

[54] MULTILAYER PAPER MAKING MACHINE

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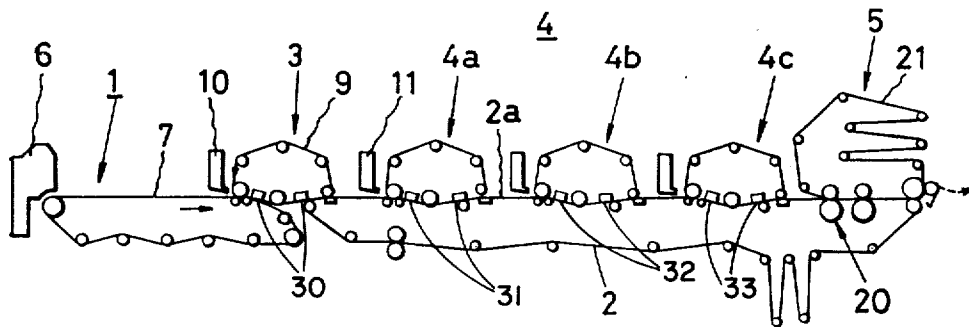
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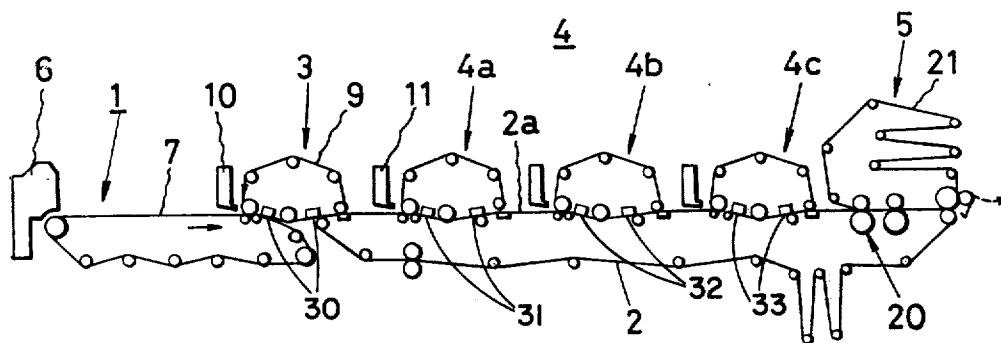
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[57] ABSTRACT

A combination-paper making machine comprising a Fourdrinier wire on which is formed the first layer of a multi-layer paper sheet, a looped conveying felt placed adjacent to the wire; an inverter unit comprising a second layer-making unit for forming a second layer on the first layer, and is placed over the one end of said Fourdrinier wire and the opposite end of the looped conveying felt, and preferably successive inverter layer making units for forming in turn a third and other successive layers, each of said inverter units having at the bottom part thereof a dehydration mechanism whereby the texture of said multi-layer paper is formed.

6 Claims, 1 Drawing Figure





MULTILAYER PAPER MAKING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The apparatus of the present invention relates to an improved combination-paper making machine in which multi-layer paper is formed by putting the second and preferably following paper layers in turn over the first paper layer.

2. Prior Art

Among such paper machines, one has already been proposed which has along the entire top thereof a travelling path of a looped Fourdrinier wire as a bottom layer, a plurality of short wire making units which cooperate with said wire and are positioned in turn so as to receive paper layers successively in each layer making unit thus forming the multilayer paper which is composed of combined paper layers. This type of multi-layer paper making apparatus has disadvantages of planning, operation, conservation and cost due to the increased wire length and weight as the number of layer making units increases because all the multi-layer making units thereof for making the first and following layers are arranged in the travelling direction of the single Fourdrinier wire so as to cooperate with said wire. Moreover, the combination-paper making machine should form the first layer which is a base of the multi-layer paper, in a considerable thickness while forming an excellent texture paper. A conventional combination-paper making machine in which all the layer making units including the first paper layer forming unit cooperate with a common bottom wire never meets the aforementioned requirements, because of limited length of the bottom wire and the difficulties in weighing of the first paper layer as well as other adjustments.

