Nov. 30, 1965 L. TRUXA 3,220,920

ADJUSTABLE DRAINAGE FOIL FOR FOURDRINIER PAPER MACHINES

Filed Nov. 13, 1963 2 Sheets-Sheet 1

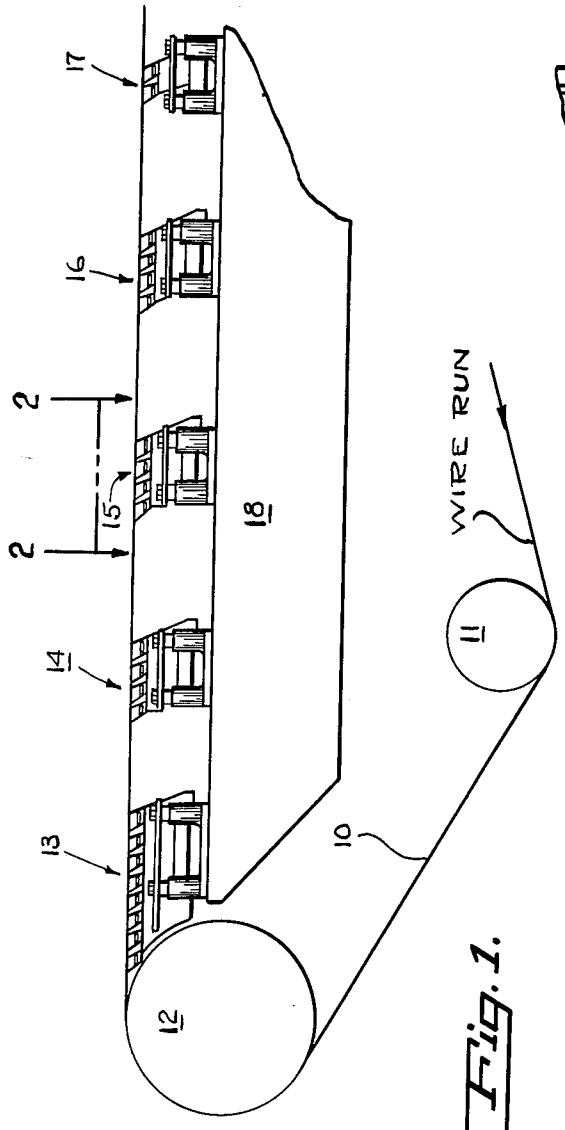


Fig. 1.

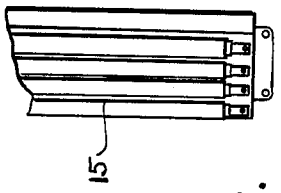


Fig. 2.

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Fig. 4.

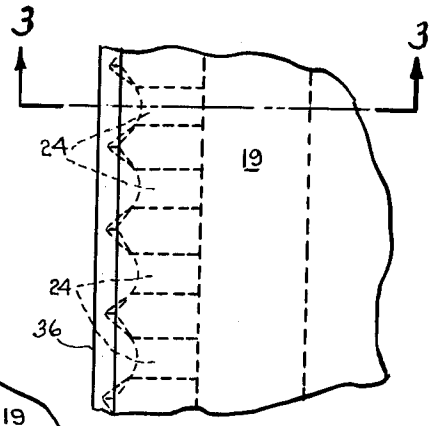


Fig. 5.

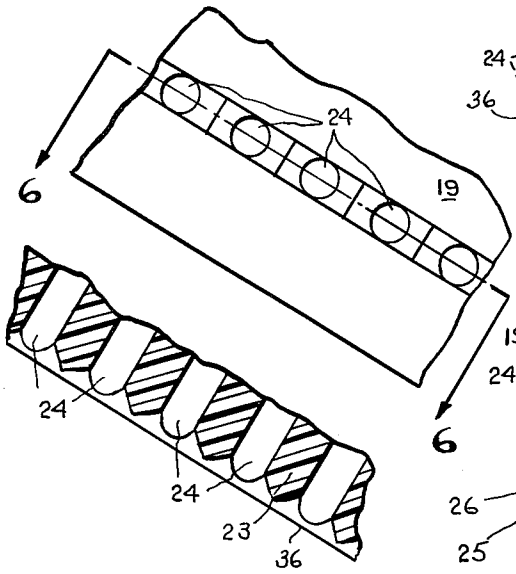


Fig. 6.

