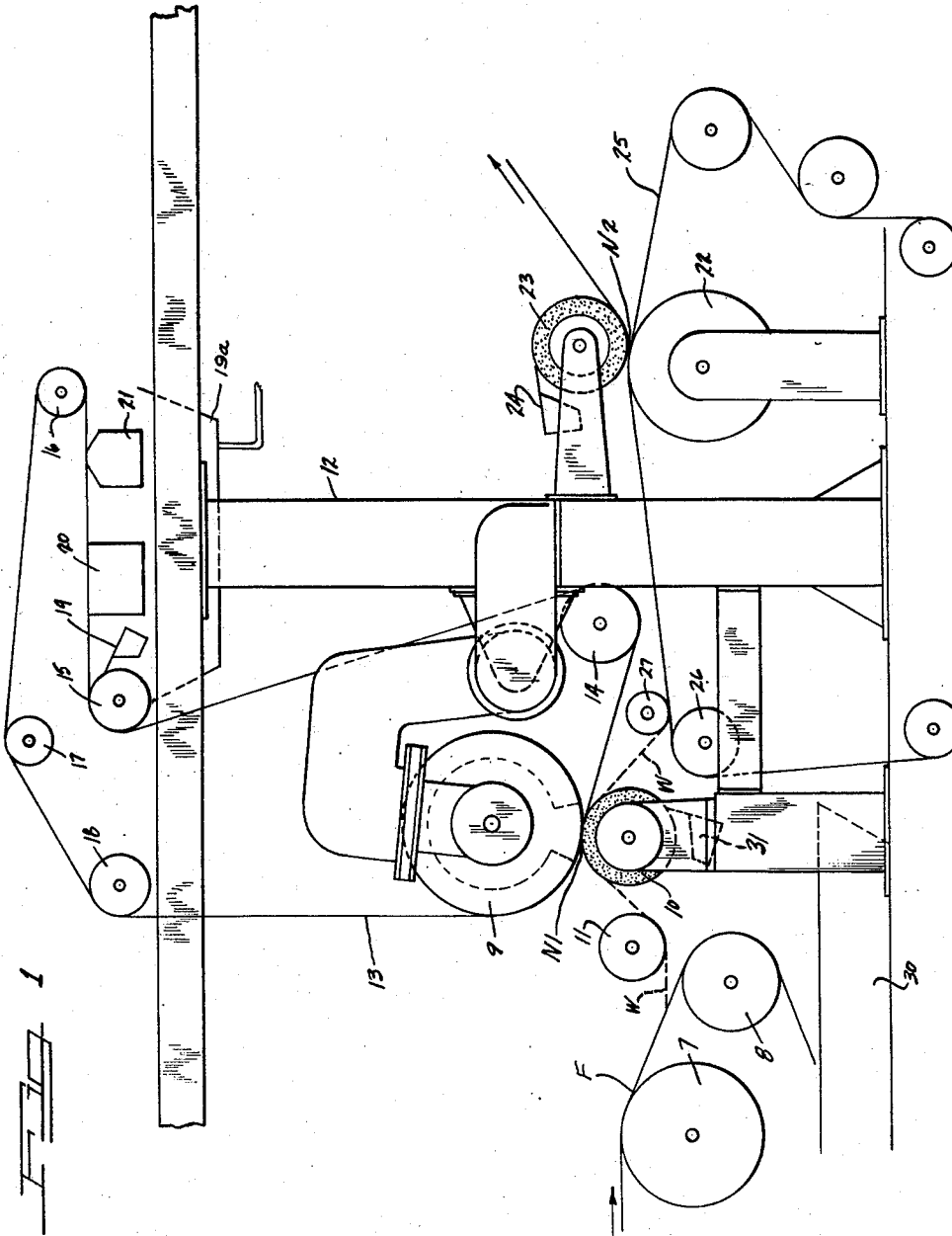
L. HORNBOSTEL

**3,080,913**

INVERSE FIRST PRESS FOR PAPER MACHINE

Filed Oct. 17, 1960

2 Sheets-Sheet 1



INVENTOR.

