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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Suction Box Cover

We, TEXAS INSTRUMENTS INCORPORATED, a Corporation organized according to the laws of the State of Delaware, United States of America, of 13500 North Central Expressway, Dallas, Texas, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to suction box covers, and more particularly to an improved suction box cover for use with apparatus for the manufacture of paper.

The principal method of making paper involves the use of an apparatus known as a Fourdrinier machine. In such a machine, a slurry of wood pulp and water is fed onto a rapidly moving endless screen wire. The slurry deposited on the screen generally contains less than 1% wood pulp. The screen wire provides support for the fibres while the fibres are matted and the water drained off leaving a paper mat. A sidewise shaking motion is usually imparted to the moving wire to help orient the fibres and give better felting action. A large proportion of the water normally drains through the screen wire; however, to increase the speed and efficiency of the drainage the wire is drawn over a series of suction boxes. These suction boxes have perforated covers which contact the underside of the wire. A vacuum maintained in the suction boxes draws water from the partially felted sheet into the boxes through the perforations in the covers.

As the wire is drawn progressively over a series of suction boxes, the water content of the slurry is rapidly decreased. At the drier end of the machine, there is usually insufficient water in the slurry to effect a vacuum seal between the underside of the screen wire and the surface of the suction box cover. Therefore, it is difficult to maintain a vacuum in the suction boxes near the drier end of the machine.

The presence of water at the wet end of

the machine acts as a lubricant between the underside of the screen wire and the surface of the suction box cover. However, at the dry end of the machine, there is insufficient water in the mat to provide effective lubrication between the suction box cover and the screen, thereby allowing extreme friction and wear to both the screen and the suction box cover.

The present invention comprises a paper making machine in which a travelling screen is drawn over the surface of a suction box cover, and in which the suction box cover has a channel in the said surface which surface contacts the screen with the channel extending wholly or substantially wholly across the suction box cover generally transversely of the direction of travel of the screen and being suitable to direct liquid as a lubricant between the screen and the suction box cover during operation of the machine.

Preferably the channel is disposed in an edge portion of the cover first engaged by the travelling screen as the screen passes over the cover; the cover may also include a second channel disposed in an opposite edge portion of the cover and extending generally parallel to the first mentioned channel.

By use of such a cover as described above, a high vacuum contact can be maintained with the undersurface of the moving screen at the dry end of a Fourdrinier machine. Adequate lubrication, minimising wear to the cover and the screen, can also be ensured. Such a cover is also particularly advantageous in that it can readily be substituted into existing machines.

The channel(s) in the cover box can be used for the addition of chemicals to the undersurface of the screen for lubrication or cleaning purposes and also can be used to add colouring or other chemicals to the undersurface of the screen without disturbing the paper sheet formation. By this means, chemicals may also be added to the undersurface of the screen for the elimination of pitch build ups.

By way of example, the invention will be

described in greater detail with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view illustrating the general arrangement of a paper making machine;

Figure 2 is a perspective view of a suction box cover having transverse channels along the leading and trailing edges thereof; and

Figure 3 is a sectional view of a suction box with the suction box cover forming part of this invention in place thereon.

The suction box cover to be described has a channel or canal substantially transverse to the direction of movement of the wire across the suction box cover. The channel may be either at the leading edge or the trailing edge or both. The channel is filled with water or other fluids. As the screen wire passes over the channel, it contacts the water and picks up sufficient water to provide an effective vacuum seal between the undersurface of the screen wire and the surface of the suction box cover. The water thus picked up also acts as a lubricant.

Referring now to Figure 1, a slurry of wood pulp and water is uniformly fed onto a rapidly moving endless wire screen 11. The screen passes over end rolls 12 and 13, at least one of which is driven. The slurry supported by the wire screen passes over table rolls 14 and suction boxes 15. Water is withdrawn from the slurry by normal drainage and by the vacuum of the suction boxes.

Construction of the suction box is shown in more detail in Figures 2 and 3. Suction boxes are comprised of a wire-contacting cover 20 and a base member 21. The cover 20 is conveniently attached to the base member by any suitable means such as the clamps 22 and 23, which firmly secure the cover in place on the base member 21. Each suction box is connected to a suitable vacuum source (not shown) by a means such as suction line 24.

The suction box cover 20 is generally made up of a plurality of segments such as that shown in Figure 2. Each segment is provided with a plurality of openings or perforations 26 whereby the vacuum maintained in the suction box draws water from the slurry through the screen and into the suction box base member 21.

Each segment of the suction box cover is provided with a channel 27 in the wire-contacting surface of the suction box cover. The channels in adjacent segments are aligned to form a fluid-conducting canal extending transverse to the direction of travel of the screen 11. In the preferred embodiment of the invention, the channel 27 is positioned adjacent the leading edge of the suction box cover. The canal is filled with water or any other suitable liquid. As the wire screen 11 is drawn across the surface of the suction box cover, the wire contacts the surface of the water in the canal.

The water adheres to the under-surface of the wire, thus providing a lubricant and aiding in the formation of a vacuum seal between the screen wire and the wire-contacting surface of the suction box cover without disturbing the paper formation.

The fluid may be supplied to the canal by any suitable fluid transporting arrangement. One end of the channel may be conveniently plugged so that fluid fed into the channel can escape only by adhering to the under-surface of the wire. Alternatively, the fluid may be continuously circulated through the channel and a suitable filter or purifier.

When the invention is used to supply water to the under-surface of the wire for lubrication and to aid in forming a vacuum seal, the level of water in the channel should be sufficient to allow the wire to contact the surface of the water. Alternatively, when treating solutions are added to the under-surface of the paper by way of the channel described herein, it may be advantageous to adjust the flow of fluid into the channel to provide the desired degree of flooding of the paper mat.