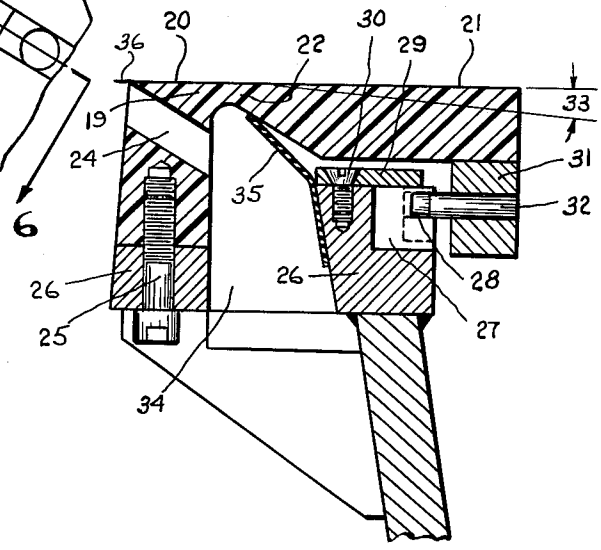


Fig. 3.

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Patented Nov. 30, 1965

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3,220,920

ADJUSTABLE DRAINAGE FOIL FOR FOURDRINIER PAPER MACHINES

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4 Claims. (Cl. 162—352)

This invention relates to Fourdrinier type paper machines, and, more particularly, to drainage foils, as used in Fourdriniers.

In Fourdrinier type paper machines an aqueous suspension of fibres, called "stock," is discharged through an orifice, known as a "slice," onto a moving endless wire or non-metallic screen. The moving screen passes around a roll known as the "breast roll" and leaves the breast roll in a substantially horizontal direction. The stock issuing from the slice is deposited on the moving screen close to its tangency with the breast roll. After leaving the breast roll the screen passes over a "forming board"; next, the screen passes over a plurality of "table rolls," whose function is to accelerate drainage of water from the stock on the screen. On leaving the last of the table rolls the screen passes over a number of "suction boxes" which are piped up to a vacuum pump after which the screen passes over the "suction couch roll" and is led back to the breast roll again by way of various rolls having functions such as driving, tensioning, and guiding the screen.

A substantial quantity of the water originally contained in the stock is removed by the Fourdrinier screen such that the aqueous suspension of fibres is converted, during its residence on the screen, into a continuous web of paper.

Many disadvantages associated with conventional Fourdrinier type paper machines are overcome in the device of Canadian Patent No. 584,544, in which a plurality of stationary drainage members, or "foils," is substituted for one or more of the table rolls. This results in Fourdrinier sections of shorter length and eliminates many of the disadvantages associated with table rolls.

Many more disadvantages associated with conventional Fourdrinier type paper machines are overcome by the device provided by pending United States patent application Serial Number 314,584, filed October 21, 1963, in which important improvements are made in said drainage foils.

Both the foils of the Canadian patent and those provided by the United States application, however, possess one major disadvantage, their cost. In short, both of said foils are extremely expensive.

Another disadvantage associated with the earlier foil applications is that the leading portion of the foil which is in constant frictional contact with the Fourdrinier wire tends to have a rapid wearing effect on the wire.

The principal object of this invention is to provide a new and improved drainage foil which can be made of a (relatively soft) plastic material such that wear on the Fourdrinier wire is substantially reduced.

Another object of the invention is to provide a rigidly supported leading portion to the foil which is interspersed alternately with spaced supports and drainage passages.

It is an object of the present invention to provide a new and improved drainage foil of the type set forth which is equal or better in efficiency of operation than conventional drainage foils, but which costs only approximately fifty percent of the cost of said conventional foils.

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Another object of the invention is to provide a new and improved drainage foil of the type set forth which is both flexible for adjustment of the divergence angle and resistant to operational wear such as, for example, wear caused by wire abrasion.

Another object is to provide a new and improved foil of the type set forth which includes means for facilitating the escape of the fluid drained from the stock.

Another object is to provide a new and improved foil of the type set forth which comprises simple means for changing the drainage capacity of said drainage foil by changing the angle of the foil trailing surface with respect to the Fourdrinier wire.