OBJECTS AND SUMMARY OF THE INVENTION

An object of this invention is to provide a novel, unique combination-paper making machine or device which does not have the above disadvantages of the conventional paper making machines.

A further object is to provide a machine according to this invention which has the feature of a looped conveying felt adjacent to or in the neighborhood of the Fourdrinier wire which functions to form the first layer of the multi-layer paper. An inverform second layer-making unit is positioned or laid over the adjacent end of said wire part opposite to said first head box means for supplying paper pulp to the Fourdrinier wire. Said inverform unit is positioned adjacent the one end of the looped conveying felt. This inverform layer making unit cooperates with the part of the Fourdrinier wire adjacent thereto and allows the second paper layer to combine with the travelling first layer formed on the said Fourdrinier wire. This inverform layer making unit cooperates with the combined paper layer to lead the so formed paper layer onto the end of the looped conveying felt successively. Thus, the inverform, second layer-making unit serves as means for conveying the doubly combined paper layer onto the looped felt as well as for making the second paper layer. In succession to the inverform second layer-making unit, the paper making machine has the provision along the top running part of said conveying felt for plural pairs of inverform making units for forming in turn and combining the third and successive paper layers, said inverform making units having each a dehydration mechanism

at its lower part which constitutes a means for forming texture of the paper.

DESCRIPTION OF DRAWING

The device will now be described with reference to the drawing.

The drawing shows in schematic form a combination-paper making machine according to this invention.

In the drawing, reference numeral 1 represents connectively for forming the first layer a Fourdrinier wire, which comprises an endlessly moving foraminous belt. A looped conveying felt (2) or bottom felt (2) is arranged is adjacent to said Fourdrinier wire (1); an inverform second-layer forming unit 3 is laid over and joins the end of the wire Fourdrinier 1 and the end of the looped conveying felt 2; means 4 are provided for forming the third and successive layers placed along the top reach or running part 2a of the conveying felt 2 adjacent to the inverform second layer-making unit 3; said means 4 which comprises several pairs of inverform making units and bottom conveying felts for forming the third and successive layers of paper in turn. Although the inverform layer making unit for the third and successive layers is shown in the drawing with only three inverform short wire units 4a, 4b, and 4c, the number of said units can be suitably increased or decreased. In addition to the inverform layer making part 4 of the machine for forming the third and successive layers of paper, a low nip pressure press part 20 is provided along the top reach or running part 2a of the conveying felt 2.

The Fourdrinier wire part 1 may be that of the usual Fourdrinier paper machine. A paper slurry is supplied over the wire 7 from the head box 6 to form the first paper layer.

Over the first paper layer which is travelling together with the Fourdrinier wire, the second paper layer is formed by the inverform, second paper layer-making unit 3. This inverform second layer-making unit 3 has a relatively short wire 9 running around several guide rolls in the direction of the arrow, and is provided with a suitable dehydration mechanism 30 at the bottom part thereof to constitute a texture-forming unit. A head box 10 is positioned adjacent to the inverform unit 3 for the second layer on the inlet side of the texture-forming part, and the paper pulp slurry is supplied over the first layer in the space between the running parts of the upper and lower wires 9 and 7, while water is removed upward from the paper pulp slurry (i.e. in the direction opposite to the usual downward dehydration) with formation of a double layer of combined paper between both of the top and bottom wires. Since the inverform, second layer-making unit 3 is laid over the one end of the foraminous wire part 1 and the one end of the conveying felt 2, the doubly combined paper layer is taken out of the wire 7 at at the other end through the inverform, a second layer-making unit 3 to be transferred onto the top running part 2a of the conveying felt 2. Thus, the second layer-making unit 3 serves as means for transferring the second layer to the felt 2 as well as means for forming it. Therefore, it is unnecessary to provide an open draw system in order to transfer the paper layer from the wire 7 to the felt 2, resulting in an increased operation efficiency because of no accompanying paper breakage ascribed to the open draw.

