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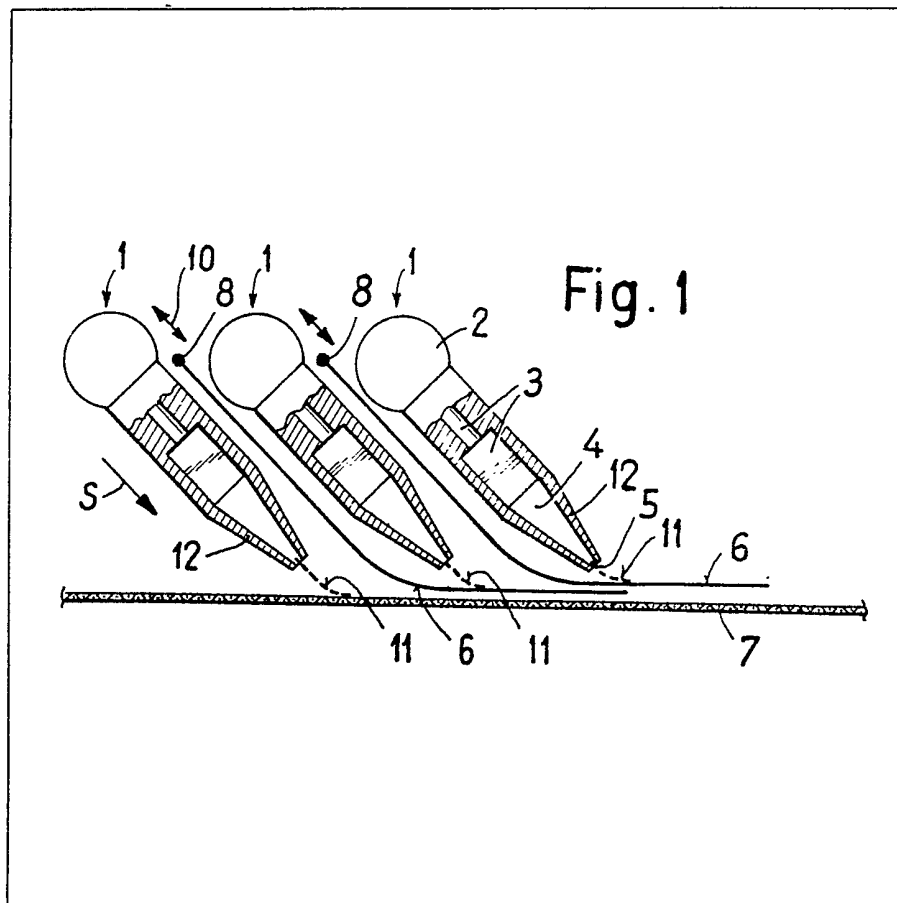
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(54) Headbox means for paper machines

(57) A headbox means for a paper machine in which a multi-ply paper web is formed on a moving, water-permeable support such as a wire, the headbox means comprising a number

of headboxes (1) which form a group and can be disposed either parallel to one another (as shown) or fanwise (Fig. 2, not shown). A flexible foil (6) is disposed between each headboxes (1) and the next and extends beyond the outlet throats (5) of the adjacent headboxes (1).