Another object is to provide a new and improved foil of the type set forth which possesses sufficient endurance to resist fatigue caused by continued adjustment of the nature set forth.

Another object is to provide a new and improved foil of the type set forth which includes easily replaceable wear elements.

Another object of the invention is to provide a new and improved foil of the type set forth which is so designed and constructed that it can be easily mounted upon conventional Fourdrinier support beams to facilitate conversion of existing equipment for use with drainage foils.

Other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings. It will be understood that changes may be made in the details of construction and arrangement of parts shown and described as the preferred form of the invention has been given by way of illustration only.

Referring to the drawings:

FIG. 1 is a general view of the wet end of a paper machine Fourdrinier section which embodies the present invention;

FIG. 2 is a view on line 2—2 of FIG. 1, looking in the direction of the arrows, showing a partial plan view embodying the invention;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 4 and illustrates the details of an execution of the invention;

FIG. 4 is a fragmentary top view of the device shown, embodying the present invention;

FIG. 5 is a fragmentary end view of the device shown embodying the invention; and

FIG. 6 is a sectional view taken on line 6—6 of FIG. 5, looking in the direction of the arrows.

Referring again to the drawings and to the drainage foil and adjacent apparatus shown therein, the foil provided by the present invention includes a molded, extrusion molded, or machined plastic foil wear strip comprised of a plastic possessing characteristics that are usually in conflict with each other and are not usually found together in a plastic. In other words, the plastic comprising the foil wear strip is not merely any plastic but is, rather, an unusual plastic possessing characteristics not usually found together in a plastic.

These characteristics which the plastic comprising the foil wear strip must possess include the endurance to resist fatigue on continued adjustment of the foil, the flexibility to permit adjustment of the divergence angle, resistance to wear under frictional contact with a moving wire or composition screen, and sufficient strength to withstand the tension of threaded bolts. Thus, the plastic comprising the foil wear strip must be strong, wear resistant and enduring yet flexible enough to permit adjustment of the foil. Also, the foil wear strip must be of

such material that it will not abrade the Fourdrinier wire. These characteristics, as previously stated, are not usually found to exist in a single plastic; rather the plastic comprising the foil wear strip of the present invention must be comprised of an unusual plastic, which unusual plastic possesses all of these characteristics.

An example of a plastic possessing all of these characteristics and, thus, of a plastic suitable for comprising the foil of the present invention is a polyurethane. This plastic is only here specified, however, as an illustration of a suitable composition; and any other plastic which possesses the above described, usually conflicting, characteristics may also be used to comprise the foil wear strip provided by the present invention.

Referring more particularly to the drawings wherein similar reference characters designate corresponding parts throughout the several views;

Referring now to FIG. 1, such illustrates a general side elevation of the wet end of a Fourdrinier section, in which the Fourdrinier wire **10** passes under roll **11**, around breast roll **12**, and over drainage sections **13**, **14**, **15**, **16** and **17**, which are mounted upon Fourdrinier side beams **18**, and are each composed of a number of drainage foils embodying the invention.

With reference to FIG. 2 of the drawings, such is a view taken on line **2**—**2** of FIG. 1, looking in the direction of the arrows, and shows a partial plan view of a drainage section containing a number of drainage foil assemblies.

With reference to FIGS. 3 through 6 of the drawings, the drainage foil assembly shown therein comprises a wear strip or foil element **19** which is comprised of a plastic possessing the characteristics previously set forth, such as, for purposes of more specific example, polyurethane or the like, and is composed of two surfaces, fixed foil leading portion **20** and adjustable foil trailing portion **21**, said two foil surfaces **20** and **21** being connected by a flexible "necked" portion **22**. The shape of said wear strip **19** is such that, in its natural unstressed position, adjustable foil trailing portion **21** is in null position of angular deflection, with respect to the Fourdrinier wire.

Leading portion **20** of said wear strip **19** is supported by the closely spaced supports **23** which are formed integrally with said wear strip **19** and which, further, have spaces or passages **24** therebetween for facilitating the escape of fluid from the stock to the sump or pit provided for the collection of said fluid (not shown).

To ensure that no streaks are caused in the paper web due to the disturbance to the web by the intersections of supports **23**, a small unsupported lip **36** is provided along the full length of the leading portion **20**.

