July 23, 1963 L. HORNBOSTEL, JR 3,098,788

LIQUID REMOVAL MEANS FOR ROTATABLE PERFORATED SHELLS

Filed April 18, 1961 2 Sheets-Sheet 1

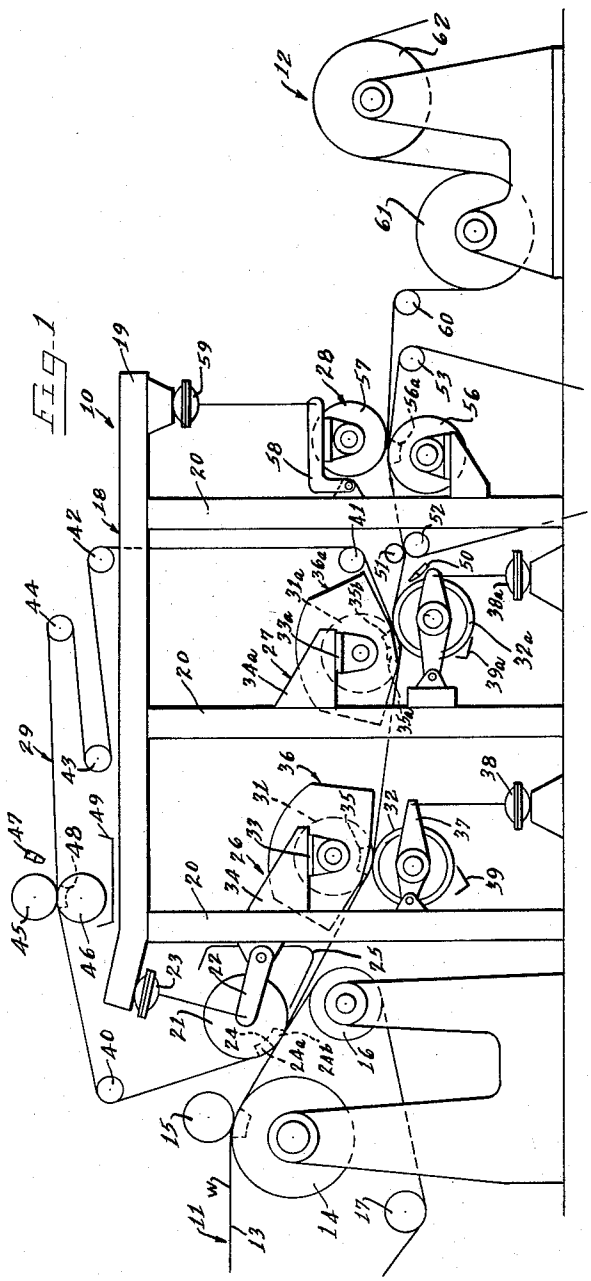


FIG. 1

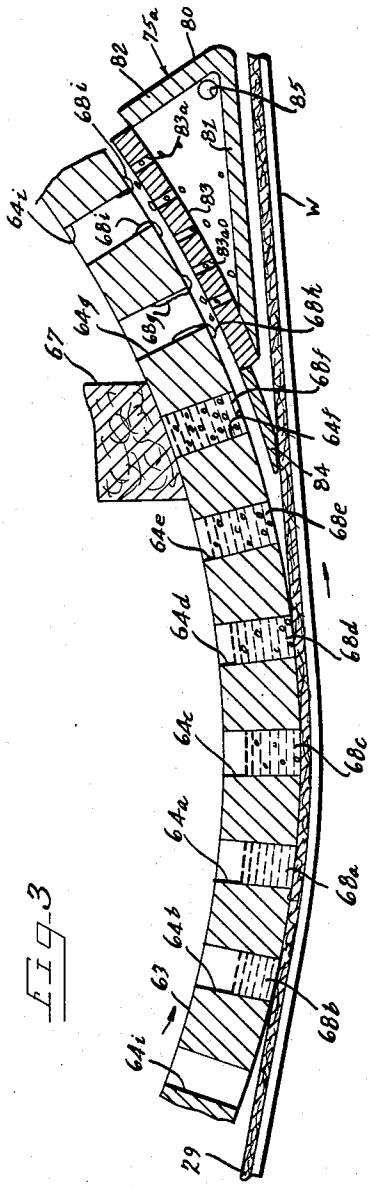


FIG. 3

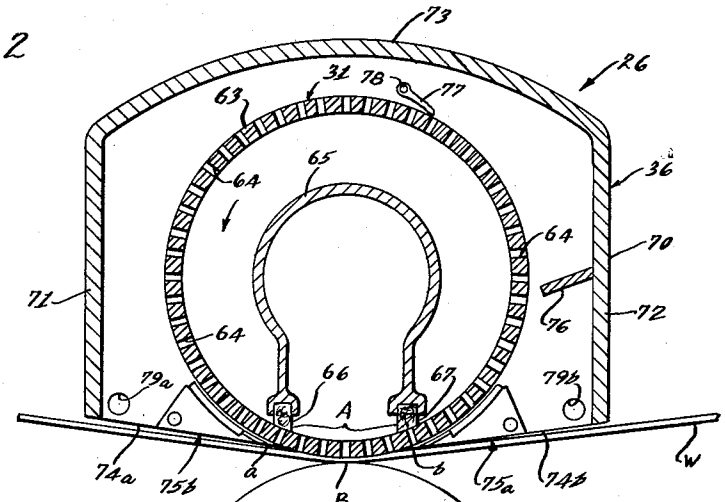
INVENTOR.
Lloyd Hornbostel, Jr.
BY
Hill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

July 23, 1963 L. HORNBOSTEL, JR 3,098,788

LIQUID REMOVAL MEANS FOR ROTATABLE PERFORATED SHELLS

Filed April 18, 1961 2 Sheets-Sheet 2

Fig. 2



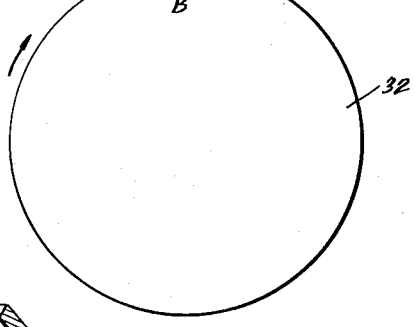
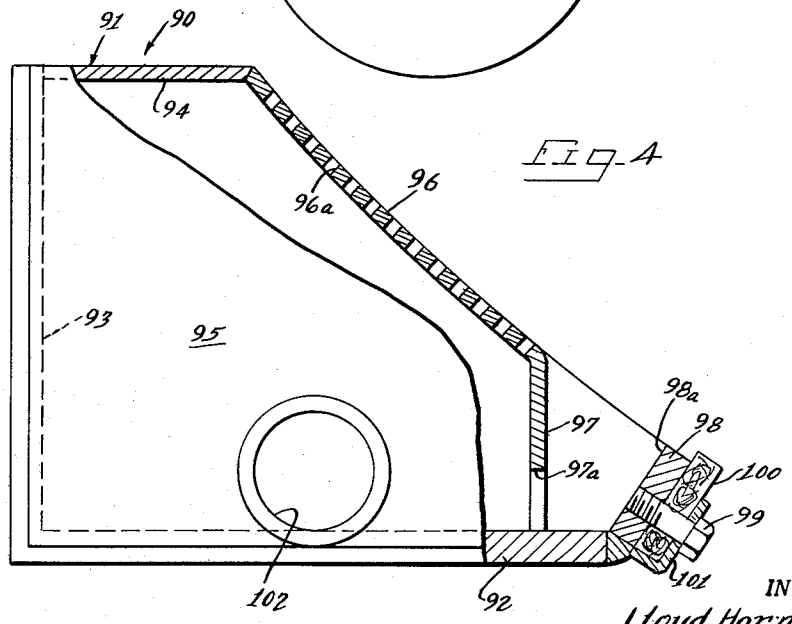


Fig. 4



INVENTOR.
Lloyd Hornbostel, Jr.
BY
Hill, Sherman, Meroni, Gross & Simpson
ATTORNEYS

United States Patent Office

3,098,788

Patented July 23, 1963

3,098,788

LIQUID REMOVAL MEANS FOR ROTATABLE PERFORATED SHELLS

Lloyd Hornbostel, Jr., Beloit, Wis., assignor to Beloit Iron Works, Beloit, Wis., a corporation of Wisconsin

Filed April 18, 1961, Ser. No. 103,921
6 Claims. (Cl. 162—274)

The present invention is concerned broadly with roll assemblies of the character employed in the art of paper making, and is more particularly directed to new and improved apparatus for removing liquids from perforated rotating shells exemplified by suction shells or rolls utilized in paper machines.

For a considerable length of time suction rolls or drums have been used in paper making machines to remove water from a moisture-bearing paper web. Typically, the suction roll is provided with means for receiving the water removed from the web and for conveying this water from the shell interior. However, with respect to the relatively small diameter holes or perforations in the shell, it has been noted that significant quantities of water remain therein, as well as upon the surface of the suction roll shell. This condition exists even at relatively high machine speeds, and without employing highly uneconomical volumes of air, this liquid cannot be drawn into the suction roll for drainage through the suction connections. As is also known, moisture or water in the shell perforations which is not removed remains to saturate the system impairing the water removal efficiency of the suction roll and press.

