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(54) **Filter press.**

(57) A filter press for removing excess water from a cake of slurry (3) running between two opposite, endless wires (1, 2), the filter press comprising a pre-pressing section (4) and a post-pressing section (5) and a turning roll (6) disposed between said pressing sections in the direction transverse to the wires and extending substantially over the whole width of the wires, and at which roll the direction of the wires is changed. One of the problems with known filter presses presently in use is that the velocity of the presses can not be improved because of the sealing difficulties between the wires. The filter press according to the present invention avoids this problem as the ends (7) of the turning roll (6) are at least during operation of the press closer to the wire (2), which is further away from the roll in the center portion (8) of the turning roll.

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FILTER PRESS

The present invention relates to a filter press used for removing excess water from a slurry cake travelling between two opposite endless wires such as used for making paper or board. The filter press comprises a pre-pressing section and a post-pressing section, and between them a turning roll extending substantially over the whole width of the wires in a direction transverse to the direction of extension of the wires and disposed to change the running direction of the wires.

As a web is formed between the wires the longitudinal tensile stressing of the wire increases in the middle of the wire and the tensile stressing at the edges may even be negative which means that the wire slackens at the edges whereby slurry may flow over the edges, especially at the pre-pressing section. To prevent this, edge sealings and "doctors" are provided at the straight portion of the wire.

It is not possible to increase the speed of the machine and the speed of the wires unless the dry-solids content of the web after the pre-pressing section is adequate. Also trimming or defining the web is difficult because of the overflow of the slurry. Thus, the need to develop a new type of sealing the filter press has recently arisen.

The object of the invention is to provide a filter press which avoids the problems discussed above and with which the speed of the filter press can be substantially improved. A filter press according to the invention is characterised in that the ends of the turning roll are, at least during operation of the filter press, closer to the wire furthest away from the turning roll than is the centre or central portion of the turning roll.

A preferred embodiment of the invention is characterized by the feature that the diameter of the ends of the turning roll is greater than the diameter of the central portion of the roll.

Another preferred embodiment of the invention is characterized in that substantially the whole turning roll is made of a flexible material.

Yet another preferred embodiment of the invention is characterized in that the material of the ends of the turning roll is harder than the material of the central portion.

Some of the most important advantages of the invention are that as the ends of the turning roll are lower than the central portion or closer to the wire further away from the roll, they create a greater wire tension at the edges of the wire than a turning roll having the same diameter from one end to the other. An increased wire tension at the edges of the wire presses the edges against each other at the curved wire portion and creates a sealing bag

or enclosure sealed at the edges which prevents the slurry from flowing out over the edges. It has been discovered experimentally that the sealing effect of a turning roll according to the invention is particularly effective at the pre-pressing section where the most difficult sealing problems occur today. Defining the web with a filter press according to the invention is remarkably easier than with prior art devices.

The invention is described in detail below, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a schematic illustration of a filter press with a pre-and post-pressing section;

Fig. 2 is a section along line II - II of Fig. 1;

Fig. 3 is an illustration corresponding to Fig. 2 of another embodiment of the invention during operation of the press;

Fig. 4 is an illustration corresponding to Fig. 2 of a third embodiment of the invention; and

Fig. 5 is an illustration corresponding to Fig. 2 of a fourth embodiment of the invention.

Fig. 1 illustrates a typical filter press, in which a web 3 of slurry is formed between two oppositely rotatable wires 1 and 2. In Fig. 1 web 3 is fed between the wires from the left. The filter press comprises a pre-pressing section 4 and a post-pressing section 5 for removing excess water from the web. A turning roll 6, at which the webs are turned, is disposed between these sections. The turning rolls of the filter presses and used hitherto are stiff and have the same diameter from one end of the roll to the other. In the filter press according to the present invention, the uniform turning roll may be replaced with a turning roll 6 such as illustrated in Figs. 2 - 5.

Fig. 2 illustrates a turning roll 6 made according to the invention. The diameter of ends 7 of the turning roll is greater than that of the central portion 8 of the roll. When wires 1 and 2 turn at the turning roll 6, the wires are tensioned, naturally. The cross section of the lower wire 2 remains constant and a web is formed on it with the upper wire curving towards the central portion 8 of the turning roll 6. At the ends 7 the wires run into contact with each other and a bag of web is formed between the wires 1 and 2 from which the wet slurry cannot flow from between the edges of the wires and whereby defining of the web in the lateral direction is easy to control.

An even tension of wire 2 can thus be achieved with the sealing turning roll 6 along the whole cross section of the wire and a cross section form sealing the edges of the wire between the wires 1 and 2 before the roll, after the roll and at the roll.

Fig. 3 illustrates a turning roll 6 which also gives the web forming result described above. In this embodiment, the ends 7 of the roll 6 are made of a harder material than the center portion 8 of the roll. The central portion is so soft that it yields and the upper wire forms the arch illustrated in the figure.

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Fig. 4 illustrates a turning roll 6 made according to the invention of a flexible material. When the filter press is not in operation the turning roll is cylindrical and its longitudinal axis is straight but during operation the material yields and the bending illustrated in the figure is achieved. Here again the edges of the wires are pressed against each other and an enclosure bag is formed between the wires for the slurry 3.

