ABSTRACT OF THE DISCLOSURE

A portion of a papermaking machine is disclosed where paper stock discharge from a headbox is deposited upon a Fourdriner type web forming wire provided with drainage foil assemblies beneath the wire (substituted for table rolls), and a foil assembly is supported beneath the wire by a support mechanism carried on rails beneath and parallel to the edges of the wire. The assembly includes a body which is connected to the support mechanism and a foil cap mounted on top of the foil body. The foil body and foil cap are provided with a dovetail connection therebetween, a clamp bar overlapping both the body and cap and pivotally connected to the body, and a fluid pressure inflatable tube between the bar and body on a side of the general connection opposite the cap, for securely clamping the cap to the body upon inflating the tube.

CROSS REFERENCE TO RELATED PATENT APPLICATION

A foil body and cap assembly with a flexible strip spring for securing a foil cap to a foil body, is the subject of a pending U.S. patent application entitled Fourdriner Drainage Foil Assembly, Ser. No. 672,117, filed Oct. 2, 1967, now Pat. No. 3,515,636.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates to papermaking machines having drainage foils, deflectors, forming boards or the like, beneath a Fourdriner type web forming wire and in particular to a foil assembly including a body carrying a removable and replaceable foil cap beneath the Fourdriner wire.

Description of the prior art

A concept involved in this invention is that of providing blades, now commonly called drainage foils, beneath a Fourdriner wire in the position formerly occupied by table rolls, to achieve superior drainage of water through the bottom of the wire. The evolution of this concept to present day forms is illustrated by the following patents: British Pat. 399,739 in 1933; British Pat. 717,796 in 1954; U.S. Pat. 2,744,454 in 1956; U.S. Pat. 3,017,930 and 3,027,941 in 1962; U.S. Pat. 3,140,225 in 1964; and U.S. Pat. 3,165,440 and 3,201,308 in 1965. In all of these prior art arrangements some provision is made for replacing a foil after it has become worn but with a considerable variation in the speed and convenience of such replacement.

SUMMARY OF THE INVENTION

It is a primary object of the present invention to provide a new and improved drainage foil assembly for promoting water removal through the bottom of a Fourdriner web forming wire.

Another object of the present invention is to provide a drainage foil assembly or the like with a new and improved arrangement for quickly replacing a removable cap.

Another object of the present invention is to provide a new and improved arrangement for mounting a removable foil cap on a body supported below the bottom surface of a Fourdriner wire.

According to a preferred embodiment of the present invention, a Fourdriner wire drainage foil assembly includes a body portion supported in a generally horizontal position below a Fourdriner wire, with a foil cap mounted on top of the foil body. The foil cap is attached to the body by a dovetail tongue and groove type joint. The dovetail tongue is defined by the bottom surface of the foil cap and projects downwardly. The top surface of the foil body defines a portion of the dovetail groove including a generally horizontal groove bottom surface and one groove wall or a generally inclined upwardly from the bottom surface in a direction to be partly over the bottom surface. A clamp bar is pivotally connected to the body adjacent the groove surface on the opposite side thereof from the one groove wall defined by the foil body. The clamp bar is arranged to project upwardly from the groove bottom surface and is inclined toward the one groove wall defined by the body. The clamp bar therefore provides a second groove wall and thereby completes the formation of a dovetail groove complementary with the tongue of the foil cap. The clamp bar is biased toward the groove wall defined by the body by inflating a fluid pressure inflatable tube between the bar and body below the level of bottom surface of the groove and therefore firmly holds the dovetail tongue of the foil cap but allows easy withdrawal and insertion of the tongue through an open end of the slot upon deflating the tube.

OTHER FEATURES AND OBJECTS OF THE INVENTION WHICH HAVE BEEN ATTAINED WILL APPEAR FROM THE MORE DETAILED DESCRIPTION OF AN EMBODIMENT OF THE INVENTION SHOWN IN THE ACCOMPANYING DRAWINGS.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic side elevation view of a portion of a papermaking machine showing a portion of a headbox, a breast roll, a Fourdriner wire and drainage foil assemblies according to the present invention.