It is accordingly an important aim of the present invention to provide apparatus for effectively removing fluids from perforated rotating shells.

Another object of this invention lies in the provision of an improved roll assembly for a paper making machine, featuring a suction roll and means adjacent thereto for removing liquid from the perforations in the suction roll shell.

Still another object of the instant invention is to provide a water removal chamber substantially entirely surrounding a suction roll shell rotatable in nip-defining relationship with another roll, the chamber incorporating therein at the off-running side of the nip a perforated liquid collection device for aiding in the removal of liquid upon its discharge from the roll shell by centrifugal forces.

A further object of the present invention lies in the provision of apparatus for removing liquids from perforated rotating shells, comprising a housing surrounding a major amount of the circumference of the shell, and a liquid collection device in said housing in closely spaced relation to the shell for aiding in the removal of liquid from the perforations in the shell during rotation past said device.

A still further object of this invention is to provide a method of removing liquid from perforations in a rotatable shell, which features rotating the shell within a substantially enclosed chamber and along a path of negative pressure to enhance the effects of centrifugal forces, thereby withdrawing liquid contained in the shell perforations, removing any remaining volumes of liquid in the perforations and on the shell periphery during continued shell rotation, and collecting the liquid in the chamber.

Other objects and advantages of the invention will become more apparent during the course of the following description, particularly when taken in connection with the accompanying drawings.

In the drawings, wherein like numerals designate like parts throughout the same:

FIGURE 1 is a more or less diagrammatic and fragmentary side elevational view of a pickup and press assembly illustrative of a typical environment for the present invention;

FIGURE 2 is a side elevational view of a press section of the apparatus of FIGURE 1, illustrating in section a suction press roll in association with an exemplary form of suction saveall constructed in accordance with the principles of this invention;

FIGURE 3 is a fragmentary sectional view of the suction roll and liquid collection device of FIGURE 2, showing the water and water-air pockets in the suction shell and the removal of water from the shell perforations by the collection device of this invention; and

FIGURE 4 is a side elevational view, with parts thereof taken in section, and illustrating another form of liquid collection device embodying the concepts of this invention.

While the structure of the present invention is shown in the drawings and will be described as applied to a suction press roll of a paper making machine, it will be readily apparent as the description proceeds that the invention has numerous other applications, and as to the paper making art, the liquid removal apparatus can be employed with any suction roll regardless of its location in the paper making machine. Specifically, the instant liquid removal apparatus may be utilized in connection with a suction press assembly as illustrated, with a suction roll positioned in the dryer press assembly of the paper machine, or with a suction couch roll. Additionally, while the apparatus of this invention produces particularly satisfactory results in the paper making art, it obviously is not restricted thereto and may be employed with any perforated rotatable shell from which it is desired to remove any liquid.

Briefly stated, the present invention is directed to a suction roll assembly comprising a perforated cylinder having a suction gland or box therein defining a localized suction area, and a housing or saveall surrounding a major amount of the circumference of the shell and supporting interiorly a liquid collection device.

The liquid collection device desirably has a lip portion terminating closely adjacent a nip defined between the suction roll shell and a plain press roll rocated thereabove or therebelow, the lip and liquid collection device being at least on the off-running side of the nip and preferably also on the oncoming side thereof.

The liquid collection device further embodies a perforated wall portion lying relatively closely adjacent the rotatable shell to aid in the natural centrifugal release of water by applying a negative pressure adjacent the nip. The negative pressure may be of the order of five inches of mercury, and is effective in combination with centrifugal forces to remove from the shell perforations the major volume of liquid retained therein by surface tension effects. However, any liquid not removed from the shell perforations as the shell rotates past the liquid collection device is cast from the roll shell by centrifugal forces and collected in the housing. Baffle means may be provided in the housing to deflect any centrifugally impelled liquid toward the bottom of the housing for draining therefrom. As stated, the housing substantially entirely surrounds the roll shell, and in this manner any liquid cast by centrifugal forces can readily be collected in the housing and drained therefrom. Other features of the structure and method will become apparent as the description now proceeds.