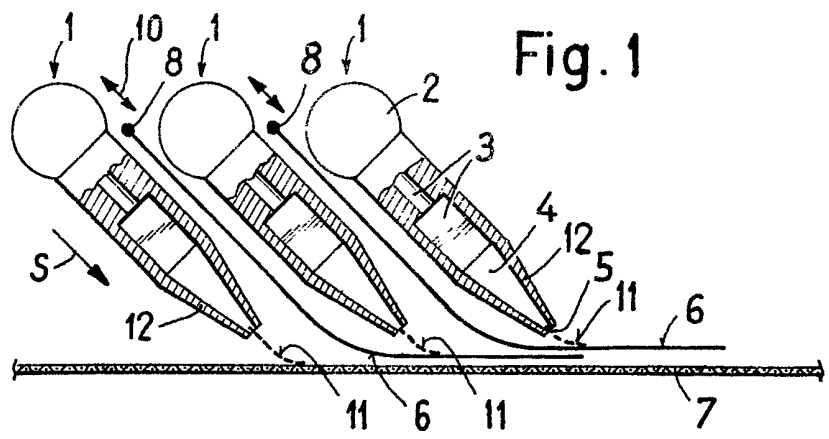


Fig. 1

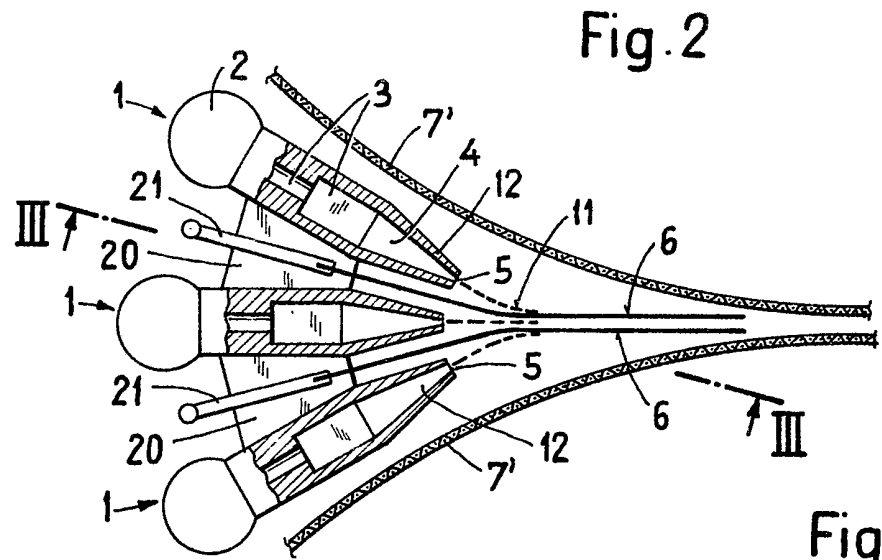


Fig. 2

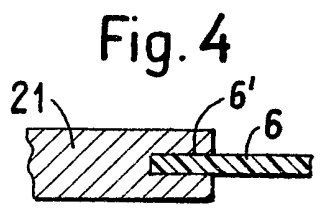


Fig. 4

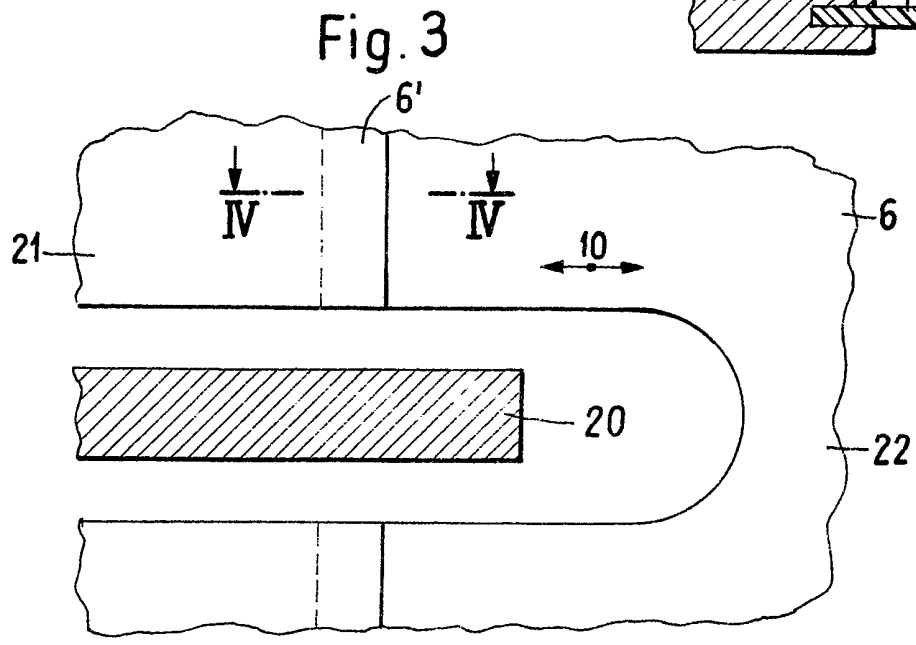


Fig. 3

SPECIFICATION

Headbox means for paper machines

This invention relates to headbox means for paper machines in which a multi-ply paper web is formed on a moving, water-permeable support.

Headboxes for forming a multi-ply paper web are described in, for example, German PS 899 896 and US-PS 3 923 593 and 4 141 788. In all these cases the headbox has a common nozzle duct which leads to the outlet throat and is divided by internal structures so as to convey various kinds of stock. In the headbox described in German PS 899 896 the structure is a rigid but adjustable tongue-like part, whereas in the headbox described in US-PS 3 923 593 the structures are flexible blades. In the headbox described in US-PS 4 141 788, flexible foils actually extend beyond the outlet throat, thus separating the individual jets of stock until they are deposited on the wire.

The advantage of this separation, however, in the device described in US-PS 4 141 788, is offset by the fact that the flexible blades or foils in the nozzle duct take up a position such that the stock is at the same pressure on both sides of the flexible part. As a result, the flow speeds are also equal in the portions of the nozzle duct on both sides of the blades or foils. This restricts the possibilities in the production of various kinds of paper.

An object of the invention is to construct headbox means which is compact and can produce multi-ply paper but is free from restrictions regarding the supply of stock and the formation of individual layers.

According to the present invention, headbox means for a paper machine for forming a multi-ply paper web on a moving, water-permeable support comprises at least two independent headboxes forming a group and each having a feed pipe, flow guide means, a nozzle duct and an outlet throat at the end of the nozzle duct, a flexible foil being disposed between each pair of headboxes and extending beyond the outlet throats thereof.