FIG. 2 is an enlarged and fragmentary view of one of the drainage foil assemblies of FIG. 1, showing the assembly in greater detail; and

FIG. 3 is a view of another embodiment of a drainage foil assembly according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing and FIG. 1 in particular, a portion of a papermaking machine is shown wherein a headbox 1 discharges pulp through a slice opening 2 to deposit the pulp on a Fourdriner wire 3 as it leaves a breast roll 4 that is turning in the direction indicated by the arrow. A plurality of drainage foil assemblies 5 are shown arranged beneath the wire 3 and mounted on side rails 6.

Referring to FIG. 2, the foil support assembly 5 is shown as having a support member 10 connected to rail 6 (as shown in FIG. 1), a foil body 14, and a replaceable foil cap 16 having a leading knife-edge 11, mounted on top of the foil body in a manner that will appear as the description of the disclosed apparatus proceeds. The term "leading" as herein used to describe knife-edge 11 refers to the orientation shown in FIG. 1 where it is shown that the knife-edge 11 is the lead edge with respect to the approach of wire 3 toward foil cap 16.

The foil cap 16 is attached to the foil body 14 by a dovetail tongue and groove type joint. As shown in FIG. 2 a dovetail tongue 17 is formed on the bottom of foil cap 16 and has a generally horizontal surface 18, a first tongue wall 19 spaced back of the leading knife-edge 11, and a
second tongue wall 20 spaced back of the first wall 19, to define therebetween the downwardly projecting dovetail tongue 17. A third wall 21 defined by cap 16 is spaced ahead of the second wall 20 and cooperates therewith to define a slot 22. The tongue walls 19, 20 are inclined downwardly in diverging relation to each other to form with the surface 18 the dovetail tongue configuration 17. A portion of a dovetail groove 23 is defined on top of said foil body 14 by a generally horizontal surface 24 and a groove wall 25. A clamp bar 26 is attached to the foil body 14 by screws 27 projecting through a hole 28 in bar 26. The hole 28 is of slightly larger diameter than the shaft of screws 27 to permit bar 26 to pivot about screws 27 as indicated by the arrows 29 and 30. The bar 26 has a portion 26a that projects upwardly from groove surface 24 in converging relation to wall 25 and a lip 26b of bar 26 projects horizontally from portion 26a into slot 22. Wall 25, surface 24 and bar 26 complete the formation of the dovetail groove 23 in foil body 14 which is complementary to dovetail tongue 17.

A groove 35 is defined in body 14 and open in a direction facing clamp bar 26. The groove 35 is arranged below the level of screws 27 and extends parallel to the leading edge 11. A tube 36 is arranged within slot 35 and connected to a suitable adjustable source of fluid pressure (not shown) for providing selected positive pressure or negative pressure (i.e. drain) to inflate or collapse tube 36. Tube 36 may be made of any rubber or rubber-like material.

Referring to FIG. 3, another embodiment of the present invention is shown, in which walls 20, 21, slot 22, bar 26, screws 27, groove 35 and tube 36 are all located on the leading edge 11 side of the assembly 5 rather than on the side opposite edge 11 as shown in FIG. 2.

In time the top surface of the foil cap 16 and its leading knife-edge will become worn and require replacement. To remove the 16 fluid pressure is released and drained from tube 36 causing tube 36 to deflate and collapse. As tube 36 collapses within groove 35, the clamp bar 26 pivot about screws 27 in the direction indicated by arrow 29 and the portion 26a of bar 26 above screws 27 will move away from cap tongue wall 20 and since hole 28 is larger than the shaft of screw 27 the bar portion 26b is not pulled downwardly in slot 22, the cap 16 is then loosely carried on body 14. The cap 16 may then be easily withdrawn in a direction transverse to the wire 3 shown in FIG. 1.