Referring now to FIGURE 1, there is identified generally by the numeral 10 a suction pickup and press assembly with which the instant invention is of important application, although as noted the present concept is not restricted thereto. The assembly 10 is positioned between the Fourdrinier forming part 11 and drying section 12,

and it may be seen that the forming part includes the conventional traveling forming wire 13 having a suction couch roll 14 within the loop thereof, a lump breaker roll 15 coacting with the couch roll 14, a wire turning roll 16, and a bottom wire directing roll 17. A web W formed on the upper run of the forming wire 13 passes between the couch roll 14 and lump breaker roll 15 together with the wire. The wire and the web travel along a downwardly inclinded run of the wire between the couch and turning rolls.

In the illustrated typical environment for this invention, the pickup and press section 10 may include a main framework 18 formed of a top horizontal framework 19 supported on vertical posts 20. A suction pickup roll 21 is supported on swing arms 22 mounted by the posts 20, and a loading device 23 carried by the top beam 10 controls the position of the arms 22. A hydraulic or pneumatic cylinder assembly, a pneumatic supported diaphragm or other suitable means can provide the loading device 23.

The suction pickup roll 21 is provided with a suction gland 24 which can be arranged to define a first and relatively lower vacuum area 24*a* and a second and relatively high suction area 24*b*. In the disclosed arrangement, a saveall tray 25 is provided to receive any water that might be discharged from the cylinder of the roll 21.

The press section 10 provides a primary press assembly 26, a secondary press assembly 27 and a third press assembly 28, all supported by the framework 18. It may be seen from FIGURE 1 that a looped pickup felt 29 is trained under the suction transfer roll 21, through the nip of the first press 26, and thereafter through the nip of the second press 27 to carry the web W along its underrun. After passing through the nip of the second press 27, the web is separated from the pickup felt 29. The third press 28 is equipped with a press felt 30 receiving the web from the second press 27.

Comprising the first press 26 is a rubber-covered plain bottom press roll 32 and a top suction press roll 31, certain details of which will be later described in connection with FIGURES 2 and 3. For the present, however, it may be noted that the top roll 31 is supported on bearings 33 from brackets 34 mounted by the posts 20. As will also later appear in further detail, the roll 31 is provided with a suction gland or box 35, shown somewhat diagrammatically in FIGURE 1, and by the instant invention there is provided in association with the suction press roll 31 a liquid removal housing or saveall 36 to receive liquid scavenged from the perforations or holes in the roll, to thereby prevent re-wetting of the felt 39.

Swing arms 37 pivotally mounted on the posts 20 support the bottom roll 32, and said arms 37 are positioned by a loading device 38 to control the nip pressure and to provide a nip which may be easily opened for threading of the web. The surface of the roll 32 is scraped of broke by a self-dumping doctor 39, and preferably, the surface of the roll 32 is composed of a hard rubber of the character known as self-releasing which will not stick to the web or felt.

The second press 27 is constructed generally similarly to the first press 26, and accordingly, like numerals have been applied to the second press with the suffix "*a*" appended thereto. However, the surface of the roll 32*a* is preferably of greater durometer hardness than the roll 32, and a granite of 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 32 and 32*a*. In any embodiment, however, the rolls 32 and 32*a* 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 drawings.

While the instant invention is directed particularly to the suction savealls 36—36*a* coacting with the suction press rolls 31—31*a*, a brief description will be given of the dewatering action up to the second press 27. The felt 29 is directed around a guide roll 40 to the suction pickup roll 21 where it laps said 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. A pressure differential is provided by the suction area 24*a* of the gland 24 which removes or picks the web off the wire 13 and transfers it to the bottom face of the felt 29. The felt with the web thereon then passes under the suction area 24*b* at which initial dewatering of the web is accomplished. As noted, the suction area 24*b* is at a relatively higher vacuum than the area 24*a*.

With the web thereon, the felt then continues to travel in generally the same downwardly inclined direction as the forming wire but in spaced relation thereto. The web is then lapped under the top suction roll of the first press, and generally simultaneously is acted upon by the suction gland 35, while the wire side of the web is contacted by the hard surface of the roll 32 to perform a smoothing operation. Of course, two suction areas could be provided in the roll 31 in the manner of the suction pickup roll 21, and under these conditions the major amount of dewatering would be effected by the relatively higher vacuum area. As will be described in detail when specific reference is made to FIGURES 2 and 3, liquid in the holes of the roll 31 is positively removed by the suction saveall 36, to effectively prevent rewetting of the felt.