As a result of constructing the headbox means from a number of independent headboxes each having a separate feed line, flow guide means, nozzle duct and outlet throat, the amounts and speeds of flow can be freely adjusted within individual layers. This may be an advantage where, for example, the stock fibres have to be given a particular alignment in each layer. The flexible foils can separate the layers until they are deposited on a wire or between two wires, which is particularly important when it is desired to keep separate streams of stock moving at different speeds. Each foil can be movable in the general direction of stock flow in the headboxes adjacent to the foil, thus enabling the effective length of the foil to be adjusted. Alternatively the foil can be given an oscillatory movement, thus obtaining various novel effects.

At least one of the headboxes may have at least one adjustable lip for varying the size of the outlet

throat. This results in additional freedom by making it possible to vary the amount of stock in a flow by varying either the speed or the flow cross-section.

In one possible construction, the headboxes are substantially parallel to and offset from one another. This arrangement is suitable for Fourdrinier type machines or twin wire machines having a single Fourdrinier part.

Alternatively the headboxes may be disposed fan-wise. This arrangement is suitable for twin wire machines where the jets of stock from the headboxes are directed into an inlet wedge or nip between the two wires.

Preferably, each foil at its upstream end is secured to a rigid plate-shaped part. The part, which can preferably be made of metal, ensures that the foil is firmly secured and adjustable and if damaged can be replaced much more easily than in headboxes in which the foils are internal.

In a preferred construction, the headboxes are interconnected by spaced connectors and each foil and/or each plate-shaped part has a notch for each connector. The result is a particularly compact construction of the headbox means.

The invention may be carried into practice in various ways but two headbox means embodying the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic section through the first headbox means;

Figure 2 is a diagrammatic section through the second headbox means;

Figure 3 is a partial section through the headbox means shown in Figure 2, substantially along line III—III in Figure 2; and

Figure 4 is a partial section along line IV—IV in Figure 3.

