April 6, 1971 H. JUD ET AL 3,574,056

STRIPPING FOIL ASSEMBLY FOR PAPER MACHINES

Filed March 20, 1968

FIG.1

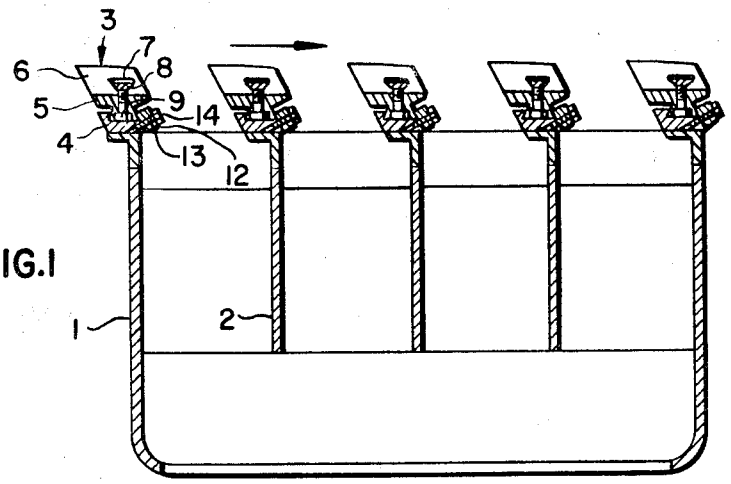


FIG.3

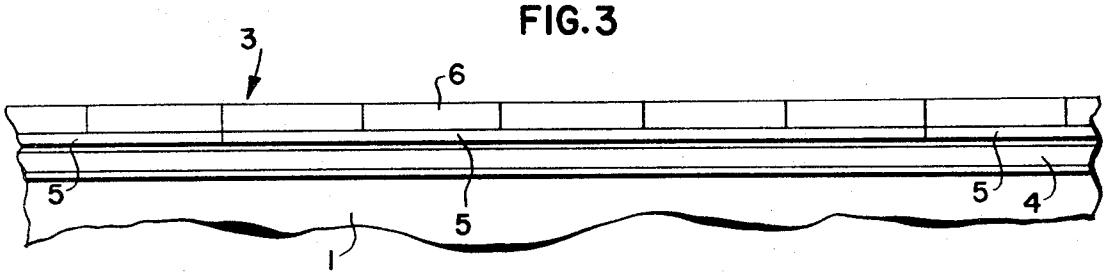


FIG.2

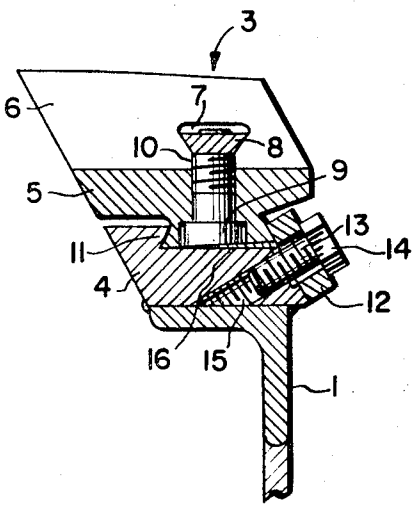
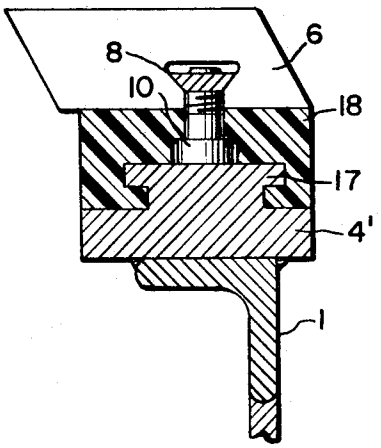


FIG.4



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STRIPPING FOIL ASSEMBLY FOR PAPER MACHINES

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Int. Cl. D21g 9/00
U.S. Cl. 162—352 7 Claims

ABSTRACT OF THE DISCLOSURE

Carrier steel bars extending across the width of the Fourdrinier wire in a paper machine carry metallic or plastic supports elongated in the direction of wire width and releasably attached to the carrier bars in end-to-end relationship. Foil sections of sintered alumina are juxtaposed on each support, thereby permitting adjustment and removal of the foil sections without disturbing their relationship with a contiguously adjacent metallic support.