The felt and web then continue along a substantially horizontal path to the second press 27 whereat the first suction area 35*a* acts on the felt and web before their entry into the nip. Low vacuum water removal is accomplished to maintain the nip relatively dry, and the web then contacts the hard surface of the plain roll 32*a* and passes through the nip and under the high vacuum suction area 35*b* of the second press. The web adheres to the bottom roll 32*b* after passing through the nip of the second press and may be seen to be supported alone on the top portion of this roll. A guide roll 41 is provided which directs the felt upwardly from the formed sheet or web and around another guide roll 42, a stretcher roll 43, a guide roll 44 and from said roll through the nip of a pair of wringer rolls 45 and 46. Preferably, the felt is cleaned before it enters the nip of the wringer rolls by a water jet 47, and desirably the bottom wringer roll is provided with a suction gland 48. Water is prevented from dropping on the underrun of the felt by a water collecting pan 49, and said felt after passing through the wringer rolls 45 and 46 is trained around the guide roll 40 and back to the suction transfer roll 21.

By provision of air jet means 50, the paper web on the bottom roll 32*a* is released therefrom and passes under a paper roll 51 to be deposited upon the top run of the bottom press felt 30. It may be seen that the latter press felt is trained around an oncoming guide roll 52, through the nip of the press 28, around a guide roll 53, and under bottom guide rolls (not shown) in the manner known to the art.

The third press 28 is comprised of a bottom suction roll 56 having a suction gland 56*a*, and a plain surfaced roll 57 which provides the top roll of the press and is supported on swing arms 58 from the posts 20. The swing arms are under control of a loading device 59 which may be of the same type as the devices 23 and 38—38*a* earlier described.

The web is carried on the top run of the felt 30 over the suction area provided by the gland 56*a* and then through the nip of the press 28, whereat the hard surface of the top roll 57 smoothes the non-wire side of the web. After having passed through the nip of the third press, the web is sufficiently dewatered to enter the drying section 12, and is directed around a guide roll 60 onto the first drying cylinder 61 and from there onto a second drying cylinder 62 of the drier section 12.

As eariler mentioned, the suction press and transfer

assembly 10 of FIGURE 1 provides an illustrative environment for the suction saveall or water removal apparatus 36—36*a* of this invention. The suction saveall will now be specifically described in connection with FIGURES 2 and 3 showing the instant apparatus as a portion of the first press section 26, although as was also stated hereinabove, the suction saveall could be employed with the suction couch roll 14, with the suction transfer roll 21 or at other locations in the paper making machine.

In FIGURES 2 and 3, the suction press roll 31 comprises a rotatable outer cylinder or shell 63 having spaced radially extending perforations or holes 64 extending therethrough, and a suction gland or box 65 mounted in the interior of the shell 63 and extending generally parallel to the axis of rotation thereof. The suction gland 65 mounts a pair of packing or sealing strips 66 and 67 located in the lower portion of the shell 63 and cooperating therewith to define a suction area A extending over and at opposite sides beyond a nip B between the upper and lower rolls 31 and 32. As is indicated by the arrow applied to the suction roll 31 in FIGURE 2, the roll 31 rotates counter-clockwise, and accordingly, the sealing strip 66 is at the oncoming side of the nip B while the sealing strip 67 is at the off-running side of said nip.

As is known, when the web W and the press felt 29 pass into the nip B water from the web is forced into the felt and from said felt radially inwardly into the shell perforations 64 by the combined action of the nip pressure and the vacuum in the suction gland 65. Desirably, the suction gland 65 would immediately remove from the perforations 64 water upon its entrance therein; however, to accomplish this desirable condition would require abnormally high and impractical volumes of air. Then, too, at the relatively high speeds of present day paper machines, and consequent high speed rotation of the suction press roll 31, the rotating shell 31 passes so rapidly across the suction area A that there is simply not sufficient time for complete removal of the water in the holes 64 passing across the suction area. Under these circumstances, significant quantities of water remain in the holes or perforations 64 and upon the outer diameter of the suction roll 31. Obviously, this water would then return to the press felt to re-wet the felt and greatly interfere with the drying efficiency of the press section.

This condition is portrayed in FIGURE 3, although to a degree somewhat exaggerated to facilitate the description. It may be noted that at the nip B, whereat the compacting pressure is greatest, the shell perforation or hole identified as 64*a* is at least partially filled with essentially airfree water 68*a* forced therein by the nip pressure. The hole 64*a* may be filled to a greater or lesser extent than indicated, although the point of interest is that the water in this hole is substantially void of air pockets. The hole 64*b* at the oncoming side of the nip B may be seen to contain therein a relatively lesser amount of water 68*b*, while at the off-running side of the nip and in the perforation 64*c*, an air-water mixture 68*d* is present. At the oncoming and off-running sides of the nip, the nip pressure is relatively less, which accounts for a reduced volume of water in the hole 64*b*, and the presence of the air bubbles in the mixture 68*c* in the perforation 64*c*.

