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SUCTION BOX COVER FOR A PAPERMAKING MACHINE

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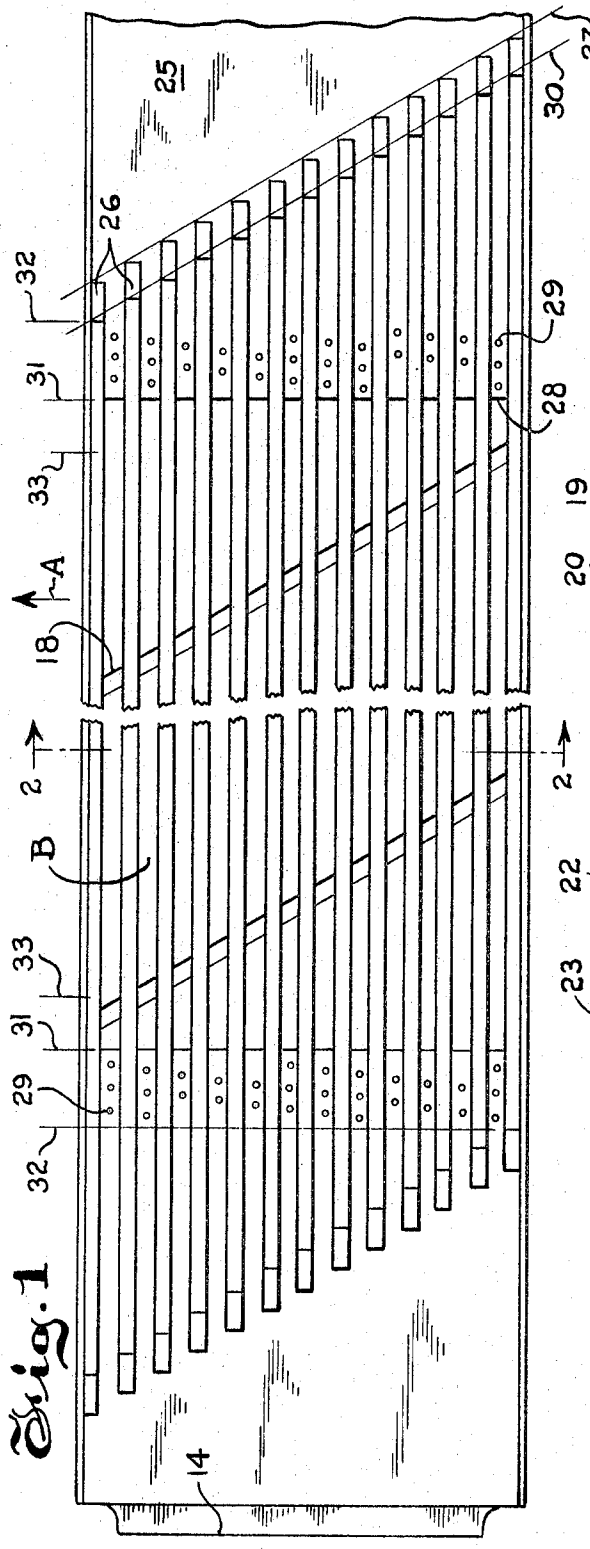


Fig. 1

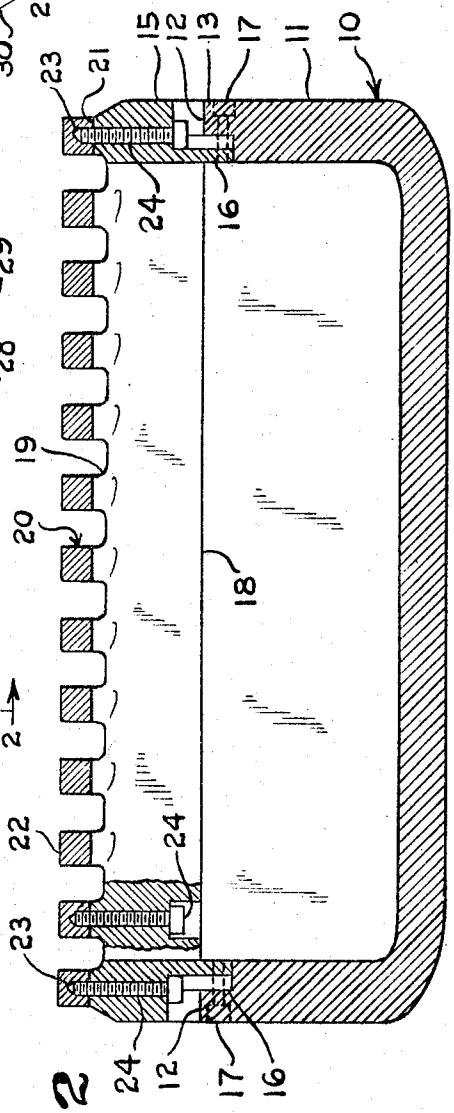


Fig. 2

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SUCTION BOX COVER FOR A PAPERMAKING MACHINE

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The invention relates to papermaking machines of the Fourdrinier type and relates more particularly to improvements in suction boxes forming elements of such machines.