Lloyd Hornbostel

BY

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Will, Sherman, Merwin, Good & Simpson

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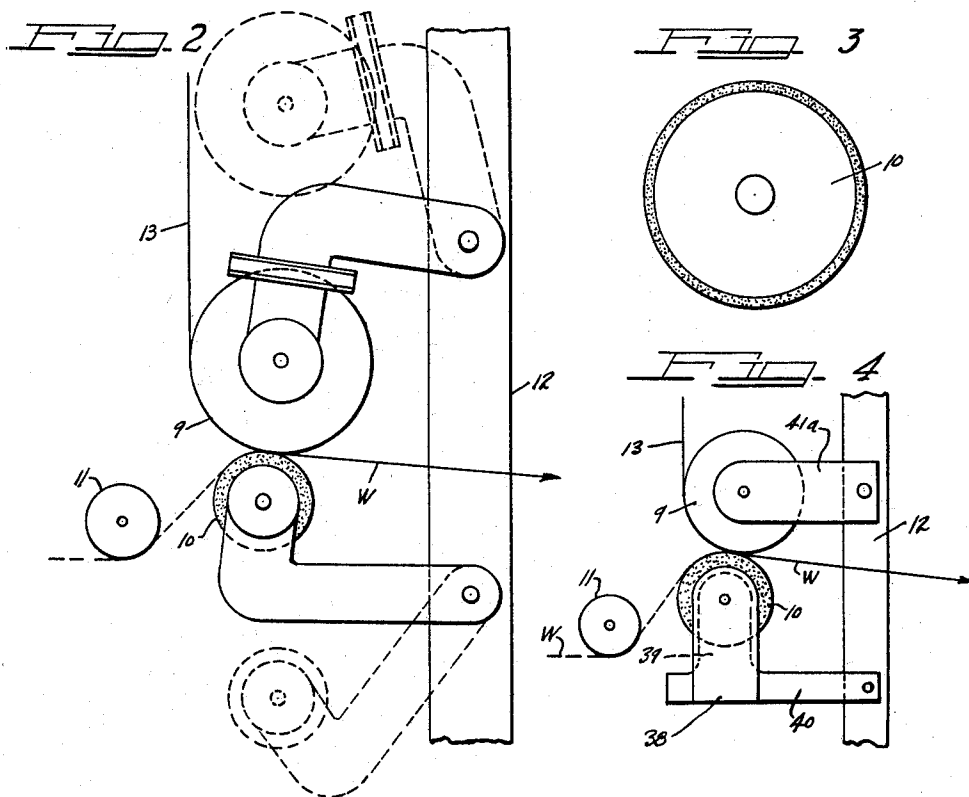
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**INVERSE FIRST PRESS FOR PAPER MACHINE**  
**Lloyd Hornbostel, Beloit, Wis., assignor to Beloit Iron**  
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**4 Claims. (Cl. 162—360)**

This invention relates to papermaking machines and is more particularly directed to improved methods and means for couching and pressing of a newly formed paper web material.

Couching means are employed for lifting the web off the forming wire of the papermaking machine and generally for transferring the web into the press section of the papermaking machine.

In the open draw transfer arrangements as distinguished from the closed or pick up arrangements, the formed paper web is transferred across an open span into the press section of the papermaking machine. In prior art arrangements, transfer across the open draw to the press roll occurs with the wire side of the web contacting the felt of the first press nip.

A number of transfer arrangements have been proposed which employ a suction pick-up felt to permit pressing of the "wire side" of the web against plain surfaced rolls in the first press nip in an attempt to eliminate web wire marks.

In the open draw type transfer arrangements it has not been feasible to transfer the web across the span into a first press nip defined by plain surfaced rolls because of the inherent adherence of the newly formed web to the smoother of the two surfaces and the resultant tendency of the web to enwrap that roll surface. To overcome the tendency of the web to adhere to the smoother of the two press rolls, granite top rolls have been employed to permit release of the web from the press roll surface. However, a granite roll must be employed in the top roll position or be otherwise supported because granite rolls lack sufficient mechanical strength to permit use thereof in the bottom press roll position. Thus where a granite roll is employed in the top press roll position the web must be conveyed through reversing paths to accomplish pressing of the web wire side while it is in the plastic condition for removal of the wire marks therefrom.

I have found that a roll in the bottom first roll position having a surface porosity or micro-porosity comparable to the surface porosity of granite may be employed satisfactorily for transfer of the web from the wire across an open space to the first press nip, and the bottom roll need not be provided with a felt loop.

It is well known that drainage of the forming web on the forming wire normally leaves a higher concentration of fines in the top surface of the web than in the wire side. These fines are easily released from the web in its newly formed condition. Prior arrangements employed to transfer the web from the forming surface across the open draw to the press section utilized a transfer device comprising a plain top roll and a bottom roll around which was lapped a felt loop.

