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FOURDRINIER DRAINAGE FOIL ASSEMBLY

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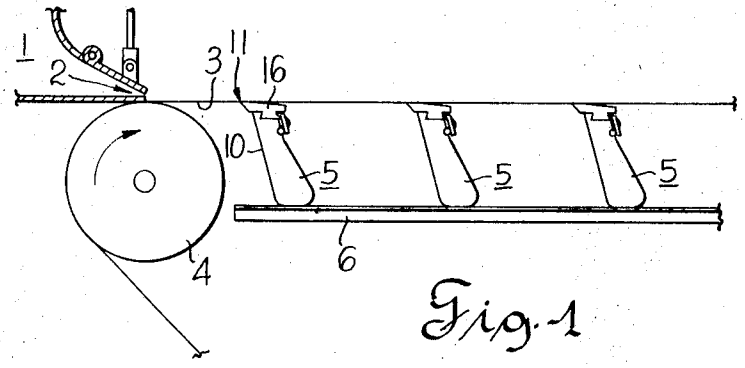


Fig. 1

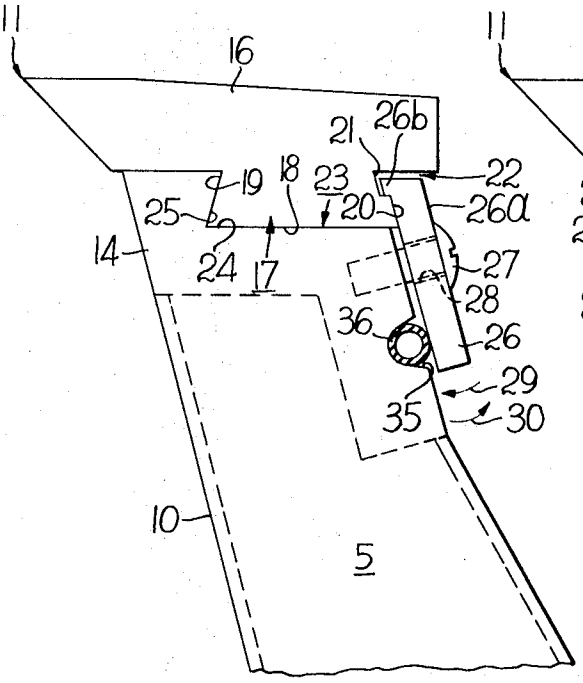


Fig. 2

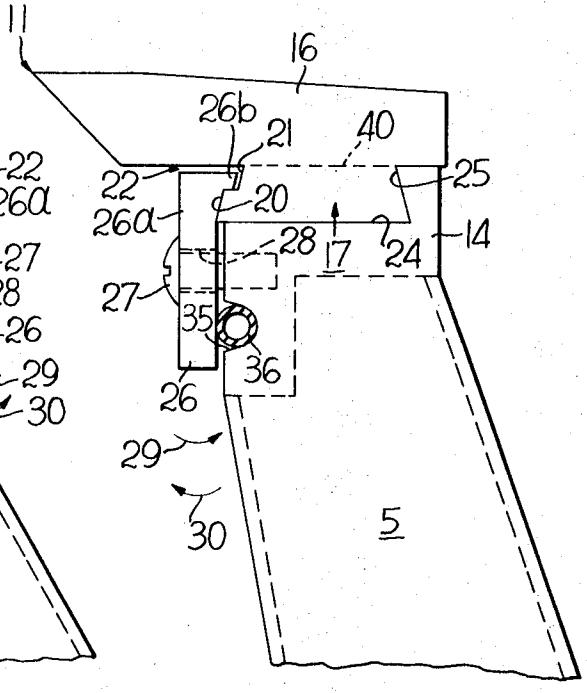


Fig. 3

Inventors
George E. Reynolds
Fred J. Sedemeyer
Lee R. Loughran
By Arthur M. Streich
Attorneys

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FOURDRINIER DRAINAGE FOIL ASSEMBLY

George E. Reynolds, Fred J. Gedemer, and Lee R. Loughran, Appleton, Wis., assignors to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

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ABSTRACT OF THE DISCLOSURE

A portion of a papermaking machine is disclosed where paper stock discharge from a headbox is deposited upon a Fourdrinier 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 pivotal 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 copending U.S. patent application entitled Fourdrinier 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 Fourdrinier type web forming wire and in particular to a foil assembly including a body carrying a removable and replaceable foil cap beneath the Fourdrinier wire.

Description of the prior art

A concept involved in this invention is that of providing blades, now commonly called drainage foils, beneath a Fourdrinier 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. 717,798 in 1954; U.S. Pat. 2,744,454 in 1956; U.S. Pats. 3,017,930 and 3,027,941 in 1962; U.S. Pat. 3,140,225 in 1964; and U.S. Pats. 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 Fourdrinier 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 Fourdrinier wire.

According to a preferred embodiment of the present invention, a Fourdrinier wire drainage foil assembly includes a body portion supported in a generally horizontal position below a Fourdrinier 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 angularly 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 that 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 DRAWING

FIG. 1 is a diagrammatic side elevation view of a portion of a papermaking machine showing a portion of a headbox, a breast roll, Fourdrinier 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 Fourdrinier 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 cooperatees 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 **26***a* that projects upwardly from groove surface **24** in converging relation to wall **25** and a lip **26***b* of bar **26** projects horizontally from portion **26***a* 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 collapsible-inflatable 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 cap **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** will pivot about screws **27** in the direction indicated by arrow **29** and the portion **26***a* 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 **26***b* 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 **26***b* into slot **22** and the upper portion **26***a* 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 balling particles of stock fibers are disturbing desired sheet formation on wire **3**. Under such circumstances tube **36** may be defiated and cap **16** slid back and forth to dislodge such balling 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 having 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 build-up 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 this invention.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A Fourdrinier 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 a 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 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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REUBEN FRIEDMAN, Primary Examiner

T. A. GRANGER, Assistant Examiner