The hole or perforation adjacent the hole 64*c* is identified in FIGURE 3 by the numeral 64*d*, and the air-water mixture 68*d* therein generally contains a relatively greater volume of water than the hole 64*c* and a relatively greater number of air bubbles may also be present therein. At the off-running side of the nip there is shown a hole or perforation 64*e* containing an air-water mixture 64*e* having therein a greater amount of air than the mixtures 64*c* and 64*d*. This is accounted for the fact that there is zero negative pressure, and by the fact that the felt 29 and web W at this point or location continued forwardly off the circumference of the suction shell 63.

Again referring to FIGURE 3, there is shown a hole or perforation 64*f* adjacent the opening 64*e*, and within this hole is a mixture 68*f* of generally the same consistency as the mixture 68*e*, since said mixture is prevented from release by the covering action of the sealing strip 67. The next perforation in the direction of shell rotation is identified as 64*g*, and for purposes of the instant description this opening is shown as essentially free of the described air-water mixtures, and instead as carrying along the inner walls thereof a water film 68*g* which also clings to the shell outer diameter adjacent the hole 64*g*, as indicated in FIGURE 3 by the numeral 68*h*. It will now be appreciated that in the absence of the novel structure of this invention the clinging water 68*g* and 68*f* would be thrown onto the felt 29 below to re-wet the felt and thereby substantially reduce the effectiveness of the drying or water removal action.

To prevent re-wetting there is first provided by this invention a suction saveall shown in FIGURE 2 and identified therein by the numeral 36. The suction saveall comprises a housing 70 having a pair of opposed sidewalls 71 and 72, opposed end walls (not shown), top wall 73 and inclined bottom wall portions 74*a* and 74*b* spaced from one another in the area of the nip B. It is to be observed from FIGURE 2 that the suction saveall housing 71 surrounds a major portion of the circumference of the rotatable shell 63, and is open only in the area defined by the points "*a*" and "*b*." In this manner, liquid present on the shell periphery or in the shell perforations is continuously subjected to centrifugal forces and is impelled during shell rotation for collection in the housing 70.

However, as the shell 63 rotates beyond the off-running side of the nip B and past the collection device 75*a*, any clinging liquid uncontrollably impelled by the shell 63 could be deflected by the side wall 72 and be cast back against the shell. To preclude this possibility, the housing side wall 72 mounts baffle means 76 providing a liquid shield. As well, it may be noted from FIGURE 2 that at approximately 30° to the right of the top center of the shell 63 doctor blade means 77 is mounted. The doctor blade can be supported in any suitable manner, as upon rod means 78 received in the opposed end walls of the housing 70. The doctor blade acts as a shear blade, and suitable means are provided to control the pressures applied by the doctor.

Any liquid centrifugally cast from the shell 63 into the housing 70 is drained therefrom through connections 79*a* and 79*b*, to which may be attached drop heads in the basement of the machine room. As was described in connection with FIGURE 1, the suction saveall 36 is suitably mounted by bracket means 34 connected to the post structure 20.

Previously, it has been suggested to use an imperforate lip or plate on the off-running side of the nip as a shield for the felt to prevent re-wetting thereof. However, and particularly at relatively high machine speeds of the order 1000 feet per minute, the high velocity air in conjunction with an imperforate lip upsets or interferes with the normal tangential flow path of the centrifugally impelled liquid. Such liquid, instead of moving generally tangential to the roll circumference and collecting in the bottom of the saveall, is impelled by the high velocity air flow upwardly in the saveall, and deflects either off the sidewalls of the saveall and unto the roll circumference or is cast upwardly and falls by gravitational forces onto the roll circumference. As well, the imperforate lip in effect holds the water in the shell perforations. In this manner, the liquid returned to the roll is carried thereby to the oncoming side of the nip, rewets the felt and thereby markedly impedes the water removal effectiveness of the apparatus.

The liquid collection device provided herein is identified in FIGURES 2 and 3 by the numeral 75*a*, and in combination with a substantially enclosed saveall housing, removes markedly greater volumes of water from the shell perforations than has heretofore been regarded as possible. The liquid collection device 75*a* may be seen to comprise a generally triangularly shaped housing 80 secured in any suitable manner to the saveall bottom wall portion 74*b*, the housing 80 being formed of a bottom wall 81, generally angularly disposed sidewall 82 and top wall 83 having liquid receiving perforations 83*a* therein. The top wall 83 is generally arcuate to be uniformly spaced along its length from the roll circumference, and either integral with or suitably attached to the top wall 83 is a lip portion 84 providing an extension on the top wall 83 and overlying the felt 29 the maximum distance obtainable in order to prevent liquid from the perforations of the shell from contacting the felt. Of course, as was noted, it is generally not until the liquid containing perforations in the shell move past the sealing strip 67 that any liquid drains therefrom. The lip portion 84 does, however, extend as close to the nip B as is structurally possible, and as was noted, any water not removed by the device 75*a*, is cast from the shell by centrifugal forces.