The easily released fines of the top side of the web tended to adhere to the top roll of the transfer nip so that they were picked from the web in crumbs resulting in an imperfect surface for end use, e.g., printing, and required special equipment for the removal of particles which tend to accumulate on the plain top roll surface to prevent further damage to the web thereby. Additionally, for the purpose of establishing or re-establishing the operation of papermaking machines, difficulties were encountered in open draw arrangements and production losses suffered thereby.

By employment of my invention, I eliminate the fore-

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going disadvantages and difficulties and provide simple and effective means for transfer of a web from the forming wire of a papermaking machine across an open draw.

It is therefore an object of the present invention to provide improved methods and means for transferring and receiving a newly formed paper web from the forming surface of a papermaking machine.

It is another object of the present invention to provide improved press means for receiving a newly formed web paper from the forming surface of a papermaking machine across an open span.

It is still another object of the present invention to provide improved open draw couching and pressing arrangements for papermaking machines.

It is a further object of the present invention to provide improved open draw couching and pressing arrangements for transferring a newly formed paper web across an open span to the press section wherein the bottom roll of the first press nip is provided with a surface porosity permitting free release of the web from engagement with said bottom roll.

A still further object of the present invention is to minimize the quantity of fines removed from a web by adherence to an unfelted roll surface.

Yet another object of the present invention is to provide improved means for establishing and re-establishing operation of a papermaking machine which are simple and compact in construction and high speed and efficient in operation.

These and other objects, features and advantages of the present invention will become more apparent upon the careful consideration of the following detailed description, when considered in conjunction with the accompanying drawings, illustrating preferred embodiments of the present invention and wherein like reference numerals and characters refer to like and corresponding parts throughout the several views.

On the drawings:

FIGURE 1 is a generally schematic view of a preferred embodiment of the present invention.

FIGURE 2 is an enlarged fragmentary view in side elevation illustrating the web transfer features of the present invention.

FIGURE 3 is a view in side elevation of the bottom press roll of FIGURE 2.

FIGURE 4 is a generally schematic view of an alternative embodiment of the transfer press section of the present invention.

As shown on the drawing:

Briefly stated, the present invention involves a paper machine press arrangement for receiving an unsupported reach of a freshly formed and wet paper web from a Fourdrinier wire comprising a plain micro-porous surfaced bottom roll cooperating with a top roll having a felt looped thereabout to form a press nip for reducing the water content of the web whereby the web is carried across the open span from the forming wire and through the nip by adherence of the web to the micro-porous surfaced bottom roll.

As appears schematically in FIGURE 1 there is shown a Fourdrinier wire F lapped about a couch roll 7 and a forward turning roll 8. The web W is transferred across an open span and through a nip N1 defined by a felted plain or suction (perforated) top roll 9 cooperating with a plain micro-porous surfaced bottom roll 10. The press nip N1 is located in proximity to the couch roll to reduce the open draw or span therebetween to a minimum. Preferably, the bottom roll 10 is positioned adjacent the turning roll 8 to effect such span reduction whereby the stretching of the web due to the force required to release the web from the Fourdrinier wire and the weight of the unsupported web itself is reduced to a minimum thereby

maintaining the inherent strength of the paper web as it is formed. In addition, the web preferably is transferred across the span between the forming wire and the press nip from a point located between the couch roll and the forward turning roll to avoid the difficulties encountered in pulling a newly formed web off the wire from against the vacuum of the couch roll.

An air roll 11 of conventional construction may be employed to stabilize the web at the point from which it is taken from the wire.

The transfer press nip N1 is defined by the upper roll 9, which is a suction roll of conventional construction preferably operating on the air bleed principles as taught by the Hornbostel U.S. Patent No. 2,694,347. The top roll 9 may be pivotally mounted as appears in FIGURE 2 on an upright stanchion 12 of the papermaking machine frame. Looped around the top roll 9 is a felt 13 which traverses a plurality of guide rolls 14, 15, 16, 17 and 18. Guide roll 17 may be a conventional felt alignment roll and conventional felt stretchers (not shown) may be employed.

Picking off or adherence of fines from the top surface of the web W by the top roll 9 occurs, to some extent, even where a felt is employed. In the arrangement shown in FIGURE 1, the fines which adhere to the felt may be removed by conventional means. For this purpose, as appears in FIGURE 1, guide roll 15 may be provided with a conventional doctor 19, and, in addition, the felt may then traverse a felt conditioner 20, such as a Vickery conditioner, and then a suction box 21 of conventional construction which is arranged to withdraw wash water, fines and fibers from the surface of the felt. A pit 19a is provided.

