SUMMARY OF INVENTION

It is thus an object of the present invention to provide an improved insert specifically adapted for use with replaceable drainage elements.

Broadly the present invention relates to a replaceable drainage foil having an insert formed from a plurality of discrete wear resistant elements retained in an undercut groove on the drainage element and held in abutting relationship by means of an elongated clamping member connected to the insert and applying a clamping pressure to the discrete elements to hold same in position.

BRIEF DESCRIPTION OF DRAWINGS

Further features, objects and advantages of the present invention will be evident from the following detailed description of a preferred embodiment of the present invention when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a partial perspective view of a replaceable drainage foil having a wear resistant insert constructed according to the present invention incorporated therein;
FIG. 2 is a section along the lines 2--2 of FIG. 1;
FIG. 3 is a partial plan view partly in section of the installation shown in FIGS. 1 and 2;
FIG. 4 is a partial elevation taken from FIG. 1;
FIG. 5 is a perspective view of one form of abutment member as used in FIGS. 1, 2 and 3;
FIG. 6 is a view similar to FIG. 2 but showing a modified form of clamping mechanism;
FIG. 7 is a perspective view of the abutment element used in the FIG. 6 embodiment;
FIG. 8 is a partial end elevation similar to FIG. 4 but showing another form of groove and abutment member;
FIG. 9 is a perspective view of the abutment member shown in FIG. 8;
FIG. 10 is an enlarged end view of one form of wear resistant insert showing the chamfered lower edge;
FIG. 11 is a perspective view of a further form of insert constructed in accordance with the present invention;
FIG. 12 illustrates yet another form of insert constructed in accordance with the present invention;
FIG. 13 is a section along the lines 13--13 of FIG. 12; and
FIG. 14 is an end view of a foil incorporating the insert of FIGS. 12 and 13.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIG. 1, the foil includes a main foil body 10 which is adapted to be mounted on a Fourdriner machine in a manner such that the wire of the machine (not shown) travels over the element 10 in the direction of the arrow 7.

The drainage element 10 includes a body member 12 formed of suitable material such as high density, high molecular weight polyethylene and having a leading edge 14, a supporting surface 16, and a diverging surface 18. This foiling element is positioned under the wire of a paper machine in a manner such that the wire travels over the foil moving in the direction of the arrow 7 shown in FIG. 1. The surface 16 serves as a supporting area for the wire while the surface 18 causes suction to be applied to the wire.

An insert receiving groove 20 is formed in the body 12 of the element 10 so that its open end extends longitudinally of the foil in the supporting area 16. At least the upper portion of the groove is provided with an undercut or dove-tailed slot section 22 adapted to receive the corresponding dove-tailed ends of an insert 24.

Below the dove-tailed section 22 is a channel 26 and at opposite ends of the channel 26 adjacent the ends of the foil element 10 are deepened cut-out areas 28.
The wear resistant insert 24 is formed from a plurality of discrete wear resistant elements 30 each of which is provided with a beveled edge adapted to be received in the dove-tailed part of the groove 22 so that the individual elements 30 may be slid axially into position. These discrete elements 30 of the insert 24 will be described in detail hereinafter.

One suitable mechanism for clamping the discrete elements 30 in position to form the wear resistant insert 24 is shown in FIGS. 1 to 4 inclusive. In this embodiment, a longitudinally extending connecting rod 31 is positioned in the slot 26 beneath the dove-tailed slot 22 and extends longitudinally of the foil element beneath the insert 24. Abutment members 32 and 34 are located at each end of the insert 24. The abutment member 32 has a pair of dove-tailed sections 36 on opposite sides thereof and is provided with a downwardly extending flange 38 having a threaded opening 40 which receives the end of the rod 31.

The other abutment piece 34 is similar to the abutment piece or member 32 but the hole therein is not threaded and the connecting rod 31 simply passes therethrough.

The connecting rod 31 is threaded at one end as indicated at 42 and has a suitable wrench receiving socket end 44 at its opposite end.

The threaded end 42 is received within the threaded hole 40 and turning of the connecting rod 31 via the wrench engaging section 44 permits tightening of the clamping members 32 and 34 together.

In the arrangement shown, the elements 30 are slid into the dove-tailed groove 22 with dove-tailed portions of the element 30 being snugly received within the dove-tailed groove 22. The abutment members 32 and 34 which are essentially the same have their dove-tailed sections 36 slid into the dove-tailed groove 22 and are positioned with their end 46 (see FIG. 5) in abutting relationship with the end elements 30 forming the insert 24. By turning the rod 31, the threaded engagement between the hole 40 and the threaded end 42 of the rod tightens the two elements 32 and 34 towards each other thereby clamping the elements 30 in position and forming the insert 24. Tightening of the rod 31 stresses same to a degree such that the temperatures encountered during the operation of the device does not expand the rod to relieve the clamping pressure applied to the elements 30 to hold them in position.

As can be seen, the flange 38 projects down into the deeper part of the groove 28 with the bottom of the flange resting on the base of the groove. This cooperation between the edge of the flange 38 and the bottom of the groove 28 helps to stabilize the end abutments 32 and 34 when clamping pressure is applied.

Referring now to FIGS. 6 and 7 inclusive, an arrangement is substantially the same as the arrangement in FIGS. 1 to 5 inclusive, the exception being that the abutment members indicated at 50 and 52 are substituted for the abutment members 32 and 34. The abutment member 50 is provided with an upper beveled section 54 having beveled surfaces 56 and 58 which are adapted to cooperate with the beveled or dove-tailed groove 22 in the element 10 and a downwardly projecting body member 60 having a threaded hole 62 adapted to receive the threaded end 42 of the rod 31. The member 52 is substantially the same as the abutment member 50 except that the hole therethrough is not threaded.