Figure 1 shows a headbox assembly comprising three headboxes 1 each having an independent feed line 2, a flow guide device 3, a nozzle duct 4 and an outlet throat 5. A flexible foil is disposed between each pair of headboxes 1 and extends beyond the outlet throats of the adjacent headboxes 1 and along a wire 7 on which the headbox assembly forms a three-ply paper web. The foils 6 are secured to rod-like anchorages 8 extending across the wire 7 and the anchorages and the foils attached to them reciprocate in the direction of arrows 10. These movements occur substantially in the same direction as the stock flows in the headboxes 1 as indicated by an arrow S.

During operation, jets 11 of stock flow out of the throats 5 of the nozzle ducts 4 and are separated by foils 6. The lengths of the foils can be variously chosen or adjusted depending on the requirements of paper manufacture. To simplify the drawing, the foils 6 have of course been shown rather further apart in Figure 1 than is the case in practice.

Figure 2 shows a headbox assembly in which parts corresponding to those shown in Figure 1 have the same reference numerals. In Figure 2 the

individual headboxes 1 are disposed fanwise, the jets 11 of stock converging towards one another. The assembly shown in Figure 2 is used to form a paper web in a twin-wire machine having two wires 7'. The individual headboxes are connected together at spaced points by connectors 20. As shown in Figure 4, the upstream ends of the foils 6 are secured in slots 6' in platelike parts 21, which can be rigid and made of metal. As shown in Figure 3, the foils 6 and the parts 21 are formed with notches 22 in way of the connectors 20 so as to be adjustable in the direction of the arrow 10.

The nozzle ducts 4 of the headboxes 1 are bounded by lips 12 which can be adjusted in known manner to vary the size of the outlet throat 5. Adjustment can be made, for example, by pivoting the lips or moving them in their own planes generally towards or away from the guide device 3. Optionally, each headbox can have only one adjustable lip 12 whereas the other can be fixed. If required one or all of the headboxes can be made non-adjustable.

As already mentioned, the headboxes 1 shown in Figure 1 extend at an angle to the wire, parallel to and offset from one another, and are adapted to form a paper web on a substantially straight wire. The wire can be a Fourdrinier wire or a Fourdrinier part of a twin-wire machine.

The foils 6 can be made of a suitable flexible material such as plastics or a metal.

The surfaces of the foils 6 can be smooth or rough; it is possible for the various foil surfaces engaged by the stock flows to be of different surface finishes from one another.

35 CLAIMS

1. Headbox means for a paper machine for

40 forming a multi-ply paper web on a moving, water-permeable support, the means comprising at least two independent headboxes forming a group and each having a feed pipe, flow guide means, a nozzle duct and an outlet throat at the end of the nozzle duct, a flexible foil being disposed between each pair of headboxes and extending beyond the outlet throats thereof.

45 2. Headbox means as claimed in Claim 1 in which each foil is movable in the general direction of stock flow in the headboxes adjacent to the foil.

50 3. Headbox means as claimed in Claim 1 or Claim 2 in which at least one of the headboxes has at least one adjustable lip for varying the size of the outlet throat.

55 4. Headbox means as claimed in Claim 1 or Claim 2 or Claim 3 in which the headboxes are substantially parallel to and offset from one another.

5. Headbox means as claimed in Claim 1 or Claim 2 or Claim 3 in which the headboxes are disposed fanwise.

60 6. Headbox means as claimed in any of the preceding claims in which each foil at its upstream end is secured in a rigid, plate-shaped part.

65 7. Headbox means as claimed in Claim 6 in which the headboxes are interconnected by spaced connectors and each foil has a notch for each connector.

8. Headbox means as claimed in Claim 6 or Claim 7 in which the headboxes are interconnected by spaced connectors and each plate-shaped part has a notch for each connector.

70 9. Headbox means substantially as described herein with reference to Figure 1 or to Figures 2, 3 and 4 of the accompanying drawings.