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POLYTETRAFLUOROETHYLENE SUCTION BOX COVER FOR FOURDRINIER MACHINES

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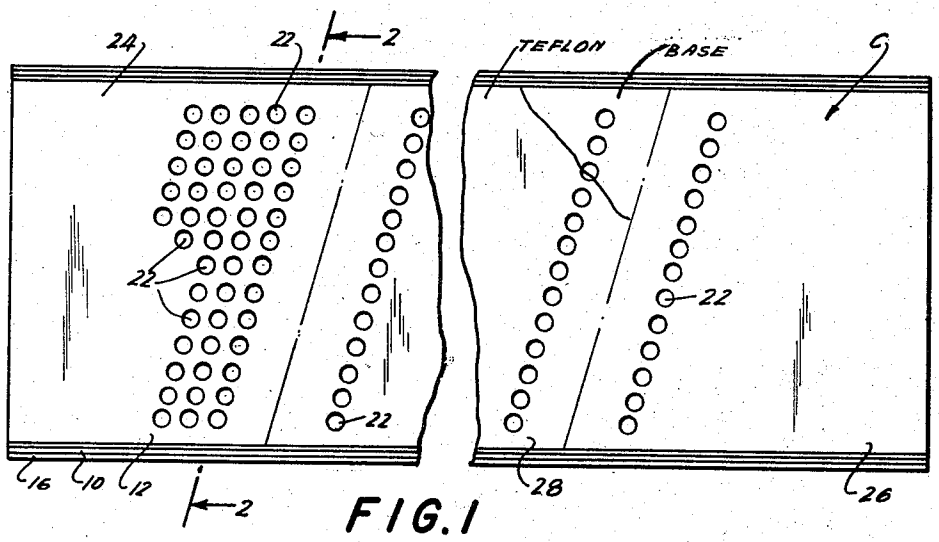


FIG. 1

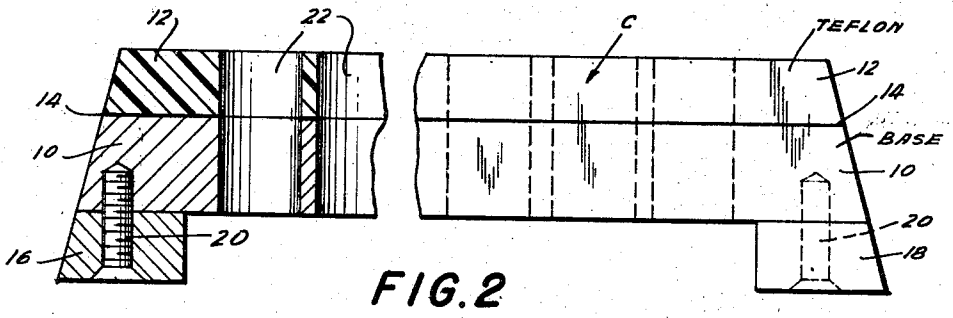


FIG. 2

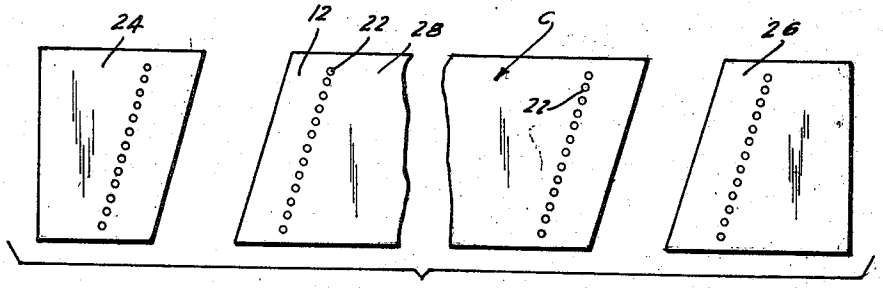


FIG. 3

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POLYTETRAFLUOROETHYLENE SUCTION BOX COVER FOR FOURDRINIER MACHINES

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4 Claims. (Cl. 92—51)

This invention relates to an improved suction box cover for Fourdrinier paper making machines.