BACKGROUND OF THE INVENTION

This invention relates to paper machines, and particularly to stripping foil assembly for such machines.

Stripping foils made of sintered alumina or similar hard, but brittle, non-metallic materials have been disclosed in the commonly owned application Ser. No. 430,356, filed on Feb. 4, 1965, now Pat. No. 3,393,124, in which one of us is a co-inventor. The sharp edges of these foils facing the rapidly moving Fourdrinier wire of a high-speed paper machine surprisingly resist the impact of the wire and do not damage the same.

The ceramic material, however, is still vulnerable to damage from other sources, such as tools accidentally dropped by a careless mechanic. Although wear resistant to an astonishing degree, the ceramic sections which normally constitute each foil, ultimately must be reground or replaced.

It has been found very difficult to regrind individual sections and thereafter to re-install them in the precise alignment of their several faces which is necessary for smooth operation. On the other hand, it is not normally possible for the machine shop of a paper mill to regrind the sections while installed on a common carrier bar if the assembly has a length of about 25 to 30 feet, not uncommon in modern paper machines. The entire bar had to be returned to the manufacturer for regrinding.

It has furthermore been found that the useful life of the ceramic sections depends on their proper seating on a metallic or other non-ceramic support. Stresses concentrated on narrow ceramic face portions and transmitted from the support tend to shorten the useful life of the sections.

A primary object of the invention is an improvement in the known stripping foil assemblies which overcomes the problems outlined above.

SUMMARY OF THE INVENTION

The invention, in one of its aspects, interposes several supporting members between the ceramic foil sections and each carrier bar. The supporting members are elongated in the direction of Fourdrinier wire width and are releasably secured to the carrier bar substantially in end-to-end relationship. Groups of foil sections are attached to each supporting member, and are juxtaposed on the associated supporting member in the direction of elongation of the latter.

When a group of ceramic foil sections with its common supporting member is removed from the carrier bar for regrinding, the position of the re-installed group is adjusted by varying the relationship of the metallic or plastic supporting member to the metallic carrier bar. Wedges, shims, and similar conventional devices may be used freely in a manner not advisable with ceramic bodies because of the inevitable stress concentration. The relationship between each section and its supporting member is never disturbed during regrinding. The entire group of sections is readily reground on equipment available in the normal paper mill workshop. The same equipment may also be used for simultaneously finishing the aligned operating surfaces of a group of foil sections in which one or more members were replaced.

Other features, additional objects, and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description of preferred embodiments of the invention when considered in connection with the attached drawing.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

FIG. 1 shows a water stripping foil assembly of the invention in side elevational section;

FIG. 2 shows a portion of the assembly of FIG. 1 on a larger scale;

FIG. 3 shows the device of FIG. 2 in fragmentary front elevation; and

FIG. 4 illustrates a modified assembly in a view corresponding to that of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawing in detail, and initially to FIG. 1, there is seen a box-like frame **1**, normally arranged under the Fourdrinier wire of a paper machine, as shown in the afore-mentioned copending application, while the wire moves from the left to the right, as indicated in FIG. 1 by an arrow. The frame **1** is equipped with upright partitions **2** extending in the direction of wire width and stiffening the frame. The front and back walls of the frame **1** and each partition **2** carry water stripping foil, **3**, each foil having an acutely angular upper leading edge, consisting of sintered, high-purity alumina, and being mounted on a carrier bar **4** welded to the top edge of the associated frame wall or partition. An elongated supporting member **5** is interposed between the carrier bar **4** and the ceramic foil **3**.