The housing 80 of the liquid collection device 75*a* has a drain 85 provided therein, and this drain is connected to a drop length in the basement of the press room. Such a drop leg thereby in effect constitutes a barometric leg, although in certain applications the drain opening 85 may be connected to a source of vacuum so that there is applied to the perforations 83*a* approximately five inches of mercury. The negative pressure applied is, however, limited so that a pumping action does not take place, but instead, liquid clinging to the shell perforations, as at 68*g* and 68*h* is promptly withdrawn as the perforations rotate past the perforated plate 83. Thus, the negative pressure applied abets the centrifugal forces to at least draw to the shell periphery the water in the shell perforations. Some water may remain in the perforations, as at 68*g* and 68*i*, however, this water is at a location where it can be effectively acted upon by centrifugal forces and in most instances will be completely removed.

It is to be further observed from FIGURE 3 that by use of the liquid collection device 75*a* the clinging liquid 68*g* and 68*h* is drawn by negative pressures from the shell perforations, as is portrayed by the legends 68*i* applied to the hole or perforation 64*i* adjacent the perforation 64*g*. Thus, as the hole 64*i* completes its advance past the upper hole 83*a* in the top wall 83 of the collection device 75*a*, the aperture or perforation 64*i* is generally almost entirely cleansed of liquid. However, any remaining liquid not removed by the device 75*a* is then subjected to centrifugal forces, and further, if in the remote instance centrifugal forces do not remove all liquid, the doctor blade 77 by its shearing action completes the liquid removal operation.

As an even further assurance that the perforated rotatable shell 63 is returned to the oncoming side of the nip B devoid of liquid in its perforations, a second collection device 75*b* may be utilized. This device is, as appears in FIGURE 2, at the oncoming side of the nip, and has a lip portion 84 extenidng as far into the nip as is structurally possible. The liquid collection device 75*b* can be structurally identical to the device 75*a* described in connection with FIGURE 3, and has a moderately low vacuum applied thereto to remove any liquid in the perforations which under unusual conditions would be present. The roll shell 63 is thereby presented to the sealing means 66 in essentially completely dry condition, and this is shown in FIGURE 3 by the legend 64*i* applied to the oncoming perforation adjacent the hole 64*b*.

The liquid collection device 75*b* located at the oncoming side of the nip B may take various forms, and a structural modification thereof appears in FIGURE 4. The liquid collection device shown therein is identified generally by the numeral 90 and comprises a substantially enclosed housing 91 having a bottom wall 92, generally upright side wall 93, a top wall 94 disposed generally parallel to the bottom wall 92, opposed end walls 95 (one of which is shown), and a curvate wall portion 96 having perforations 96*a* therein, the wall portion 96 having a downwardly dependent portion 97 formed with an aperture 97*a* therein.

Connected to the bottom wall 92 of the housing 91 is an inclined wall section 98 defining with the upper end of the downwardly dependent wall 97 a liquid receiving opening 98*a* extending between the opposed end walls 95 of the housing. Lying flush against the wall section 98 and secured thereto by fastening means 99 is wiper means 100, which may take the form of a felt strip. The securement means for the felt strip 100 may further include bracket means 101 receiving the fastening means 99.

Any liquid remaining in the perforations 64 of the roll shell 63 as it rotates toward the oncoming side of the nip B is withdrawn therefrom by the collection device 90 through the perforations 96*a* in the wall portion 96. The interior of the housing 91 communicates with a drain connection 102, and this connection may be attached to a drop leg in the manner of the connection 85 for the liquid collection device 75*a*. On the other hand, negative pressures may be applied to the liquid receiving openings 96*a* by a vacuum pump drawing pressures of the order of five inches of mercury.

There does exist, however, the possibility that any remaining liquid in the shell perforations 64 drawn therefrom by the collection device 90 may lie along the shell circumference, and for this purpose as the shell continues its rotation along the collection device 90, the circumference of the shell is contacted by the wiper means 100. Further, any remaining water film not removed through the liquid receival openings 96*a* in the wall member 96, and prior to contact with the wiper means 100 may be centrifugally impelled into the trough or opening 98*a* between the wall section 98 and the upper end of the dependent wall portion 97. Any such centrifugally impelled liquid can then drain through the opening 96*a* into the interior of the housing 91.