The bottom roll 10 of the first press nip N1 may be pivotally mounted on the frame stanchion 12 as appears in FIGURE 2. Immediately following the first press nip is a second press nip N2 defined by a bottom suction roll 22 of conventional construction and a top roll 23 having a micro-porous surface similar to the micro-porous surface of the first press nip bottom roll 10. A doctor 24 may be employed in conjunction with the top roll 23 to maintain the surface of the roll 3 free of fines and fibers adhering thereto as the web passes through the nip N2. A felt 25 is looped about the bottom roll 22 and traverses a roll 26 and a plurality of guide rolls as shown in FIGURE 1. A roll 27 is located adjacent the felt roll 26 for receiving the web from the first press nip N1 for delivery to the felt 25. From the nip N2 the web may be transferred to the first dryer drum (not shown) in the dryer section.

Referring particularly to FIGURE 2, the web W is released from the forming wire between the reach of the forming wire located between the couch roll 7 and the forward turning roll 8. The web traverses the open draw or span under the stabilizing influence of the air roll and is transferred to the nip N1 defined by rolls 9 and 10. As aforementioned it is preferable that the bottom roll 10 be located quite closely to the forward turning roll 8 and that the air roll 11, if used, be in the position shown. Thus the open draw between the forming wire and the first press nip N1 is reduced to a minimum span.

Establishment of re-establishment of the papermaking operation with the arrangement shown in FIGURE 2 is quite simple. As is customary in initiation and re-initiation of the operation of paper machinery, a web is established on the Fourdrinier wire by the delivery of the slurry from a slice to the wire in the usual manner. Before the transfer of the web from the wire to the press section is established, the web is initially run into a couch pit 30 by being permitted to fall off from the wire or auxiliary means may be employed to wash the web from the wire at generally a position adjacent the forward turning rolls 8. A relatively narrow tail is cut on the wire by means of a squirt or jet of water, located usually in a position in advance of the couch roll, and this narrow

tail is transferred to the first press nip N1 by means of air jet or by hand. With the arrangement of the present invention, this narrow tail is transferred to the nip N1 in the above manner and adheres to the micro-porous bottom roll and then passes through the press nip N1 to be removed by a self-dumping roll doctor 31 so that the tail is free to drop into the couch pit 30 which, in the arrangement shown in the drawing, is extended slightly in order to receive broke at this point. After a predetermined time interval, the tail defining water jet is traversed across the width of the Fourdrinier wire and the tail thereby progressively widened to the full web width. This full width web may be removed to the couch pit by the doctor 31 until it becomes convenient to transfer the web to the bottom felt 25 of the second press nip N2. In order to transfer the full width web to the bottom felt of the second press nip N2 the tail cutting jet is again positioned so as to cut a relatively narrow tail for transfer to the bottom felt of the second press nip and is then traversed across the full width of the wire to establish the full width of the web in the usual manner.

From the top roll 23 of the second press nip N2 the tail is transferred to the first dryer (not shown) either by "Sheehan ropes," by hand, or any other convenient transfer mechanism for travel thereof through the dryer section. When travel through the entire machine is established, the tail cutting jet is traversed across the wire to widen the tail into its full sheet width throughout the machine. Thus establishing or re-establishing of the web may be made smoothly and safely at any location in the papermaking machine. The doctor 31 is a self dumping doctor similar to that disclosed in U.S. Patent No. 2,732,772.

As appears in FIGURE 3, at least the surface of roll 10 is constructed of a material having the characteristics of micro-porosity. An example of such material is the rubber base composition identified as "Stonite" and sold under that name by Stowe-Woodward, Inc., Upper Newton Falls, Mass.

The cover of rubber or elastomeric material having a micro-porous surface is characterized by a web releasing property which permits their employment as the bottom roll. Release of the web without damage thereto appears to be due, in part, to entrapment of minute particles of air in the micro-pores. These small pockets of air appear to re-expand after passing from the nip thereby producing approximately atmospheric pressure beneath the web permitting release of the web from the roll surface.

It will be appreciated that the first press nip N1 is not a transfer press as is generally understood in the art, but is rather a working first press for the removal of the water from the mat.

As appears in FIGURE 4, the top roll 9 may be a plain roll rather than a suction roll and may be pivotally mounted. Roll 9 is rotatably mounted to the frame stanchion 12 by a pair of spaced pivot arms 41a, one of which is shown, to adjust pressure on a web passing through the nip N1. Roll 9 is rotatably mounted on arms 38 and 39 on pivot support arm 40.