A replacement cap 16 may then be put in place by inserting and sliding tongue 17 in dovetail groove 23. The cap 16 is then securely clamped in position by inflating tube 36 causing it to expand within groove 35 and push bar 26 to pivot about screws 27 in the direction indicated by arrow 30. Pivoting the bottom portion of clamp bar 26 in the direction indicated by arrow 30 moves portion 26b into slot 22 and the upper portion 26a of bar 26 against tongue wall 20 and pushes tongue 17 against groove wall 25 and pulls tongue 17 down on groove surface 24 to thereby securely clamp cap 16 to foil body 14.

It may be desired to operate the described apparatus when the cap 16 does not require replacement but bailing particles of stock fibers are disturbing desired sheet formation on wire 3. Under such circumstances tube 36 may be deflated and cap 16 slid back and forth to dislodge such bailing particles.

There are also times when it may be desired to operate the paper machine with one or more of the foil assemblies inoperative. Under such circumstances tube 35 may be deflated, foil cap 16 withdrawn and a filler insert 40 inserting a top surface indicated by broken line 40 in FIG. 3, may be inserted and securely held in place by again inflating tube 35. The filler insert 40 will eliminate a buildup of material in dovetail groove 23 of an assembly 5 that is not in use, and the level of the surface 40 is at a distance below wire 3 sufficient to allow ample clearance.

From the foregoing detailed description of the present invention it has been shown how the objects of the invention have been attained in a preferred manner. However, modifications and equivalents of the disclosed concepts such as readily occur to those skilled in the art are intended to be included within the scope of the claims in which an exclusive property or privilege is claimed are defined as follows:

1. A Fourdriner wire drainage foil assembly and the like including a pair of elements one of which is a foil body adapted for support in a generally horizontal position and the other of which is a cap mounted on top of said body and connected thereto, said body having a top surface and said cap having a bottom surface cooperating to define therebetween the downwardly projecting dovetail tongue and a portion of a dovetail groove, said portion of said dovetail groove including a generally horizontal groove surface and a first transverse groove wall, and a clamp bar loosely connected by a pivotal connection to the assembly adjacent said groove surface on the opposite side thereof from said first groove wall and with said clamp bar having a portion projecting away from said groove surface in a direction converging toward said first groove wall to provide a second wall for said groove and thereby define a dovetail groove complementarily engaging said dovetail tongue, the dovetail tongue defines a slot open in a generally horizontal direction toward the said projecting portion of the clamp bar, the projecting portion of the clamp bar is provided with a generally horizontally extending lip projecting away from the bar and in register with the slot defined in the dovetail tongue, and a fluid pressure inflatable tube between the clamp bar and the assembly on a side of the pivotal connection remote from said projecting portion of said clamp bar and said lip, for inserting the lip into the slot and then securely clamping the cap to the body upon inflation of said tube.

2. A drainage foil assembly according to claim 1 having a tube holding groove for the inflatable tube and within which the tube collapses upon deflation.

3. A drainage foil assembly according to claim 1 in which said dovetail tongue projects downwardly from the bottom surface of said foil cap, said portion of said dovetail groove is defined in the top of said foil body, and said clamp bar is connected to said body with the said projecting portion of said bar projecting upwardly from the pivotal connection to complete the formation of a dovetail groove in said foil body complementary to said dovetail tongue projecting from said foil cap.

4. A drainage foil assembly according to claim 3 in which the downwardly projecting dovetail tongue defines a slot open in a generally horizontal direction toward the said upwardly projecting portion of the clamp bar, and the said upwardly projecting portion of the clamp bar is provided with a generally horizontally extending lip projecting away from the bar and into the slot defined in the dovetail tongue.

5. A drainage foil assembly according to claim 1 in which said foil cap has a leading knife-edge and said clamp bar is connected to the assembly on a side thereof opposite said knife-edge.

6. A drainage foil assembly according to claim 1 in which said foil cap has a leading knife-edge and said clamp bar is connected to the assembly on the knife-edge side of the assembly.

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