It may now be seen that applicant has provided a novel method and apparatus by means of which felt re-wetting is prevented by effectively removing all water from the shell perforations, so that when the shell returns to the nip there is no water clinging thereon and the holes or perforations are void of water, as is indicated in FIGURE 3 by the opening 64*i* at the oncoming side of the nip. The apparatus provided is relatively simple in construction and reliable in operation, and can be readily attached to existing paper machines with ease. The suction saveall of this invention can be installed at numerous locations in the paper machine, in association with any suction roll having perforations or other open areas from which it is desired to remove water or other liquids. The drawings illustrate the suction press roll 31 in an upper position, although it is now quite apparent that the suction saveall herein disclosed can be employed with a lower suction roll with effective results.

It is of course appreciated that various other changes and modifications may be effected without departing from the novel concepts of the present invention.

I claim as my invention:

1. Apparatus for removing liquids from perforated rotating shells forming part of a press nip comprising, a housing surrounding a major portion of the circumference of the shell, and a liquid collection device in said housing in closely spaced relation to the shell withdrawing liquid from the perforations in the shell during rotation past said device, said liquid collection device having a lip portion extending to a point closely adjacent the nip on the off-running side thereof and a perforated wall portion closely spaced from the shell for assisting centrifugal forces and receiving liquid from the perforations in the shell during rotation past said device.

2. Apparatus for removing liquids from perforated rotating shells, forming part of a press nip, comprising a housing surrounding a major portion of the circumference of the shell, doctor blade means in close running relation with the roll circumference and located adjacent the top center of said shell, and a liquid collection device in said housing in closely spaced relation to the shell assisting centrifugal forces and withdrawing liquid from the perforations in the shell during rotation past said device, bringing liquid to the surface of the shell for removal by the doctor blade means, said liquid collection device having a lip portion extending to a point closely adjacent the off-running side of the nip.

3. Apparatus for removing liquids from perforated rotating shells forming part of a press nip, comprising a housing surrounding a major portion of the circumference of the shell, a liquid collection device in said housing in closely spaced relation to the shell assisting centrifugal forces and withdrawing liquid from the perforations in the shell during rotation past said device, said liquid collection device having a lip portion extending to a point closely adjacent the off-running side of the nip, baffle means mounted within said housing upwardly of said liquid collection device to deflect centrifugally impelled liquid away from the shell circumference, and doctor blade means in close running relation with the roll circumference and located adjacent the top center of said shell to remove any remaining liquid from the shell circumference.

4. In a press roll assembly having a perforated suction press roll and a plain press roll in nip-defining relationship with a felt passing therebetween, the improvement which comprises a suction saveall surrounding a major portion of the circumference of the suction roll, and a liquid collection device in said saveall having a lip portion extending to a point closely adjacent the nip on the off-running side thereof and a perforated wall portion closely spaced from the shell for assisting centrifugal forces and withdrawing liquid from the perforations in the shell during rotation past said device.

5. In a press roll assembly having a perforated suction press roll and a plain press roll in nip-defining relationship with a felt passing therebetween, the improvement which comprises a suction saveall surrounding a major portion of the circumference of the suction roll, a liquid collection device in said saveall having a lip portion extending to a point closely adjacent the nip on the off-running side thereof and a perforated wall portion closely spaced from the shell for assisting centrifugal forces and withdrawing liquid from the perforations in the shell during rotation past said device, and liquid receiving means in said saveall having a perforate wall closely spaced from the shell at the oncoming side of the nip for removing any liquid from the shell circumference not removed by the liquid collection device.

6. In a press roll assembly having a perforated suction press roll and a plain press roll in nip-defining relationship with a felt passing therebetween, the improvement which comprises a suction saveall surrounding a major portion of the circumference of the suction roll, a liquid collection device in said saveall having a lip portion extending to a point closely adjacent the nip on the off-running side thereof and a perforated wall portion closely spaced from the shell for assisting centrifugal forces and withdrawing liquid from the perforations in the shell during rotation past said device, baffle means mounted within said saveall upwardly of said liquid collection device to deflect centrifugally impelled liquid away from the shell circumference, and doctor blade means in close running relation with the roll circumference and located adjacent the top center of said shell to remove any remaining liquid from the shell circumference.

References Cited in the file of this patent

FOREIGN PATENTS

531,879	Great Britain	Jan. 13, 1941
795,432	Great Britain	May 21, 1958