As is partly seen in FIG. 3, the carrier bar **4** extends over the full width of the Fourdrinier wire or the machine frame, while the ceramic foil **3** is longitudinally divided into numerous sections **6**, groups of five sections **6** being arranged on a common supporting member **5**. The latter are arranged end-to-end on the bar **4** in a sufficient number to extend over almost the entire length of the bar **4**, and their top faces are practically completely covered by the ceramic foil sections **6**.

The manner in which the assembly shown in FIGS. **1** and **3** is held together is best seen in FIG. 2. The bottom faces of the ceramic sections **6** mounted on a common supporting member **5** have aligned slots **7** with inwardly flaring walls. A locking bar **8**, whose cross section has the shape of an inverted isosceles trapezoid, extends through the aligned slots **7** and is longitudinaly coextensive with the associated supporting member **5**. Spaced threaded bores in the locking bar **8** are axially aligned with smooth bores in the supporting member **5**.

Heads **9** of screw **10** are recessed in the dovetail-shaped bottom part of the supporting member **5**, and each screw

10 which passes through a bore of the member 5 engages the locking bar 8. When the several screws 10 are tightened, the locking bar 8 holds broad, flat sealing faces of each foil section 6 and of the associated supporting member 5 in secure contact. The spatial relationship of the ceramic sections 6 to the steel member 5 is not normally disturbed during the useful life of the ceramic sections.

The bottom portion of the supporting member 5 is conformingly received in an upwardly open groove formed over the entire length of the carrier bar 4 by an integral shoulder portion 11 of the bar and retaining bars 12 longitudinally coextensive with the supporting members 5. Clamping screws 13 whose heads 14 abut against the retaining bar 12 threadedly engage bores 15 in the carrier bar 4 which slope obliquely downwardly so that the bottom portion of the supporting element 5 is forced downward against the bar 4, and forward against the shoulder 11 when the screw 13 is tightened.

The precise location of the leading edge of foil 3 is determined by spacers, such as metallic shims or wedges, interposed between the faces of the bar 4 and of the member 5, which are pressed toward each other by the screw 13, a wedge-shaped spacer 16 being shown in FIG. 2 by way of example. Stress concentrations which might be caused in the relatively ductile metallic elements 4, 5 by the presence of the spacer 16 are readily tolerated, while similar stresses applied to the ceramic foil sections 6 might be destructive.

Prior to the invention of ceramic water stripping foils, as disclosed int he afore-mentioned copending application, some paper machines were equipped with plastic foils which were not durable, but at least did not cause rapid wear of the Fourdrinier wire. FIG. 4 shows a portion of a paper machine initially equipped with plastic water stripping foils, but modified according to this invention to accept sectional ceramic foils, the view corresponding to that of FIG. 2.

The stationary frame 1 of the know machine is equipped with several spacedly juxtaposed carrier bars 4' arranged in the manner of the bars 4 seen in FIG. 1. A flanged rib 17 extends along the top of the bar 16 and was conformingly received in a groove of a plastic water stripping foil, when originally installed.

As modified according to the invention, the foil assembly shown in FIG. 4 includes supporting members 18 of strong plastic, such as polyester resin reinforced with glass fibers, and jointly extending end-to-end over the length of the carrier bar 4', each supporting member 18 carrying five ceramic foil sections 6. The individual sections are attached to the associated supporting member 18 by a locking bar 8 and by screws 10 as described above with reference to FIG. 2. The row of supporting members 18 is longitudinally secured on the rib 17 by stops, not shown in the drawing.

If one or more ceramic sections 6 needs to be reground, the associated supporting members 5, 18 are removed from the frames 1, and the several section 6 on each supporting member are simultaneously ground so that their corresponding surfaces are precisely aligned in the direction of wire width. If all sections are reground, no further adjustment is needed when the supporting members 5, 18 are again installed on the carrier bars 4, 4'. If only the sections 6 on individual supporting elements 5, 18 are reground, the positions of the supporting elements may have to be adjusted by means of spacers as explicitly shown in FIG. 2 and some manual refinishing of the abuttingly engaged edges may be necessary. Similar adjustments by means of spacers are possible with the arrangement seen in FIG. 4 after some of the material of the carrier 18 has been ground or filed away.