Although the invention has been described with particular reference to channels positioned adjacent the leading and/or trailing edges of suction box covers, it will be understood by those skilled in the art that other designs and configurations of channels may be advantageously used. It is to be also understood that although the invention has been described with particular reference to a suction box cover comprising a plurality of segments, the invention is equally applicable to a suction box cover of unitary construction.

WHAT WE CLAIM IS:—

1. A paper making machine in which a travelling screen is drawn over the surface of a suction box cover, and in which the suction box cover has a channel in the said surface which surface contacts the screen with the channel extending wholly or substantially wholly across the suction box cover generally transversely of the direction of travel of the screen and being suitable to direct liquid as a lubricant between the screen and the suction box cover during operation of the machine.

2. A machine as claimed in claim 1, wherein the channel is disposed in an edge portion of the cover first engaged by the travelling screen as the screen passes over the cover.

3. A machine as claimed in claim 2, including a second channel disposed in an opposite edge portion of the cover and extending generally parallel to the first mentioned channel.

4. A machine as claimed in any one of claims 1—3, wherein the suction box cover is segmented in the direction of the channel and each segment includes a portion of the channel.

5. A paper making machine in which a tra-



described in greater detail with reference to the accompanying drawings, in which:—

Figure 1 is a perspective view illustrating the general arrangement of a paper making machine;

Figure 2 is a perspective view of a suction box cover having transverse channels along the leading and trailing edges thereof; and

Figure 3 is a sectional view of a suction box with the suction box cover forming part of this invention in place thereon.

The suction box cover to be described has a channel or canal substantially transverse to the direction of movement of the wire across the suction box cover. The channel may be either at the leading edge or the trailing edge or both. The channel is filled with water or other fluids. As the screen wire passes over the channel, it contacts the water and picks up sufficient water to provide an effective vacuum seal between the undersurface of the screen wire and the surface of the suction box cover. The water thus picked up also acts as a lubricant.

Referring now to Figure 1, a slurry 10 of wood pulp and water is uniformly fed onto a rapidly moving endless wire screen 11. The screen passes over end rolls 12 and 13, at least one of which is driven. The slurry supported by the wire screen passes over table rolls 14 and suction boxes 15. Water is withdrawn from the slurry by normal drainage and by the vacuum of the suction boxes.

Construction of the suction box is shown in more detail in Figures 2 and 3. Suction boxes are comprised of a wire-contacting cover 20 and a base member 21. The cover 20 is conveniently attached to the base member by any suitable means such as the clamps 22 and 23, which firmly secure the cover in place on the base member 21. Each suction box is connected to a suitable vacuum source (not shown) by a means such as suction line 24.

The suction box cover 20 is generally made up of a plurality of segments such as that shown in Figure 2. Each segment is provided with a plurality of openings or perforations 26 whereby the vacuum maintained in the suction box draws water from the slurry through the screen and into the suction box base member 21.

Each segment of the suction box cover is provided with a channel 27 in the wire-contacting surface of the suction box cover. The channels in adjacent segments are aligned to form a fluid-conducting canal extending transverse to the direction of travel of the screen 11. In the preferred embodiment of the invention, the channel 27 is positioned adjacent the leading edge of the suction box cover. The canal is filled with water or any other suitable liquid. As the wire screen 11 is drawn across the surface of the suction box cover, the wire contacts the surface of the water in the canal.

The water adheres to the under-surface of the wire, thus providing a lubricant and aiding in the formation of a vacuum seal between the screen wire and the wire-contacting surface of the suction box cover without disturbing the paper formation.

The fluid may be supplied to the canal by any suitable fluid transporting arrangement. One end of the channel may be conveniently plugged so that fluid fed into the channel can escape only by adhering to the under-surface of the wire. Alternatively, the fluid may be continuously circulated through the channel and a suitable filter or purifier.

When the invention is used to supply water to the under-surface of the wire for lubrication and to aid in forming a vacuum seal, the level of water in the channel should be sufficient to allow the wire to contact the surface of the water. Alternatively, when treating solutions are added to the under-surface of the paper by way of the channel described herein, it may be advantageous to adjust the flow of fluid into the channel to provide the desired degree of flooding of the paper mat.

Although the invention has been described with particular reference to channels positioned adjacent the leading and/or trailing edges of suction box covers, it will be understood by those skilled in the art that other designs and configurations of channels may be advantageously used. It is to be also understood that although the invention has been described with particular reference to a suction box cover comprising a plurality of segments, the invention is equally applicable to a suction box cover of unitary construction.

WHAT WE CLAIM IS:—

1. A paper making machine in which a travelling screen is drawn over the surface of a suction box cover, and in which the suction box cover has a channel in the said surface which surface contacts the screen with the channel extending wholly or substantially wholly across the suction box cover generally transversely of the direction of travel of the screen and being suitable to direct liquid as a lubricant between the screen and the suction box cover during operation of the machine.

2. A machine as claimed in claim 1, wherein the channel is disposed in an edge portion of the cover first engaged by the travelling screen as the screen passes over the cover.

3. A machine as claimed in claim 2, including a second channel disposed in an opposite edge portion of the cover and extending generally parallel to the first mentioned channel.

4. A machine as claimed in any one of claims 1—3, wherein the suction box cover is segmented in the direction of the channel and each segment includes a portion of the channel.

5. A paper making machine in which a tra-

velling screen is drawn over the surface of a suction box cover, substantially as described herein with reference to Figs. 1—3 of the accompanying drawings.

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