These suction boxes, of which several are usually employed, are located at the couch end of the machine and are spaced beneath the horizontal run of the Fourdrinier wire just before the latter reaches the couch roll. The suction boxes extend transversely across the machine and are provided with perforated or slotted covers. The boxes are connected with a suction pump or pumps which maintain a partial vacuum in the boxes; and, as the wire with its film of paper travels over the tops of the boxes, a portion of the water contained in the paper is sucked into the suction boxes. The partial vacuum within the boxes tends to hold the wire against the covers of the boxes with considerable pressure, and as the wire is constantly moving transversely of the width of the boxes, it tends to wear grooves in the covers and is itself subjected to severe abrasion. This requires frequent resurfacing of the suction box covers and replacement of the costly Fourdinier wires.

The box covers have been made of various materials and perhaps wood is most customarily used. One of the chief objections to wood suction box covers is the amount of wear that occurs with such covers and the tendency for abrasive particles to embed themselves in the wood, causing accelerated wear of the Fourdrinier wire. Therefore, harder materials for suction box covers have been proposed, such as synthetic resins, hard rubber, ceramic materials or metals. Stainless steel may be used, and preferably it is provided with a hard surface, such as with a layer of tungsten carbide, ceramic oxides, or welded overlays.

Many different patterns of openings have been used in suction box covers in the past. One of the most common includes round openings which are disposed in regular pattern across the width of the machine. Bars extending transversely of the machine and spaced longitudinally of the machine have also been used extensively. These bars provide elongated openings into a suction box which are equally spaced and are of equal width and extend transversely across the machine.

It is, in particular, the latter type of cover utilizing transversely extending bars with which my invention is concerned, and it is an object of the present invention to provide an improved suction box cover of this type utilizing a series of identical bars any one of which may be used to replace any one of the others. Since the bars are identical, spare bars may be kept in storage so that if there is breakage of, or undue wear on, any of the bars, the damaged bar may be easily replaced by any one of the spare bars in storage.

The invention consists of the novel constructions, arrangements and devices to be hereinafter described and claimed for carrying out the above stated objects, and such other objects, as will be apparent from the following description of a preferred form of the invention, illustrated with reference to the accompanying drawing, wherein:

FIG. 1 is a top plan view of a suction box having a cover embodying the principles of the invention; and

FIG. 2 is a sectional view on an enlarged scale taken on line 2—2 of FIG. 1.

Like characters of reference designate like parts in the several views.

Referring now to the drawings, a suction box **10** is illustrated, which is adapted to be disposed beneath the screen wire of a Fourdrinier machine adjacent to the couch, as above mentioned. The suction box comprises a relatively narrow and shallow trough **11** preferably formed of metal and provided with a flat upper edge surface **12** and a flange **13**. A vacuum connection **14** is provided at one end of the box and is suitably connected to a source of vacuum for providing a partial vacuum within the suction box and for removing water which drains into the box. A rim **15** is disposed on the trough **11**. The rim **15** has a flange **16** lying within the flange **13**, and cap screws **17** extend through the flanges **13** and **16** for fastening the rim **15** on to the trough **11**.

A plurality of support bars or struts **18** extend obliquely across the trough **11** to opposite sides of the rim **15**. The arrow A indicates the machine direction of the suction box and of the paper-making machine, that is, the direction in which the Fourdrinier wire passes over the suction box; and it will be noted from FIG. 1 that the support bars **18** extend approximately at an angle of 30 degrees with respect to the machine direction indicated by the arrow A. This angular disposition of the support bar is important in minimizing any tendency of the supporting structure to shadow-mark the freshly formed paper web. The bars **18** are fixed in place with respect to the rim **15** by any suitable means, such as by welding.

The bars **18** are provided on their upper edges with equally spaced bosses **19**, and Fourdrinier wire supporting bars **20** are disposed on top of the bosses **19** and extend from one end to the other end of the suction box. The rim **15** is provided with an upper flat surface **21** disposed at the same height as the tops of the bosses **19**, and steel or ceramic bars **20** are also disposed on the surface **21**, as will be noted.

Each of the bars **20** has a hard top surface **22** so as to provide long wearing capabilities. The top surface may be flat, curved, beveled, placed at a slight angle or otherwise shaped for various water removal requirements. Each of the bars **20** is provided with a series of threaded blind openings **23** for receiving cap screws **24** that extend through the bars **18** and bosses **19** or through the rim **15** into the openings **23** for fixing the bars **20** with respect to the bars **18** and the rim **15**. The bars **20** are all identical and the openings **23** are equally spaced and are identically located.

The rim **15** is provided with supporting end plate portions **25** on the ends of the suction box. The plate portions **25** are formed with slots **26** for receiving the bars **20**, and it will be noted that the ends of the slots **26** lie on lines **27** that are parallel with the obliquely extending bars **18**. The slots **26** define tongues **28** between them, and the tongues **28** are provided with holes **29** therethrough. The bars **20** terminate closely adjacent the ends of the slots **26**, and the ends of the bars **20** lie on lines **30** that are adjacent the lines **27** and are parallel to the lines **27**. It will be noted that the holes **29** lie on lines that extend diagonally with respect to the machine direction A.