It is relatively simple with the foil assemblies of this invention to keep the top faces of the several ceramic foil sections 6 in a common plane, and to keep the leading edges of the sections in a common, continuous, straight line, as is necessary when the wear of the Fourdrinier wire is to be held to a minimum.

The length of the individual supporting elements and the number of ceramic foil sections carried by each supporting element may be varied, of course, as specific conditions warrant. It is generally desirable to make each sub-assembly of one supporting member and several foil sections indentical with all the other sub-assemblies in order to minimize the number of spare parts that need to be stored to ensure uninterrupted production when one sub-assembly has to be removed. Typically, on a paper machine having a Fourdrinier wire 18 feet wide, the carrier bars 4, 4' may be 20 feet long and carry five supporting members, each four feet long and supporting five 24" foil sections.

It will be appreciated that neither the frames 1 nor the carrier bars 4, 4' need ever be removed from the paper machine if equipped with foil sections mounted on non-ceramic supporting members of materials less brittle and much more ductile and tougher than the sintered alumina and similar materials which have uniquely advantageous properties in the foils, but cannot accept fasteners which are fully applicable to metals or strong plastics.

Wedge-shaped spacers of the type illustrated in FIG. 2 may be used to adjust the angle of attack of the Fourdrinier wire, that is, the angle between the normal plane of movement of the wire and the top surface of the ceramic sections so as to adapt the foil assembly to changes in stuff composition which might otherwise impair the water stripping abilities of the foil assembly. The spacers not only permit tilting of one supporting member relative to the others, but also joint angular adjustment of all supporting members.

It should be understood, of course, that the foregoing disclosure relates only to a preferred embodiment of the invention and that it is intended to cover all changes and modifications of the examples of the invention herein chosen for the purpose of the disclosure which do not constitute departures from the spirit and scope of the invention set forth in the appended claims.

What is claimed is:

1. In a paper-making machine having a frame, a Fourdrinier wire movable on the frame, and a water stripping foil assembly mounted under the wire, the assembly including a substantially rigid carrier member extending over the width of the wire and fixedly fastened to the machine frame, a plurality of foil sections of non-metallic ceramic material juxtaposed on the carrier member in the direction of the wire width and having aligned, acutely angular, exposed edges, and fastening means fastening the foil sections to the carrier member, the improvement in the fastening means which comprises:

(a) a plurality of supporting members elongated in the direction of said width, and having each two longitudinal ends;

(b) attaching means attaching respective groups of said foil sections to each of said supporting members, the foil sections of each group being juxtaposed longitudinally of the associated supporting member; and

(c) securing means releasably securing said supporting members to said carrier member substantially in end-to-end relationship.

2. In a machine as set forth in claim 1, said attaching means including release means operable to release each foil section from the associated supporting member.

3. In a machine as set forth in claim 1, said supporting members essentially consisting of material less brittle and tougher than said ceramic material.

4. In a machine as set forth in claim 3, said less brittle material being metal or plastic.

5. In a machine as set forth in claim 1, said supporting member and said carrier member having respective faces, and said securing means including clamping means urging said faces toward each other, and a spacer member interposed between said faces.

6. In a machine as set forth in claim 5, said spacer member being wedge shaped in section perpendicular to the direction of elongation of said supporting member.

7. In a machine as set forth in claim 1, said foil sections being formed with respective slots aligned in said direction and open toward said supporting member, said slots having walls flaring inward from said supporting member, said attaching means including a locking member elongated in said direction and conformingly engaging said walls, and threaded means on said supporting member extending into said slots and threadedly engaging said locking member.

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