The inverform making units 4a, 4b and 4c for the third and successive layers are arranged in turn along the top running part 2a of the looped conveying felt 2 are constructed in a manner similar to the inverform, second layer-making unit 3. Thus, over the combined paper layer doubly formed through the inverform layer making unit 3 and transferred onto the top running part 2a of the conveying felt 2, the paper pulp stuff supplied from the head box 11 for the third layer is laid in the space between the bottom running part of a looped short wire of the inverform, third layer-making unit 4a and the top running part 2a of the long continuing, looped conveying felt 2, and then undergoes upward dehydration by means of dehydration mechanism 31 to form triple layer combined paper. In the same manner, the fourth and fifth paper layers are combined in succession through the inverform layer making units 4b and 4c and so on. Thus, the multi-layer paper having a desired number of layers is sent to the low nip pressure press part 5 by means of the conveying felt 2 and further dehydrated with mechanisms 32 and 33.

The low nip pressure press part 5 is provided with several pairs of press roll means 20 which form a pressure nip in a pair between them, and has an endless felt 21 travelling around a plurality of guide rolls. Said felt cooperates with the bottom, continuing conveying felt 2 with holding the multi-layer paper of completed combination between both the felts. The paper layer is pressed while travelling through nips of the press roll means 20 transferring water onto the felt. This low nip pressure press part is provided to get easy dehydration under high nip pressure in the next step.

As described hereinbefore, the present device can achieve easy adjusting of weighing, making velocity, and texture formation of the first layer, and thereby form combined paper capable of meeting the various requirements, because the first layer having serious influence on the quality of the combined paper is formed through a Fourdrinier type wire part. The second layer dehydrated upwardly through an inverform layer making unit laid over both the rer end of the wire part and the fore end of the looped conveying felt, is formed in cooperation with the Fourdrinier wire, and moved from the wire to the conveying felt, requiring no use an open draw system for transferring the paper layer from the Fourdrinier wire onto the conveying felt, with improvement in operation efficiency due to reduced paper breakage. Since the third and successive layers

are formed through upward dehydration by means of plural pairs of inverform making units placed along the top reach or running part of a looped conveying felt quite different from the Fourdrinier type wire, multi-layer paper can be produced with a considerably shortened length of Fourdrinier wire. Hence difficulties such as increased weight of wire when making multi-layer paper with a Fourdrinier wire alone can be avoided in this device.

What is claimed is:

1. Combination paper making machine which comprises a Fourdrinier wire comprising an endless foraminous belt defining a paper forming path, headbox means for supplying a first paper forming slurry to one end of said Fourdrinier wire, a looped conveying felt having one end adjacent the Fourdrinier wire and the other end away from said Fourdrinier wire, at least one inverform paper layer making endless wire means extending over and between said Fourdrinier wire and said looped conveying felt, and second headbox means adjacent to said Fourdrinier wire and before said inverform paper layer making means for supplying a second paper forming slurry on top of said first paper forming slurry on said Fourdrinier wire.

2. Combination paper making machine according to claim 1, wherein at least one additional inverform paper layer making endless wire means is positioned over and upon said looped conveying felt and adjacent the inverform paper layer making means extending over and between the Fourdrinier wire and the looped conveying felt.

3. Combination paper making machine according to claim 2, wherein said additional inverform means includes means for dehydration of said paper, whereby a multilayer paper of the desired texture is produced.

4. Combination paper making machine according to claim 2, including a low nip pressure press adjacent the end of said looped conveying felt away from said Fourdrinier wire.

5. Combination paper making machine according to claim 1, wherein said inverform means includes means for dehydration of said paper, whereby a multilayer paper of the desired texture is produced.

6. Combination paper making machine according to claim 1, including a low nip pressure press adjacent the end of said looped conveying felt away from said Fourdrinier wire.

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