The tongues **28** extend to lines **31** which lie in the machine direction, parallel with the arrow A. The paper web made on the Fourdrinier machine preferably has sufficient width so that its edges lie over the holes **29**, the web having edges **32**, and the Fourdrinier wire itself is of some width greater than that encompassed between the lines **32**. It is contemplated that the paper web shall eventually be trimmed to have a width less than the distance between the ends of the tongues **28** such as along

lines 33, in view of the fact that the holes 29 do not provide the same drying effect as do the slots between the parallel bars 20.

It will be observed that the end plate portions 25 and the rim 15 are integral and provide a frame for the suction box cover having a central opening B across which the bars 20 extend. Since the suction box is much longer than wide, the minor axis of the frame and of the suction box is on a line parallel with the arrow A, and the support bars 18 and also the lines 27 and 30 extend diagonally with respect to the minor axis. The bars 20 extend longitudinally of the frame and of the suction box, and they are equally spaced. The tongues 28 terminate on the lines 31 that are parallel with the minor axis and with the machine direction A.

In operation, the Fourdrinier wire travels over the upper suction box surface provided by the bars 20, and suction is exerted on the paper web on the wire through the transverse slots between the bars 20. If, for any reason, it is desired to replace any one of the bars 20, it may be removed from the obliquely extending support bars 18 simply by removing the cap screws 24. All of the bars 20 are identical, in view of the fact that their ends lie equally distant and with only a small spacing from the line 27 defining the ends of the slots 26; and, therefore, a replacement bar 20 may be drawn from a stock of surplus bars 20. Since all of the bars 20 are identical, they need not be drilled and tapped just prior to assembly within the suction box to fit in a particular position and they need not be cut off to fit at one or both ends of the suction box. Any bar 20 can fit in any position in the suction box cover, and the predrilled and tapped holes 23 in the bars will line up with the corresponding holes for the screws 24 in the obliquely extending support bars 18 or in the rim 15.

Utilizing my improved suction box structure in which all of the cross bars 20 are identical, the risk of drilling and tapping these bars during assembly is avoided, and the costly alternatives of having a large stock of custom fit bars or of having overlength bars are also avoided.

I wish it to be understood that the invention is not to be limited to the specific constructions, arrangements, and devices shown and described, except only insofar as the claims may be so limited, as it will be understood to those skilled in the art that changes may be made without departing from the principles of the invention.

What is claimed is:

1. A suction box cover for use in contact with a moving screen of a Fourdrinier machine, said cover comprising a frame which is elongated in the direction of a major axis and having a central elongate opening therethrough with a plurality of equally spaced slots in the frame at the ends of the opening and defining tongues between the slots extending into the opening with the opening and slots and tongues all extending parallel with said major axis, a plurality of support struts fixed to said frame and extending between the sides of the frame and diagonally with respect to the minor axis of the frame which is at right angles to said major axis, said tongues terminating on lines parallel with said minor axis, a plurality of identical integral bars extending parallel with said major axis and into said slots at the opposite ends of said opening, and means for fixing said bars with respect to said support struts and thereby with respect to said frame.

2. A suction box cover for use in contact with a moving screen of a Fourdrinier machine, said cover comprising a frame which is elongated in the direction of a major axis and having a central elongate opening therethrough with a plurality of equally spaced slots in the frame at the ends of the opening and defining tongues between the slots extending into the opening with the opening and slots and tongues all extending parallel with said major axis, a plurality of support struts fixed to said frame and extending between the sides of the frame and diagonally with respect to the minor axis of the frame which is at right angles to said major axis, said slots terminating on lines parallel with said support struts and said tongues terminating on lines parallel with said minor axis, a plurality of identical integral bars extending parallel with said major axis and into said slots at the opposite ends of said opening, and screws extending into said bars from said support struts for fixing the bars with respect to said support struts and thereby with respect to said frame.

3. A suction box cover for use in contact with a moving screen of a Fourdrinier machine, said cover comprising a frame which is elongated in the direction of a major axis and having a central elongate opening therethrough with a plurality of equally spaced slots in the frame at the ends of the opening and defining tongues between the slots extending into the opening with the opening and slots and tongues all extending parallel with said major axis, a plurality of support struts extending between the sides of said frame and diagonally with respect to the minor axis of the frame which is at right angles to said major axis, said slots terminating on lines parallel with said support struts and said tongues terminating on lines parallel with said minor axis, a plurality of identical integral bars extending parallel with said major axis and into said slots at the opposite ends of said opening, and screws extending into said bars from said support struts for fixing the bars with respect to said support struts and thereby with respect to said frame, said tongues being provided with spaced openings therethrough which lie on lines extending slightly diagonally with respect to said minor axis.

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