If the leading portion **20** were not supported by supports **23**, the sharp edge of the wear strip **19** would not be rigid enough to maintain contact with the wire and would bend.

The upper edge of each of said spaces **24** forms an acute angle of approximately thirty degrees with said leading portion **20** of the foil. Wear strip **19** is secured by securing means **25** to the body **26** of the drainage foil.

The body **26** of said drainage foil includes a cam member **27** which includes a series of spaced cam slots **28**, said cam member **27** being secured to the remainder of said body **26** by securing plate **29** and securing means **30**. Cam member **27** containing said cam slots **28** is preferably, though not necessarily, comprised of manganese-bronze or other similar non-rusting and non-corroding material.

A guide pin supporting member **31**, which is also preferably comprised of manganese-bronze or other similar non-rusting and non-corrosive material, is joined to the wear strip **19** of the foil adjacent the trailing portion **21** thereof by means of screws or other suitable securing means. Said supporting member **31** serves to carry a series of guide pins **32** at intervals corresponding to the intervals at which cam slots **28** are spaced in member **27**.

Through the interaction of said cam slots **28** and said guide pins **32**, the trailing portion **21** of the wear strip **19** may be angularly adjusted through an angle, which is shown as **33** in the drawings, of approximately four degrees. Angular adjustment is accomplished by means of the mechanism described in U.S. application 240,941, filed November 29, 1962, now U.S. Patent 3,140,225, FIG. 1. As will be seen, wear strip **19** and body **26** of the drainage foil are so shaped in regard to each other that a cavity **34** is formed therebetween, said cavity **34** communicating with the spaces **24** between the spaced supports **23** and the sump or pit for the collection of fluid from the stock passing over the drainage foil such that said fluid may flow from said stock, through said spaces **24** and said cavity **34**, and into said sump or pit. A protective deflector **35** which may be comprised of any suitable material but which is preferably of rubber such that it can bend with the foil trailing portion **21** as illustrated in FIG. 3, is positioned within said cavity **34** such that said deflector **35** serves to deflect fluid entering the foil through the spaces **24** to the sump or pit designed for its collection.

The operation of the device is believed to be apparent from the foregoing.

From the foregoing, it will be seen that I have provided new and improved means for accomplishing all of the objects and advantages of the invention.

I claim:

1. A drainage foil for a Fourdrinier type paper machine having a forming wire, said foil extending across the Fourdrinier machine and under said wire transversely of the direction of wire travel, said foil comprising a leading portion and a trailing portion, said leading portion being in supporting relationship to the wire, closely spaced supports being formed integral with said foil leading portion and providing support therefor, passages extending between said spaced supports for the escape of fluid, said passages opening towards the leading edge of said foil.

2. A drainage foil for a Fourdrinier type paper machine having a forming wire, said foil extending across the Fourdrinier machine and under said wire transversely of the direction of wire travel, said foil comprising a leading portion and a trailing portion, said leading portion being in supporting relationship to the wire, closely spaced supports being formed integral with said foil leading portion and providing support therefor, passages extending between said spaced supports for the escape of fluid, said passages opening towards the leading edge of said foil, the angle between the upper surface of said passages and the upper surface of said foil leading portion being an acute angle.

3. A drainage foil for a Fourdrinier type paper machine having a forming wire, said foil extending across the Fourdrinier machine and under said wire transversely of the direction of wire travel, said foil comprising a leading portion and a trailing portion, said leading portion being in supporting relationship to the wire, closely spaced supports being formed integral with said foil leading portion and providing support therefor, said leading portion having an edge extending ahead of said spaced supports, passages extending between said spaced supports for the escape of fluid, said passages opening towards the leading edge of said foil, the angle between the upper surface of said passages and the upper surface of said foil leading portion being an acute angle.

4. A drainage foil for a Fourdrinier type paper machine having a forming wire, said foil extending across the Fourdrinier machine and under said wire transversely of the direction of wire travel, said foil comprising a leading portion and a trailing portion, said leading portion being in supporting relationship to the wire, closely spaced supports being formed integral with said foil leading portion and providing support therefor, said leading portion having an edge extending ahead of said spaced supports, passages extending between said spaced supports for the

escape of fluid, said passages opening towards the leading edge of said foil, the angle between the upper surface of said passages and the upper surface of said foil leading portion being approximately 30 degrees.

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