The prime object of the present invention centers about the provision of a suction box cover for Fourdrinier machines which accomplishes the dual purpose of reducing the wear on and, therefore, increasing the operating life, of both the screen wire which is moved at speed over the suction box cover and the suction box cover itself.

Of the several types of machines used in making the paper, the Fourdrinier machine produces paper at the fastest rate and in the greatest tonnages per day. Modern machines of this type are run at a speed of 2000 to 2200 feet per minute and some are being erected to be run from 2500 to 3000 feet per minute, the high speed being desired for producing paper quickly and at a lower cost. This increased, and ever increasing, speed, however, has produced and produces problems relating to the wear of the machine parts.

As is known, in the Fourdrinier machine, a slurry of wood pulp fibres in water is fed evenly to a movable wire screen, the wire screen being used to permit the water to drain or be sucked out of the pulp. The pulp which is fed on to the wire screen contains less than 1% fibre and more than 99% water; and until most of the water is removed from the paper, the paper is too weak to carry itself through the remaining water removal steps. It is, therefore, essential to remove the water as quickly as possible; and this is even more important with machines of increased speed.

In high speed Fourdrinier machines, the water is removed by means of suction boxes, the number of which may vary from a few to as many as a dozen or more. A suction box comprises a metal box with a perforated cover placed up against the the bottom of the wire screen over and in contact with which cover the wire screen is moved. A vacuum is maintained on the suction box, and the water is drawn into the boxes through the perforations in the cover. The greater the suction applied, the more water is removed, thereby permitting higher speeds or less further drying capacity.

The higher speed machines and the higher suction applied have introduced serious problems concerning the wear of the machine parts, due to the increased friction between the moving wire screen and the suction box cover. While slow machines operating at from 500 to 600 feet per minute will often have wires that wear for a period of months before they wear out or break, the 1200 to 1500 feet per minute machines used in making heavy kraft paper can wear out a wire screen in from three to five days. It is estimated that roughly 80% of the wire wear occurs due to the friction developed over the suction boxes. Wire screens are quite costly, but the biggest expense is incurred in the stoppage of the machines which is necessitated by changing the wire screens. It has been estimated that a wire change will cost, in wire, labor and loss of production, between ten to fifteen thousand dollars.

Many attempts have been made heretofore to improve the suction box covers so that mainly wire screen wear may be reduced but also so that the operating life of the suction box cover may be long. Suction box covers generally in use today are made of end grain maple. Some of this wood is wax impregnated to produce some degree of lubrication (to reduce wire wear) and to stabilize the wood against excessive swell when wet; but such covers when not in use must be continuously kept wet and are most often submerged in water to prevent warpage or cracking of the wood. Wood box covers of the most improved construction have been designed to last about nine months on a high speed machine. On slow machines, resin impregnated paper or cloth laminates, drilled for suction purposes, have been used; but due to the higher friction between wire and resin laminate, the wire wears faster, although the laminate does not wear as fast as wool. Although the cost of screen wire and their change time are of paramount importance, the dual problem for high speed machines is the design of the suction box cover and use of materials therefor which yields the lowest frictional effects on the moving wire and presents the most durable and most easily servicing suction box cover.

I have found that the operating or useful lives of both the Fourdrinier screen wire and the suction box cover are greatly increased by providing the suction box cover over its screen wire contacting side with a body or sheet of a polytetrafluoroethylene (Teflon) surface. Teflon possesses a very low coefficient of friction and about one tenth of that of wood, and I have found that its use as the contacting surface for the screen wire results in a greatly lowered wire wear and thus in highly reduced operating costs on fast paper making machines. Teflon, however, possesses poor abrasion resistance and mars and cuts easily. Despite this, however, I have found that when used as the contacting surface of the moving screen wire, not only is the life of the moving screen wire greatly increased but that the life of the suction box cover, which would be expected to be far less than that of the best of prior art covers, surprisingly equals or exceeds the same. Thus, I have found experimentally that Teflon topped suction boxes will even outlast the life of the best designed wood topped covers. The reasons for such unexpected and surprising results are not known unless it be the effect of the white water on the system in lubricating the wire over the Teflon surface.