In the arrangement of FIGS. 6 and 7, the rod 31 is tightened in the manner described hereinafore with respect to the previous embodiment. The abutment members 50 are moved in the dove-tailed groove 22 and in the deep sections 28 of the groove 20 to clamp the elements 32 therewith. The bottom of the member 60 rests on and slides along the bottom surface of the deep part of the groove 28 and functions in much the same manner as the bottom edge of the flange 38 of the previously described embodiment.

The embodiments shown in FIGS. 8 and 9 are essentially the same as that shown in FIGS. 6 and 7, however, the elements 50' and 52' have been provided with laterally projecting lugs 64 and 66 which lugs are adapted to engage corresponding undercut grooves 68 and 70 formed in the deep section 28 of the groove 20.

In the embodiments of FIGS. 6 to 9 inclusive, the side walls of the member 60 may be spaced from the side walls of the deepened section 28 of the groove 20.

Referring now to FIG. 10 which shows in cross section an end view of one of the elements 30. It can be seen that the upper surface of the element is substantially flat and is provided with beveled sides 72 and 74 which are adapted to be received in the dove-tailed groove 22 of the element 10. Adjacent the bottom and around the periphery of each element 30 is a chamfer 76. This chamfer 76 is relatively important since it reduces damages incurred by these elements when the element with insert in position is handled during application to the paper machine.

If desired, to further reduce the damage that may be incurred, the rod 31 may be tightened after the element 10 has been applied to the machine.

Referring now to FIG. 11, it can be seen that the foiling element here is made from a plurality of discrete elements essentially equivalent to the elements 30 mounted on a bar or plate 100 to form the insert 24.

These discrete elements 30 in the arrangement shown in FIG. 11 are glued to the backing strip or plate 100 and are held in this position. The element 24 may be produced by stress the element 100 when the element 30 is positioned thereon and the glue is applied and set so that when the tension is released, the blocks will be held tightly together. The degree of stress applied to the element 100 will be sufficient to hold the elements 30 in clamped position after the stressing forces are released under the temperature conditions encountered on the paper machine.

Preferably there will also be glue between the abutting faces of adjacent elements 30, however, the adjacent edges of the upper abrasive resistant surface of the elements will simply be in intimate abutting relationship.

An alternate mode of construction would be to compress the element 30 together and glue them in this compressed state to the backing member or plate 100.

Stressing of the backing plate 100 can also be attained by heating so that the backing plate is at a high temperature when the elements 30 are glued thereon in abutting relationship.

If the backing plate 100 has substantially the same coefficient of expansion as the blocks 30, then the requirement for prestressing, of course, is no longer necessary. However, generally this backing plate 100 will be prestressed.

Each of the elements 30 regardless of the clamping member used will have a length L of less than 6 inches and preferably will be about inches or less (see FIG. 11). The width W will generally be less than 3/8 of an inch and preferably about 1/4 of an inch and the thickness T of each element will be in the order of less than .15 inch. With a 1/4 inch width element the thickness preferably will be about .125 inch. These dimensions apply to the elements 30 for each of the embodiements above described.

A further embodiment of the present invention which is shown in FIGS. 12, 13 and 14 includes a substantially round rod-like insert 102 formed by a plurality of discrete tubular members 104. Extending axially of the tubular members 104 are dovetailed grooves 106. An abutment member 100 is positioned at opposite ends of the tubular member 102 and the threaded rod 106 is tightened to stress the rod and clamp the tubular elements into abutting relationship as shown. If desired,
5 the adjacent ends of the individual members 104 may be tapered slightly to ensure accurate fitting of the members together.

The insert of FIGS. 11 to 13 inclusive is shown mounted in position on a drainage element 10'. As can be seen, the element 102 is slid axially into a suitably shaped groove 110 cut into the body of the foil 10' to provide undercuts at opposite sides and to locate the exposed part of the tubular elements 102 at the point of maximum wear on the drainage element 10'.

Modifications may be made without departing from the spirit of the invention as defined in the appended claims.

We claim:

1. A replaceable drainage element for paper machines, said drainage element having an elongated body formed with a supporting surface and a diverging surface, said wall means defining an insert receiving groove in said supporting surface longitudinally of said body, means defining an undercut portion extending longitudinally from said supporting surface in the upper portion of each longitudinal sidewall of said groove, a wear resistant insert removably retained between said undercut portions, said insert having a wear resistant surface located in the same plane as said supporting surface and positioned to reduce wear of the wire of the paper machine on said drainage element, said insert including a plurality of discrete elongated elements having a wear resistant surface, said elements being arranged in end abutting relationship, an abutment member removably retained between said undercut portions at each end of said groove, and connecting means engageable with each said abutment members and extending in said groove under said discrete elements, said connecting means being adjustably engageable to said abutment members to cause said members to apply clamping pressure to said discrete elements to hold said elements in said abutting relationship.

2. An element as defined in claim 1, wherein said discrete elongated elements are less than about 6 inches long and are chamfered at their abutting edges on a surface of each said discrete element remote from said wear resistant surface to reduce breakage.

3. An element as defined in claim 1, wherein said connecting means is an elongated rod.

4. An element as defined in claim 3, wherein at least one of said abutment members is threadedly connected to said rod.

References Cited

UNITED STATES PATENTS

3,446,702 5/1969 Buchanan -------- 162—352 X
2,408,176 9/1946 Proulx ------------ 162—374
3,393,124 7/1968 Klinger et al. ------ 162—374 X
3,393,123 7/1968 Klinger et al. ------ 162—374 X
3,337,394 8/1967 White et al. -------- 162—352

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