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Fig. 5 illustrates yet another embodiment in which the diameter of the ends of the turning roll 6 is larger than that of the central portion of the roll. In this embodiment, portions 9 between the ends 7 and the central portion 8 have the shape of a truncated cone. This embodiment also gives the desired result, i.e. the edges of the wires are sealed.

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It will be apparent to persons skilled in the art that the invention is not limited by the embodiments disclosed here as examples, only, but it can be modified within the scope of protection defined by the appended patent claims. The term "wire" relates to an endless belt of mesh or cloth as it is referred to sometimes.

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Claims

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1. A filter press for removing excess water from a cake of slurry (3) when running between two opposite endless wires (1, 2), the filter press comprising the two opposite endless wires (1, 2) a pre-pressing section (4) and a post-pressing section (5) and a turning roll (6) disposed between said pressing sections in the transverse direction of the wires and extending substantially over the whole width of the wires, characterized in that the ends (7) of the turning roll (6) are closer to the wire (2) than the central portion (8) of the turning roll.

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2. A filter press as claimed in claim 1, characterized in that the diameter of the ends (7) of the turning roll (6) is greater than the diameter of its central portion (8).

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3. A filter press as claimed in claim 1, characterized in that substantially the whole turning roll (6) is made of a flexible material.

4. A filter press as claimed in claim 1, characterized in that the material of the ends (7) of the turning roll (6) is harder than the material of the central portion (8).

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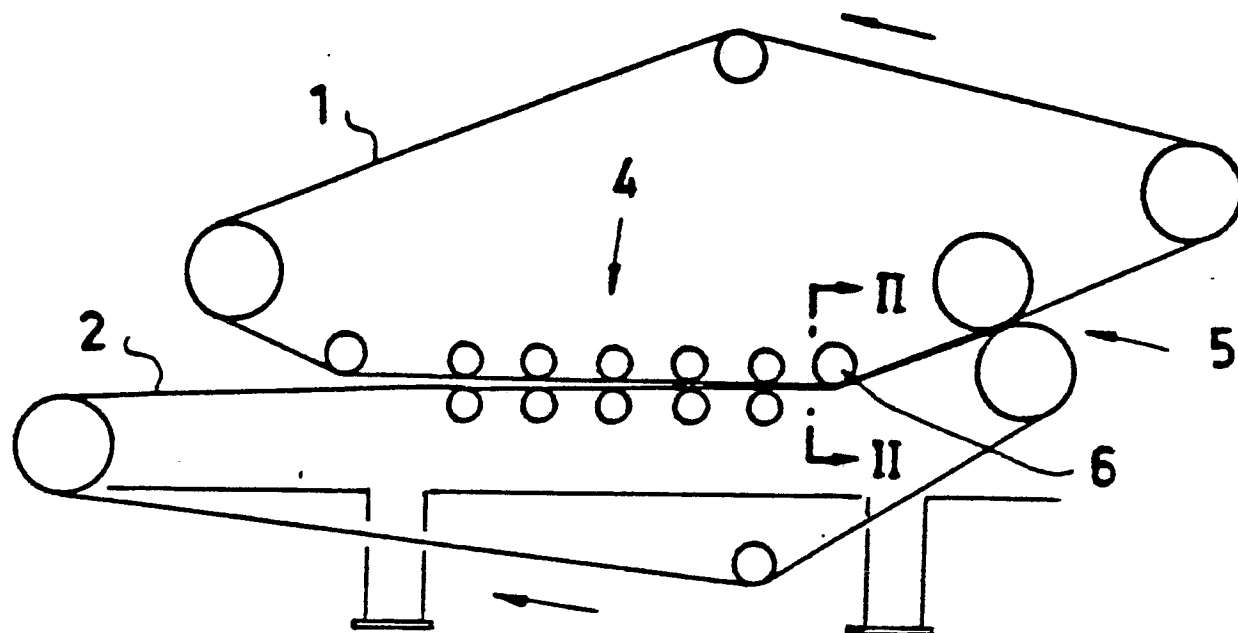


Fig. 1

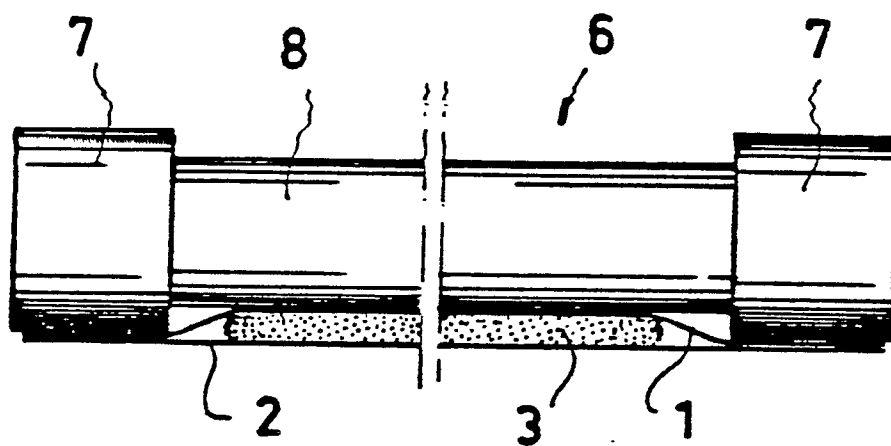


Fig. 2