In operation, the mat W is carried on the forming wire to the reach between the couch roll 7 and forward turning roll 8, and transfer thereof effected across the open gap between the turning roll and the first press nip N1 with the assistance of the stabilizing air roll 11. The mat passes through the nip N1 and, in passing through the nip N1, the pressure applied in the nip forces water from the mat. The web is then transferred onto the felt 25 and then carried by it through the second nip N2 defined by the upper roll 23 having a micro-porous surface and the suction roll 22. The paper roll 27 serves to steady the web and prevent air currents from causing the web to flutter.

From the nip N2, the web may be then fed to the first dryer in the dryer section and, from there, through the paper making machine to the end thereof.

It will be appreciated that the web is received at the nip while the web is in a plastic condition. The wire mark imprints on the underside of the web attributable to the pattern of the forming wire are significantly reduced in the nip, while the web is yet in a plastic condition.

Thus it will be seen that, by employment of the present invention, effective means are provided for transferring an unsupported, newly formed, wet mat from the forming surface of a paper making machine across an open span, which reduces considerably forming surface imprint, which operates as a working press to remove water or the fluid of the mat, which reduces the number of fines picked from the mat in the receiving nip, and which permits simple establishment and re-establishment of the operation of the paper making machine. Apparatus, actually constructed in accordance with the present invention including a 36" diameter couch roll, a 22" diameter forward turning roll and a 21" bottom micro-surfaced press roll, was satisfactorily tested, and the wire marks on the underside of the web significantly reduced.

Although various minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. In a paper making machine, a forming wire on which a newly formed mat may be carried, a couch roll for the forming wire, a forward turning roll for the forming wire and a mat press device spaced in close proximity to the reach of the forming wire between the couch roll and the forward turning roll for receiving an unsupported, newly formed and wet mat from a short open span between said forming wire reach and said mat press device, said mat press device including a bottom roll mounted in close running relation to the forming wire having a micro-porous synthetic cover on a shell and a top roll having a felt lapped thereabout cooperating with said bottom roll to form a first press nip for the reduction of the water content of the mat and for reducing the number of forming wire markings on the mat, said felt being the only felt passing through said nip.

2. In a paper making machine, a forming wire on which a newly formed mat may be carried, a couch roll for the forming wire, a forward turning roll for the forming wire and a mat press device spaced in close proximity to the reach of the forming wire between the couch roll and the forward turning roll for receiving an unsupported, newly formed and wet mat from a short open span between said forming wire reach and said mat press device, said mat press device including a bottom roll mounted in close running relation to the forming wire and having a micro-porous synthetic cover on a shell and a top roll having a felt lapped thereabout cooperating with said bottom roll to form a first press nip for the reduction of

the water content of the mat and for reducing the number of forming wire markings on the mat, said felt being the only felt passing through said nip, and a self-dumping doctor mounted in operative association with the down-running side of said bottom roll for removal of the mat during establishment of the operation of the paper making machine.

3. In a paper making machine, a forming wire on which a newly formed mat may be carried, a couch roll for the forming wire, a forward turning roll for the forming wire and a mat press device spaced in close proximity to the reach of the forming wire between the couch roll and the forward turning roll for receiving an unsupported, newly formed and wet mat from a short open span between said forming wire reach and said mat press device, said mat press device including a bottom roll mounted in close running relation to the forming wire and having a micro-porous synthetic cover on a shell and a top suction roll having a felt lapped thereabout cooperating with said bottom roll to form a first press nip for the reduction of the water content of the mat and for reducing the number of forming wire markings on the mat, said felt being the only felt passing through said first press nip, and means defining a second press nip receiving the mat from said first press nip.

4. In a paper making machine, a forming wire in which a newly formed mat may be carried, a couch roll for the forming wire, a forward turning roll for the forming wire and a mat press device spaced in close proximity to the reach of the forming wire between the couch roll and the forward turning roll for receiving an unsupported, newly formed and wet mat from a short open span between the forming wire reach and said mat press device, said mat press device including a bottom roll mounted in close running relation to the forming wire and having a micro-porous synthetic cover on a shell and a top suction roll having a looped felt lapped thereabout cooperating with said bottom roll to form a first press nip for the reduction of water content of the mat and for reducing the number of forming wire markings on the mat, said felt being the only felt passing through said first press nip, and a web guide roll outside of the aforesaid felt loop mounted in closing running relationship to the forming wire for guiding the web from the forming wire to the mat press device through the aforesaid short open span, thereby minimizing the damage to the web in the open span.

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