To the accomplishment of these objects, my present invention relates to the novel suction box cover referred to and to a suction box cover as sought to be defined in the appended claims taken together with the following description and the accompanying drawings illustrating an embodiment thereof, in which:

Fig. 1 is a top plan view of the suction box cover of the present invention with part of the Teflon top broken away for illustrative purposes;

Fig. 2 is an end or transverse view thereof shown on an enlarged scale and taken partly in section in the plane of the line 2—2 of Fig. 1; and

Fig. 3 is a plan view of the same shown on a reduced scale and depicting the three component sections of which the cover may be made.

Referring now more in detail to the drawings, the suction box cover comprises in its broader aspects a perforated cover generally designated as C, said cover being provided over its top or screen wire contacting side with a body having a polytetrafluoroethylene (Teflon) surface.

In its more specific aspects, and in the preferred embodiment, the suction box cover comprises a base member 10, which may be made of metal or a resin laminated

paper or cloth body to which is united a sheet of polytetrafluoroethylene. In the drawings, I have illustrated the base as comprising a sheet of aluminum of ¾" thickness to which is united a sheet **12** of polytetrafluoroethylene which may also be about ½" thick, the Teflon sheet being adhered as by being cemented to the metal base at the contiguous faces **14** thereof.

The base member **10** is employed as a support for the Teflon top sheet **12** which latter is flexible and should be supported planularly to prevent any concavity occurring on its top surface while under vacuum. The base member **10** is provided on its opposite sides with the metal runners **16** and **18**, which may be secured to the base member along the length thereof by a plurality of screws such as **20**, **20**. These runners are used to build the box to an overall height of 1¾" so as to equal the height of prior art commercial wood covers.

The super-imposed Teflon and base laminae **12** and **10** are drilled to provide the suction perforations **22**, **22**, which latter are distributed transversely and longitudinally over substantially the entire length and width of the suction cover; and these may be drilled in suitable pattern, such as illustrated in Fig. 1 of the drawings, it being understood that any desired pattern or style of drilled perforations may be used.

As illustrated both in Fig. 1 and Fig. 3, the suction box cover may be made in a plurality of sections, such as the two end sections **24** and **26**, and the middle section **28**, assembled together to form the suction box cover in the manner depicted in Fig. 1 of the drawings.

The structure of the improved suction box cover of the present invention, the function, use and advantages thereof, will in the main be fully apparent from the above detailed description. It will be further apparent that changes may be made in the design, arrangement, base materials and assembly of the parts without departing from the spirit of the invention and the scope thereof as defined in the following claims.

I claim:

1. A suction box cover for Fourdrinier machines comprising a perforated cover for the suction box and in contact with which is moved the Fourdrinier screen wire, said cover comprising a base member and a screen wire contacting body consisting essentially of polytetrafluoroethylene on the base member.

2. A suction box cover for Fourdrinier machines comprising a perforated cover for the suction box and in contact with which is moved the Fourdrinier screen wire, said cover comprising a metal base attachable to the suction box and a screen wire contacting sheet consisting essentially of polytetrafluoroethylene united to the base.

3. A suction box cover for Fourdrinier machines comprising a perforated cover for the suction box and in contact with which is moved the Fourdrinier screen wire, said cover comprising a resin laminated paper base attachable to the suction box and a screen wire contacting sheet consisting essentially of polytetrafluoroethylene united to the base.

4. A suction box cover for Fourdrinier machines comprising a perforated cover for the suction box and in contact with which is moved the Fourdrinier screen wire, said cover comprising a resin laminated cloth base attachable to the suction box and a screen wire contacting sheet consisting essentially of polytetrafluoroethylene united to the base.

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